KTH Teknikvetenskap

Protokoll

Närvarande: Leif Kari   Anders Forsgren
            Jakob Kuttenkeuler   Anna-Karin Burström
            Mats Wallin   Anna Delin
            Karin Blom
            Jens Fransson
            Henrik Shah Gholian

1. Mötets öppnande

Ordförande Leif Kari förklarar mötet öppnat. Anna Delin är tilltänkt som ny vice skolchef och är därför närvarande vid skolrådet.

2. Anmälda förhinder

Anna Finne Wistrand och Katja Grillner har anmält frånvaro.

3. Närvaro- och yttranderätt

Anders Forsgren, Anna-Karin Burström och Anna Delin ges närvaro- och yttranderätt under hela mötet.

4. Val av justeringsperson

Mats Wallin utses till justeringsperson.

5. Fastställande av föredragningslista [bilaga 1]

Ett ärende har inkommit efter att handlingarna skickades ut. Rådet får besluta om ärendet kan hanteras vid dagens möte. I övrigt fastställs föredragningslistan utan ändringar.

6. Föregående protokoll (rådsmöte 9 oktober 2017)

Protokollet från rådsmötet 9 oktober 2017 läggs till handlingarna.

7. **Anmälningar [bilaga 2]**

   Leif Kari redovisar aktuella disputationer och licentiatseminarier enligt bilaga 2.

8. **Rekryteringsärenden, fakultetsförnyelse och jämställdhet**

   a. Rapport av pågående ärenden [bilaga 3]

   Anders Forsgren hanterar pågående ärenden tills de är avslutade. Tillträdande vice skolchef är delaktig i hanteringen och hanterar nya ärenden.

   b. Förlängning av affilierad fakultet i fordonsdynamik [bilaga 4]

   Anders Forsgren föredrar ärendet. Ärendet har dragits i skolrådet tidigare

   och återremitterats till institutionen p.g.a. finansieringsformen. Institutionen presenterar nu ett nytt förslag med ny finansiering.

   Strategiska rådet beslutar

   att tillstyrka ärendet.

   c. Affilierad fakultet i lättkonstruktioner [bilaga 5]

   Anders Forsgren föredrar ärendet.

   Strategiska rådet beslutar

   att tillstyrka ärendet.

   d. Gästprofessor i teoretisk fysik med inriktning mot partikelfysik [bilaga 6]

   Anders Forsgren föredrar ärendet.

   Strategiska rådet beslutar

   att tillstyrka ärendet.

   e. Gästprofessor i matematik [bilaga 7]

   Anders Forsgren föredrar ärendet. Ärendet är inte utskickat i förväg men rådet beslutar att behandla ärendet vid sittande bord.

Strategiska rådet beslutar

att tillstyrka ärendet.

9. Diskussion kring ledarskap, jämställdhet och värdegrund – Alice Marshall

Alice Marshall, ny jämställdhetshandläggare på KTH berättar om det kommande arbetet med jämställdhetsintegrering.

10. Övriga frågor

Inga övriga frågor.

11. Mötets avslutande

Leif Kari förklarar mötet avslutat.

Vid protokollet

_____

Anna-Karin Burström

Justeras

_____   _____

Leif Kari   Mats Wallin

Föredragningslista

*= bilaga finns

1. Mötets öppnande

2. Anmälda förhinder

3. Närvaro- och yttranderätt

4. Val av justeringsperson

5. Fastställande av föredragningslista

6. Föregående protokoll (rådsmöte 10 oktober 2017)

7. Anmälningar*

8. Rekryteringsärenden, fakultetsförnyelse och jämställdhet

   a. Rapport av pågående ärenden *

   b. Förlängning av affilierad fakultet i fordonsdynamik*

   c. Affilierad fakultet i lättkonstruktioner*

   d. Gästprofessor i teoretisk fysik med inriktning mot partikelfysik*

9. Diskussion kring ledarskap, jämställdhet och värdegrund

10. Övriga frågor

11. Mötets avslutande

Kungliga Tekniska högskolan   Skolan för Teknikvetenskap

KTH, SE-100 44 Stockholm. Tel: 08-790 7602
E-post: akbu@kth.se www.kth.se/sci

1 (1)

Licentiatseminarium
10 oktober - 27 november

27
oktober
[Thermal components in the early X-ray afterglows of Gamma-ray bursts](#)
Fysik, Atomär, subatomär och astrofysik
Plats: Sal FD5, AlbaNova universitetscentrum, Roslagstullsbacken 21, Stockholm
Licentiand: Vlasta Valan, Fysik

23
november
[Lifetime Measurements of Excited States in the Semi-Magic Nucleus 94Ru](#)
Fysik - Atomär, subatomär och astrofysik
Plats: sal FB55, AlbaNova universitetscentrum, Roslagstullsbacken 21, Stockholm
Licentiand: Aysegül Ertoprak, Fysik

Disputation
10 oktober - 27 november

11
oktober
[Bayesian inference in probabilistic graphical models](#)
Tillämpad matemaitk och beräkningsmatematik - Matematisk statistik
Plats: sal F3, Lindstedtsvägen 26, KTH, Stockholm
Respondent: Felix Leopoldo Rios, Matematik

13
oktober
[Numerical methods for the calibration problem in finance and mean field game equations](#)
Tillämpad matematik och beräkningsmatematik - Numerisk analys
Plats: sal F3, Lindstedtsvägen 26, KTH, Stockholm
Respondent: Love Lindholm, Matematik

18
oktober
[Measures to Enhance the Dynamic Performance of Railway Catenaries](#)
Farkostteknik
Plats: sal F3, Lindstedtsvägen 26, KTH, Stockholm
Respondent: Zhendong Liu, Farkost och flyg

3
november
[On particle-based online smoothing and parameter inference in general state-space models](#)
Tillämpad matematik och beräkningsmatematik, Matematisk statistik
Plats: sal F3, Lindstedtsvägen 26, KTH, Stockholm
Respondent: Johan Westerborn, Matematik

3
november
[Certain results on the Möbius disjointness conjecture](#)
Matematik
Plats: sal F3, Lindstedtsvägen 26, KTH, Stockholm
Respondent: Davit Karagulyan, Matematik

10
november
[Investigation of corrosion properties of metals for degradable implant applications](#)
Fysik, material och nanofysik
Plats: sal C (Sven-Olof Öhrvik), Electrum, Kistagången 16, Kista
Respondent: Karin Beussant Törne, Tillämpad fysik

14
november
[Advanced all-fiber optofluidic devices](#)
Fysik, Optik och fotonik
Plats: sal FB42, AlbaNova universitetscentrum, Roslagstullsbacken 21, Stockholm
Respondent: Sebastian Etcheverry Cabrera, Tillämpad fysik

24
november
[Electro-optical properties of one-dimensional organic crystals](#)
Fysik - Optik och fotonik
Plats: sal C (Sven-Olof Öhrvik) Electrum, Kistagången 16, Kista
Respondent: Gleb Lobov, Tillämpad fysik

24
november
[Experimental study on turbulent boundary-layer flows with wall transpiration](#)
Teknisk mekanik
Plats: Kollegiesalen, Brinellvägen 8, KTH, Stockholm
Respondent: Marco Ferro, Mekanik

24
november

Polymer components for photonic integrated circuits
Fysik - Optik och fotonik
Plats: sal C (Sven-Olof Öhrvik) Electrum, Kistagången 16, Kista
Respondent: Aleksandrs Marinins, Tillämpad fysik

24
november
Pairing correlation in atomic nuclei under extreme conditions
Fysik - Atomär, subatomär och astrofysik
Plats: sal FA32, AlbaNova Universitetscentrum, Roslagstullsbacken 21 , Stockholm
Respondent: Sara Asiyeh Changizi, Fysik

Biträdande lektor	flygteknik	S-2016-1309	Hos sakkunniga.
Lektor	flygteknik	VL-2016-0181	Skolchefen har beslutat att avbryta anställningsförfarandet
Lektor	matematik (2st)	VL-2017-0009	Intervjuer med sex kandidater 8 december.
Lektor	Matematisk statistik		Förslag på sakkunniga ska tas i AU-beredning 21 nov.

Docentärenden	
Pågående ärenden	
Danijela Damjanovic	Docentpresentation 20171121
Mireia Altimira	Skolans brev och förslag på sakkunnig färdigt att skicka in
Ilaria Testa	Överlämnat till UF 20171024
Walter Villanueva	Överlämnat till UF 20171031
Ivan Stenius	Skolans brev och förslag på sakkunnig ska tas fram

Sökande, befordringar	Ärende	status	
Ivan Stenius	bitr. lektor till lektor	Hos sakkunniga	
Elena Guiterrez Farewik	lektor till professor	BN mötesdag 2017-12-04 (prel)	
Petter Brändén	lektor till professor	beslutet är klart för sign.	
Fredrik Lundell	lektor till professor	beslutet expedierat	
Malin Åkermo	lektor till professor	BN har rekommenderat avslag.	
Pär Olsson	lektor till professor	beslutet expedierat	

Affilieringar och adjungeringar

Sökande	ärende	status
Jean-Marie Le Corre(förlängning)	Affilierad fakultet	Chefsjuristen Christina Engström i dialog med arbetsgivarens jurister gällande avtal.
Per Hallander	Affilierad fakultet	beslut expedierat
Simon Middleburgh	Affilierad fakultet	Chefsjuristen Christina Engström i dialog med arbetsgivarens jurister gällande avtal.
Gunnar Jacobsen(förlängning)	Adjungerad professor	beslut expedierat

KTH Farkost & Flyg

Stockholm, 2017-08-31

Skolchef Professor Leif Kari
Skolan för Teknikvetenskap
KTH

KTH Industrial Faculty – Anhållan om förlängning av affilierad forskare i Fordonsdynamik

Som en del av KTHs satsning "Industrial Faculty" har Mats Jonasson, Volvo Cars, född 690208-5510, varit affilierad forskare vid KTH Farkost & Flyg inom ämnet Fordonsdynamik med särskild inriktning mot innovativa fordonskoncept i 3 + 3 år.

KTH och Volvo Cars är mycket nöjda med affilieringen och anhåller härmed om att förlänga den med ytterligare 3 år. Vi föreslår omfattningen 20 % under perioden 2017-08-31 – 2020-08-31.

I Bilaga 1 bifogas avdelningens redogörelse av vad Mats Jonasson har åstadkommit under sin tidigare affilieringstid. I Bilaga 2 bifogas Mats Jonassons avsiktsförklaring.

Vad beträffar finansiering så föreslås att Mats Jonasson fortsätter att vara 100 % anställd vid Volvo Car Group, men att 20 % av den tiden ägnas på KTH som affilierad forskare. I överenskommelsen med Volvo Cars (se Bilaga 3) finansieras hela lönekostnaden av Volvo och KTH tillhandahåller arbetsplats på KTH, resor, logi och relaterade kostnader (parkeringsavgift i samband med resa), dock ej traktamente. KTHs kostnader föreslås finansieras av externa medel via projekt SDB26171.

Docent Mats Jonasson är en mycket skicklig forskare, han är innovativ, har ett flertal patent, bidrar till undervisningen och har en stor industriell erfarenhet. I Bilaga 4 bifogas hans Curriculum Vitae samt ansökan där han redogör för vilka områden han avser att driva under denna 3-års period.

Genom detta samarbete bidrar Mats Jonasson till forskargruppen KTH Fordonsdynamik när det gäller både forskning, forskarhandledning samt undervisning. Dessutom är vår gemensamma plan att verka för en adjungerad professur inom området.

Stockholm datum som ovan

Sebastian Stichel
Prefekt

Annika Stensson Trigell
Professor Fordonsdynamik

Lars Drugge
Chef SDB

Professor Annika Stensson Trigell
Associate Professor Lars Drugge
KTH fordonsdynamik

Affilierad forskare inom fordonsdynamik med inriktningen innovativa fordonskoncept vid KTH fordonsdynamik, institutionen för farkostteknik, KTH

Vi vid KTH Fordonsdynamik anser att det är mycket angeläget att förlänga Mats Jonassons affiliering inom fordonsdynamik med inriktningen innovativa fordonskoncept i ytterligare en treårsperiod (2017-08-31 – 2020-08-31).

Mats kompetens har tillfört forskargruppen en profil inom framtida fordonskoncept, elfordon och fordonsdynamisk reglerteknik. Detta är områden som bedöms få extra stort genomslag vid elektrifieringen som är en påbörjad trend inom bilindustrin.

Mats arbetar på Volvo Cars som teknisk expert med fordondynamisk reglering av bilars aktuatorer, såsom bromsar, styrsystem, dämpare, elektrisk framdrivning och tvär- och längskopplingar. Han utvecklar också algoritmer för estimering av bilars fordonsdynamiska tillstånd, såsom längshastighet, avdriftsvinklar etc. Det skall också nämnas att han arbetar inom området Autonom körning, som syftar till att utveckla självkörande bilar. Han har ett väl utvecklat internationellt nätverk och är delaktig i flertalet forskningsprojekt inom de beskrivna områdena.

Under den tidigare affilieringsperioden har Mats publicerat 6 artiklar i vetenskapliga tidskrifter och 8 referentgranskade internationella konferensbidrag. Mats har referentgranskat 4 artiklar för olika tidskrifter. Mats är också medlem i Editorial board för tidskriften International Vehicle Systems Modelling and Testing. Mats har fått också under perioden lämnat in 5 patentansökningar inom sitt ämnesområde.

När det gäller forskarhandledning så har Mats varit industrihandledare till doktoranderna Johannes Edrén och Daniel Wanner. Mats har också assisterat doktoranderna Peikun Sun och Mohammad Mehdi Davari. Här har Mats varit värdefull med att formulera industrins problem som avses att lösas med vetenskapliga metoder. Framför allt har han bidragit kring kunskaper inom överaktuerade system, avancerade fordonsmodeller och fälttester samt tolkning av resultat till implementeringsbara lösningar. Mats har dessutom under sin tidigare affilieringsperiod blivit docent i fordonsdynamik.

Mats har bidragit till grundutbildningen på KTH på flera sätt. Under 2014 har han utvecklat laborationer i kursen Vehicle Control (SD2231) gällande bland annat estimering av fordonsdynamiska tillstånd. Han har undervisat i dessa moment under läsåren 2014-15, 2015-16, 2016-17. Vidare har han tagit fram undervisningsmaterial och föreläser om verifiering av fordonsdynamiska samband inom kursen Fordonsdynamik (SD2225) sedan många år. Han har dessutom bidragit i

Perspektivkursen (SD1001) för Farkostteknikstudenter i årskurs 1 där han har handlett projekt som innefattar både experiment, teoribilding, analys, rapportskrivning och muntlig framställning under läsåren 2015-16, 2015-16 samt 2016-17. Han har även bidragit i undervisning inom drivlina i kurserna Fordonssystemteknik (SD2221) samt ett flertal Kandidatarbeten i Fordonsteknik (SA105X). Han har också initierat och handlett ett flertal examensarbeten på Mastersnivå.

Mats har dessutom aktivt bidragit till ett flertal möten mellan medarbetare på KTH Fordonsdynamik och olika verksamheter inom Volvo Cars. Han har dessutom deltagit i ett forskningprojekt med titeln "Safe and energy efficient vehicle designs" som syftar till att förstå hur bilar skall konstrueras för att erbjuda energieffektiv reglering av överaktuerade bilar.

Det är därför ytterst viktigt för oss att behålla det goda samarbetet som vi har upparbetat under många år med Mats Jonasson, genom hans affilierade fakultet.

Med vänliga hälsningar

Professor Annika Stensson Trigell

Associate Professor Lars Drugge

Beträffande affilierad forskare i fordonsdynamik vid
Institutionen för Farkost & Flyg, KTH

Volvo Cars välkomnar och stöder initiativet från KTH Fordonsdynamik att låta vår medarbetare Mats
Jonasson fortsätta sin roll som inom fordonsdynamik som affilierad forskare med särskild inriktning
mot innovativa fordonskoncept vid KTH Fordonsdynamik, Institutionen för Farkost & Flyg, Skolan för
Teknikvetenskap vid KTH under tiden 2017-08-31 till 2020-08-31.

Volvo Cars förutsätter att adjungeringen kommer att vara inom teknikområden som är relevanta för
Volvo Cars. Därför föreslås att Mats Jonasson fortsätter vara 100 % anställd av Volvo Cars, men
ägnar 20 % av den tiden på KTH. Målsättningen är att verka för en adjungerad professur inom
området.

KTH förbinder sig att finansiera resor, logi, arbetsplats på KTH samt relaterade kostnader. Dock ej
traktamente.

Volvo Cars har samarbetat med KTH Fordonsdynamik inom olika doktorandprojekt och undervisning
under de senaste 20 åren. Det är Volvo Cars intention att fortsätta det samarbetet.

Med vänliga hälsningar

Göteborg 2017-08-16

Tomas Andersson
Senior Director, Active Safety (dept. 94400), Volvo Cars

2017-08-16

Skolchef Professor Leif Kari
Skolan för Teknikvetenskap
KTH

Angående rollen som affilierad forskare i Fordonsdynamik

Mitt namn är Mats Jonasson och jag är anställd på Volvo Cars sedan 1998. Nu är jag teknisk expert i fordonsdynamisk reglerteknik. På Volvo Cars tillhör jag en gruppering som ansvarar för konstruktion av fordonsdynamiska funktioner i framtida Volvobilar. Under 2009 disputerade jag inom ämnesområdet fordonsteknik på KTH Fordonsdynamik och 2016 blev jag Docent i fordonsdynamik. Jag har också under perioden 2014-03-01 till 2017-02-28 varit affilierad forskare på KTH Fordonsdynamik.

Jag är intresserad av att fortsätta som affilierad forskare och avsätta 20% av min tid under tre år från och med den 31 augusti 2017 inom Fordonsdynamik med särskild inriktning mot innovativa fordonskoncept. Jag kommer att då att fortsätta att engagera mig i KTH industrial faculty inom den strategiska satsningen TRENoP med intention att bidra med kompetens och forskningsresultat för grönare, smartare och säkrare fordonskoncept. Målsättningen är att verka för en adjungerad professur inom området.

Jag tror att min industriella erfarenhet tillsammans med min akademiska färdighet kommer att vara en fördel i min roll som affilierad forskare, då jag kommer att bedriva forskning, forskarhandledning och undervisning.

Vänliga hälsningar

Mats Jonasson

Application for Affiliated Researcher Mats Jonasson

Within the field of *Vehicle Dynamics* with focus on innovative vehicle concepts.

1. Basic information	
1.1.	Name. Mats Jonasson
1.2.	Date of birth. 690208
1.3.	Male/female. Male
1.4.	Home address and telephone number. Furulundsv. 6, 43340 PARTILLE, 031-444445.
1.5.	Workplace address, telephone number and e-mail address. Volvo Cars, Vehicle Dynamics and Motion Control, dept. 96640, PVV1:1, 40531 Gothenburg, Sweden, 031-592918, mats.jonasson@volvocars.com. KTH, School of Engineering Sciences, Department of Aeronautical and Vehicle Engineering, Research group, Teknikringen 8, 10044 Stockholm, matsjona@kth.se.
1.6.	Current employment with title, subject area and placement. Specify the date of employment. Technical Expert in vehicle dynamics and motion control at Volvo Cars since Mars 2016. Affiliated researcher in vehicle dynamics with focus on innovative vehicle concepts at KTH since Mars 2011.
1.7.	Previous employment (include leave of absence). 1989-1990 Waves AB, design engineer (electrical) 1990-1993 Tele 2, design engineer (electrical) 1997-1998 Semcon, design engineer (powertrain) 1998-2004 Volvo Cars, Electrical Department, design engineer (electrical) 2004-2009 Volvo Cars, Active Safety and Vehicle Dynamics, Industrial PhD student (chassis)
1.8.	Other. Not applicable

2. Education qualification and evaluations	
2.1.	Higher education qualification. Specify year of graduation, type of qualification (for example, Licentiate of Technology, Doctor of Philosophy). Attach grades. 1997 MSc.E.E Chalmers, Gothenburg, Sweden 2007 Tekn. Lic KTH, Stockholm, Sweden 2009 Tekn. Dr KTH, Stockholm, Sweden 2016 Docent KTH, Stockholm, Sweden See Appendix 1 for grades.
2.2.	Qualification required for appointment as a docent. State the year of examination. Attach certificates. Forskarhandledning 3p (LH207V, 2011-06-07) Lärande och undervisning 7.5p (LH201V, 2013-05-16) See Appendix 2 for transcript of records.
2.3.	Evaluation of own science (research council etc.) Not applicable.
2.4.	Previous skilled evidence can be attached to the application (for the last five years). Not applicable.
2.5.	Other. Not applicable.

3. Scientific qualifications

3.1. Describe your research profile (maximum two pages).

Along with the development towards safe and environmentally friendly vehicles, there has been an increasing interest in improved functions of vehicle dynamics. Since conventional chassis are built on a combustion engine base, improvement of vehicle dynamics implies an increased complexity and expensive solutions. Currently, the field maintains significant interest due to the development of hybrid electric vehicles. Here, the electric vehicle becomes an attractive solution due to the opportunity to divide the electric driveline into several electrical machines and allow them to quickly generate torque and revolve independently from each other. If the electrical driveline is distributed closer to the wheels there is a potential to further reduce energy consumption due to less friction losses. Furthermore, when the wheels are allowed to be controlled individually, the trade-off between comfort, safety and energy consumption can more easily be tackled.

One example of a long-term chassis concept, with electrical machines mounted inside the wheel, is the Autonomous Corner Module (ACM). This concept was invented at Volvo Cars in 1998 (see Figure 1a) and further developed by Magna Steyr in collaboration with KTH and Volvo Cars (see Figure 1b). The name "autonomous" indicates that wheel forces and kinematics are individually controlled supporting a common task. This solution also possesses the attribute of modularity, meaning that the one module can be re-used at all four corners and for different vehicle platforms. Figure 1c illustrates the tyre force constrains which are associated to a hybrid vehicle with ACMs.
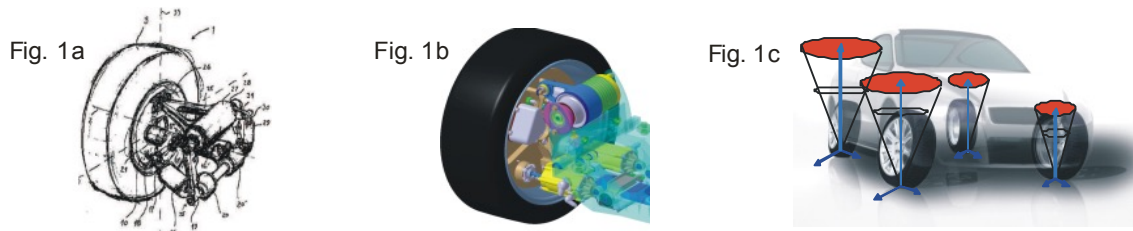

Fig. 1. a) The ACM patent picture from 1998, b) The ACM concept further developed by Magna Steyr, KTH and Volvo Cars in 2007 [16] and c) Illustration of tyre force constraints.

One question that has gained particular attention in the research society is how such concepts should be optimally used. Historically, similar problem has been faced in the aircrafts industry to control the relatively large number of rudder compared with the states that are to be controlled (so called over-actuated systems). Using optimal control theory tyre forces can be allocated to satisfy the remuneration to low energy consumption, low tyre wear and exploitation of tyre-to-road adhesion potential.

With the background above in mind, Mats Jonasson worked as a PhD student in the research project "Autonomous corner modules for hybrid vehicles" at KTH from 2004 to 2009 to give response to the following research question:

How can individual wheel actuators improve vehicle dynamics and safety and how should the actuators then be used?

Mats Jonasson gave answers on possible uses of ACMs and capacity of new vehicle dynamics functions (2005). A control strategy was specifically developed to handle ACMs and similar over-actuated vehicle systems (2005). It was found that this control strategy together with the ACM equipped vehicle have an inherent robustness to handle faults events that threaten vehicle stability (2006). In case of actuator fault, the control of the corresponding may be lost. However, the developed mechatronic system admits the remaining wheels to counteract the effect of the non-functional wheel. Thereby, vehicle stability is ensured without any additional need of extra hardware and case-specific fault-handling strategies.

The ACM control strategy was further developed by Mats Jonasson to allocate vertical forces between the four wheels (2006). It was also found that ACM utilize the available friction between road and tyre better than conventional vehicles. One key finding was the unsymmetrical left-right longitudinal tyre force allocation that increases the margins towards the friction boundary. Owing to the rear-wheel steering ability of the ACMs, it was also found that the mixing between translation and rotational motion during cornering can be controlled to increase the grip.

In collaboration with Magna Steyr, the ACM was further developed together with KTH and Volvo Cars to

prepare for industrialization (2006-2009). Basis for a complete rolling prototype Autonomous corner vehicle was delivered.

An electromechanical wheel suspension to the ACM was developed by Mats Jonasson (2007). To evaluate the feasibility of electromechanical dampers in vehicles, a dimensioning method was also developed. By adapting the dimensioning method already during the development process of the vehicle, the compromise between comfort, handling and energy dissipation can be controlled.

A method to evaluate the potential of generating global vehicle forces was developed by Mats Jonasson (2009). This approach is specifically designed to handle all types of over-actuated vehicle systems. After this method was used, important differences were revealed in the ways in which differently equipped vehicle configurations could be actuated.

A quantification of the potential for emergency avoidance manoeuvres of differently actuated vehicles was studied by Mats Jonasson (2009). Friction brakes are most important in such critical manoeuvres. Nevertheless, wheel individual drive and steering on both axles do improve the potential to perform emergency avoidance manoeuvres safely. Such vehicles in real-life traffic would manage critical situations to a larger share with an increased entry speed, assuming a certain frequency distribution of vehicle speed.

The research activates after PhD have primarily covered the fields of over-actuated systems, fault-tolerant control and post-impact control.

Since over-actuated vehicle concepts are equipped with many actuators, those concepts are exposed to high risks of hazards and failure modes. Based on the work presented by Jonasson and Wallmark 2006 a joint research project, "Fault-tolerant over actuated HEVs", was formulated, involving both Jonasson at Volvo Cars, KTH Vehicle Dynamics (Annika Stensson Trigell) and KTH Electrical machines and power electronics (Oskar Wallmark). The project was approved by SHC - Swedish Hybrid Vehicle Centre in 2010 Within the PhD project, the hazards and failure modes have been be classified and analysed. Possible consequences on the dynamic behaviour of the vehicle caused by the identified faults have been analysed, and solutions on to how to compensate for the occurring faults has been developed. The solutions of recovery will be depending on which sensors and actuators that are available. The vehicle control strategy will also be depending on actual type of failure mode. Mats Jonasson, who is an co-supervisor to PhD student Daniel Wanner (lic tech 2013, PhD 2015) in this project, has contributed with control algorithms to compensate for the fault and has taking part of writing paper (2010-2014).

An optimization study was performed (2012) to investigate whether the vehicle control method "Control allocation" is optimal. Control allocation allows the distribution of actuator requests to be independently controlled from the control of the car body itself. This was done by formulating a cost function of tracking error along a reference path and applying an open-loop optimization with the tool "Optimica". The result was evaluated against the control requests from the control allocator.

Mats Jonasson has been an co-supervisor to the PhD student Derong Yang (PhD 2013) in the project "Post-impact stability control", which aims to autonomously control a car after an impact to avoid a second collision. One part of the project was done to understand the character of the vehicle's dynamics after first impact directly after contact. It was found that the optimal control strategy highly depends on the type of vehicle motion state that is generated through the collision. A control strategy using Hamiltonian optimization was developed and Mats has contributed to the problem formulation and has taking part of writing papers (2010-2014).

Jonasson has also been an co-supervisor to the PhD student Johannes Edrén (PhD 2014) in a PhD project "Generic vehicle motion modelling and control for enhanced driving dynamics and energy management". This project aims to understand how over-actuated vehicle concepts should be utilized in the context that sensors actuators not are ideal, i.e. they have constraints and uncertainties. The project has built a down scaled prototype vehicle with ACMs equipped with electrical servo-motors. The project has for example shown that active suspension can be used to influence lateral and longitudinal dynamics, e.g. reducing stopping distance. Mats has contributed with modelling expertise and has taking part in writing papers (2010-2014).

3.2.	Describe your planned research activities (maximum two pages).

Here, a description of three planned research directions is described:
1.
Driver enjoyment, which is the human's feeling of happiness and perception of driving as being a pleasure,

plays a viable role for customers when they are evaluating which car to buy. Driver enjoyment is also an important factor to further improve the interaction between the driver and the vehicle in order to increase safety and satisfy customer demands. Generally, the research findings in the literature about driver enjoyment are rare. One reason is that the field is multi-disciplinary and involves psychology, vehicle design, vehicle dynamics, ergonomics etc. Mats Jonasson has initiated a research project in this field together with KTH Vehicle Dynamics, LTU Engineering Psychology and Volvo Cars. Volvo Cars has approved an industrial PhD student on this topic and a research application has recently been submitted to "Stiftelsen för Strategisk Forskning" with the aim to investigate driver enjoyment and how the vehicle should be designed and controlled to get the desired enjoyable attribute.

2.

During Mats PhD studies, a control strategy for ACMs was developed and tested by using simulation by high-fidelity vehicle models. At that time (2004-2009) there was not such real world vehicle available. However, KTH Vehicle Dynamics have since 2014 together with other research groups at KTH, within ITRL - Integrated Transport Research Lab, developed and built a prototype vehicle ready for test. It is therefore strongly interesting to further test and develop control algorithms for that vehicle with focus on normal and energy efficient driving. We have got approved a SHC project "Säkra och energieffektiva fordonskonstruktioner" where Jonasson is working with control algorithms for both individual torque and steering. Implementation and pilot tests have been performed by Jonasson during spring 2015.

3.

A number of papers have shown how a vehicle should be controlled optimally along a predefined patch using steering and individual braking. One method is to employ numerical optimisation to get optimal sequences of front steering angles and wheel torques. These results can be interpreted as how an optimal driver should steer and how brake pressures should be best distributed among the wheels. However a real human driver is not perfect e.g. he/she has a significant latency and limitation in bandwidth and steering/braking effort. On top on that, steering/braking will not be optimal due to restriction of the human's preview control capabilities. Hence, the optimal result will not be achieved in practice as long a human being drive the vehicle. A hypothesis is that a skilled and prepared driver follows a path very well with front steering and brake-pedal induced braking only and that little additional improvement can be gained from e.g. individual wheel torque control (wheel torque control will however be necessary for lateral stability). On the contrary, a bad driver would then gain more benefit from control assistance through individual wheel torque control. As an example it is expected that the maximum lateral acceleration will vary dependent on driver limitations. The proposed research activity aims to find evidence and quantitative measures for the hypothesis described above. The work addresses questions of type "How to control vehicle when the driver has a variety of driver skill", "How much can be gained when the driver has a variety of driver skill".

3.3.	Describe your publications in a numbered list. If there are fewer than ten authors, all co-authors are specified in published order of names. Otherwise the first author, the applicant's name and the number of co-authors are stated. Describe the articles reviewed by experts/referees in international journals.

Papers published in international reputed periodicals which have been subject to referee´s assessment

1. M. Jonasson, S. Zetterström and A. S. Trigell, 'Autonomous corner modules as an enabler for new vehicle chassis solutions', FISITA Transactions 2006, paper F2006V054T, 2006.

2. M. Jonasson and O. Wallmark, 'Stability of an electric vehicle with permanent-magnet in-wheel motors during electrical faults', The World Electric Vehicle Association Journal, Vol. 1, pp. 100–107, 2007.

3. M. Jonasson and O. Wallmark, 'Control of electric vehicles with autonomous corner modules: implementation aspects and fault handling', International Journal of Vehicle Systems Modelling and Testing, Vol. 3, No. 3, pp. 213–228, 2008.

4. M. Jonasson and J. Andreasson, 'Exploiting autonomous corner modules to resolve force constraints in the tyre contact patch', International Journal of Vehicle System Dynamics, Vol. 46, No. 7, pp. 553–573, 2008.

5. M. Jonasson and F. Roos, 'Design and evaluation of an active electromechanical wheel suspension system', Journal of Mechatronics, Vol. 18, Issue 4, pp. 218–230, 2008.

6. J. Backmark, E. Karlsson, J. Fredriksson and M. Jonasson, 'Using future path information for

improving stability of an overactuated vehicle', International Journal of Vehicle Systems Modelling and Testing, Vol. 4, No. 3, pp. 218–231, 2009.

7. M. Jonasson, J. Andreasson, A. S. Trigell and B. Jacobson, 'Utilisation of actuators to improve vehicle stability at the limit: from hydraulic brakes towards electric propulsion', Journal of Dynamic Systems, Measurement and Control, Vol. 133, Issue 5, 27 July 2011.

8. M. Jonasson, J. Andreasson, B. Jacobson and A. S. Trigell, 'Global force potential of over-actuated electric vehicles', International Journal of Vehicle System Dynamics, Vol. 48, No. 9, pp. 983–998, 2010.

9. D. Yang, T. J. Gordon, B. Jacobson, M. Jonasson and M Lidberg, 'Optimized brake-based control of path lateral deviation for mitigation of secondary collisions', Proceedings of the Institution of Mechanical Engineers, Part D, Journal of Automobile Engineering, Vol. 225, Issue 12, December 2011.

10. D. Yang, T.J. Gordon, B. Jacobson and M. Jonasson, 'Quasi-linear optimal path controller applied to post-impact vehicle dynamics', IEEE Transactions on Intelligent Transportation Systems, Vol. 13, Issue 2, pp. 1586-1598, 2012.

11. J. Edrén, P. Sundström, M. Jonasson, B. Jacobson, J. Andreasson and A. S. Trigell. 'Road friction effect on the optimal vehicle control strategy in two critical manoeuvres', International Journal of Vehicle Safety, Vol. 7, No. 2, 2014.

12. D. Yang, T. J. Gordon, B. Jacobson and M. Jonasson, 'A nonlinear post-impact path controller based on optimized brake sequences', International Journal of Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Vol. 50, Sup. 1, pp. 131-149, 2012.

13. D. Yang, T. Gordon, B. Jacobson and M. Jonasson, 'Closed-loop controller for post-impact vehicle dynamics using individual wheel braking and front axle steering', International Journal of Vehicle Autonomous Systems, Vol. 12, No.2, pp. 158 – 179, 2014.

14. D. Yang, B. Jacobson, M. Jonasson and T.J. Gordon, 'Minimizing vehicle post-impact path lateral deviation using optimized braking and steering sequence', International Journal of Automotive Technology, Vol. 15 (1), pp. 7-17. 2014.

15. D. Yang, T. Gordon, B. Jacobson and M. Jonasson. 'An optimal path controller minimizing longitudinal and lateral deviations after light collisions', Transactions on Intelligent Transportation Systems, Vol.13, No. 4, 2012.

16. J. Edrén, M. Jonasson, J. Jerrelind, A. S. Trigell and L. Drugge, 'Utilization of optimization solutions to control active suspension for decreased braking distance', International Journal of Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, 2014.

17. D. Wanner, L. Drugge, A. S. Trigell, O. Wallmark and M. Jonasson, 'Control allocation strategies for an electric vehicle with a wheel hub motor failure'. Accepted for publication in International Journal of Vehicle Systems Modelling and Testing, 2014.

18. A. Albinsson, F. Bruzelius, P. Petterson, M. Jonasson and B. Jacobson 'Inertial parameter estimation for vehicles with electric propulsion', accepted for publication in the Proc. IMechE, Part D: Journal of Automobile Engineering, 2015.

19. D. Wanner, L. Drugge, A. S. Trigell, O. Wallmark and M. Jonasson, 'Control allocation strategies for an electric vehicle with a wheel hub motor failure', submitted to the International Journal of Vehicle Systems Modelling and Testing, July 2014.

Conference proceedings, full articles with peer-reviewed abstracts

20. O. Wallmark and M. Jonasson, 'Vehicles with autonomous corner modules - control and fault handling aspects', Proceedings of the Program Review Meeting - MIT Industry Consortium on

Advanced Automotive Electrical/Electronic Components and Systems, Seattle, U.S.A., 2007.

21. J. Andreasson and M. Jonasson, 'Vehicle model for limit handling - implementation and validation', Proceedings of the 6th Modelica Conference, Bielefeld, Germany, 2008.

22. M. Jonasson, J. Andreasson, B. Jacobson and A. S. Trigell, 'Modelling and parameterisation of a vehicle for validity under limit handling', Proceedings of the 9th International Symposium on Advanced Vehicle Control, Vol. 1,pp. 202–207, Kobe, Japan, 2008.

23. J. Andreasson, M. Jonasson and H. Tummescheit, 'Modelica-simulation aktiver sicherheitsscenarios mit validierten fahrzeugmodellen in dymola', Proceedings of the ASIM-Workshop 2009, Dresden, Germany, 2009.

24. J. Edrén, M. Jonasson, A. Nilsson, A. Rehnberg, F. Svahn, J. Andreasson and A. S. Trigell, 'Modelica and Dymola for vehicle dynamics applications at KTH', 7th Modelica Conference 2009, Como, Italy, 2009.

25. J. Edrén, M. Jonasson, A. S. Trigell, J. Jerrelind and L. Drugge, 'The development of a down-scaled over-actuated vehicle equipped with autonomous corner module functionality', FISITA World Automotive Congress, Hungary, Budapest, 2010.

26. D. Yang, T. J. Gordon, M. Lidberg, M. Jonasson and B. Jacobson, 'Post-impact vehicle path control by optimization of individual wheel braking sequences'. Proceedings of 10th International Symposium on Advanced Vehicle Control, Loughborough, United Kingdom, 2010.

27. P. Sundström, M. Jonasson, J. Andreasson, A. S. Trigell and B. Jacobson. 'Path and control optimisation for over-actuated vehicles in two safety-critical maneuvers', Proceedings of 10th International Symposium on Advanced Vehicle Control, Loughborough, United Kingdom, 2010.

28. M. Jonasson, J. Andreasson and A.S Trigell, 'Evaluation of instantaneous force allocation compared to trajectory optimization', 11th International Symposium on Advanced Vehicle Control, Seoul, South Korea, 2012.

29. D. Wanner, J. Edrén, M. Jonasson, O. Wallmark, L. Drugge and A. S. Trigell 'Fault-tolerant control of electric vehicles with in-wheel motors through tyre-force allocation', 11th International Symposium on Advanced Vehicle Control, Seoul, South Korea, 2012.

30. J. Edrén, M. Jonasson, J. Jerrelind and A. S. Trigell, 'Utilization of vertical loads by optimization for integrated vehicle control', 11th International Symposium on Advanced Vehicle Control, Seoul, South Korea, 2012.

31. A. Albinsson, F. Bruzelius, M. Jonasson and B. Jacobson, 'Tire force estimation based on the recursive least square method utilizing wheel torque as a sensor and validation in simulations and experiments', 12th International Symposium on Advanced Vehicle Control, Tokyo, Japan, 2014.

32. A. Gurov, A. Sengupta, M. Jonasson and L. Drugge, 'Collision avoidance driver assistance system using combined active braking and steering', 12th International Symposium on Advanced Vehicle Control, Tokyo, Japan, 2014.

33. D. Yang, T.J. Gordon, M. Jonasson and B. Jacobson, 'Application of an optimal path controller on curved roads after collisions', 12th International Symposium on Advanced Vehicle Control, Tokyo, Japan, 2014.

34. D. Yang, X. Xie, F. Bruzelius, B. Augusto, B. Jacobson and M. Jonasson, 'Evaluation of post impact control function with steering and braking superposition in high-fidelity driving simulator', to be presented at the International Symposium on Future Active Safety Technology toward zero-traffic-accident (FAST-zero), Gothenburg, Sweden, 2015.

35. M. Mattsson, R. Mehler, M. Jonasson and A. Thomasson, 'Optimal Model Predictive Acceleration Controller for a Combustion Engine and Friction Brake Actuated Vehicle', 8th IFAC International Symposium on Advances in Automotive Control, Norrköping, Sweden, 2016.

	36.	M. M. Davari, M. Jonasson, J. Jerrelind, A. S. Trigell and L. Drugge, 'Rolling loss analysis of combined camber and slip angle control', 13th International Symposium on Advanced Vehicle Control, Munich, Germany, 2016.
	37.	M. Jonasson and M. Thor, 'Steering Redundancy for Self-Driving Vehicles using Differential Braking', 13th International Symposium on Advanced Vehicle Control, Munich, Germany, 2016.
	38.	Derong Yang, Mats Jonasson, Tomas Halleröd and Regina Johansson, 'Evaluation of an Evasive Manoeuvre Assistance System at Imminent Side Collisions', 13th International Symposium on Advanced Vehicle Control, Munich, Germany, 2016.
3.4.		Other publications including books and patents.

Licentiate Thesis
M. Jonasson, 'Aspects of autonomous corner modules as an enabler for new vehicle chassis solutions', Licentiate thesis in Vehicle Engineering, TRITA-AVE2006:101, KTH Vehicle Dynamics, Stockholm, Sweden, 2007.

Doctoral Thesis
M. Jonasson, 'Exploiting individual wheel actuators to enhance vehicle dynamics and safety in electric vehicles', Doctoral thesis in Vehicle Engineering, TRITA-AVE 2009:33, KTH Vehicle Dynamics, Stockholm, Sweden, 2009.

Patents
1. 'Antenna Unit', No. US6396447, 27 Sep 1999. Granted.
   This patent concerns a new way of integrating vehicle antennas and receivers in a module positioned in the vehicle roof (see Fig. 2). The integration admits antennas to be connected to receivers without the need for any antenna amplifiers. Since the module replaces a distributed system installation in the vehicle, the manufacturing process is substantially simplified. The patent was set into production in Volvo XC90 in 2002.
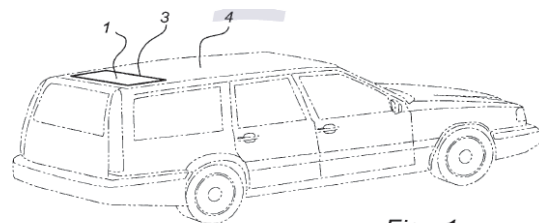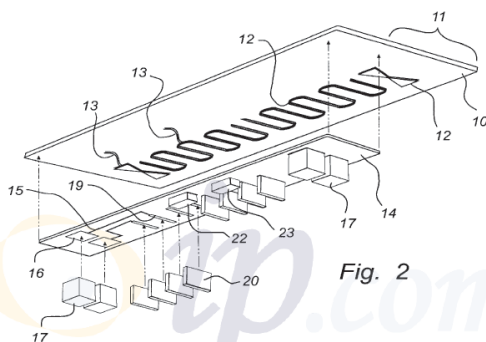

Fig 2: Illustrations from invention No. US6396447 [http://ip.com/patent/US6396447].

2. 'A steering system for a vehicle', No. EP1795433 and EP1795433, 9 Dec 2005.
   This invention relates to a control strategy where the rear wheels are steered in order to increase the lateral acceleration gradient during an evasive driving situation. The strategy requires rear axle steering and is based on cornering by putting energy into translational motion rather than yawing motion.
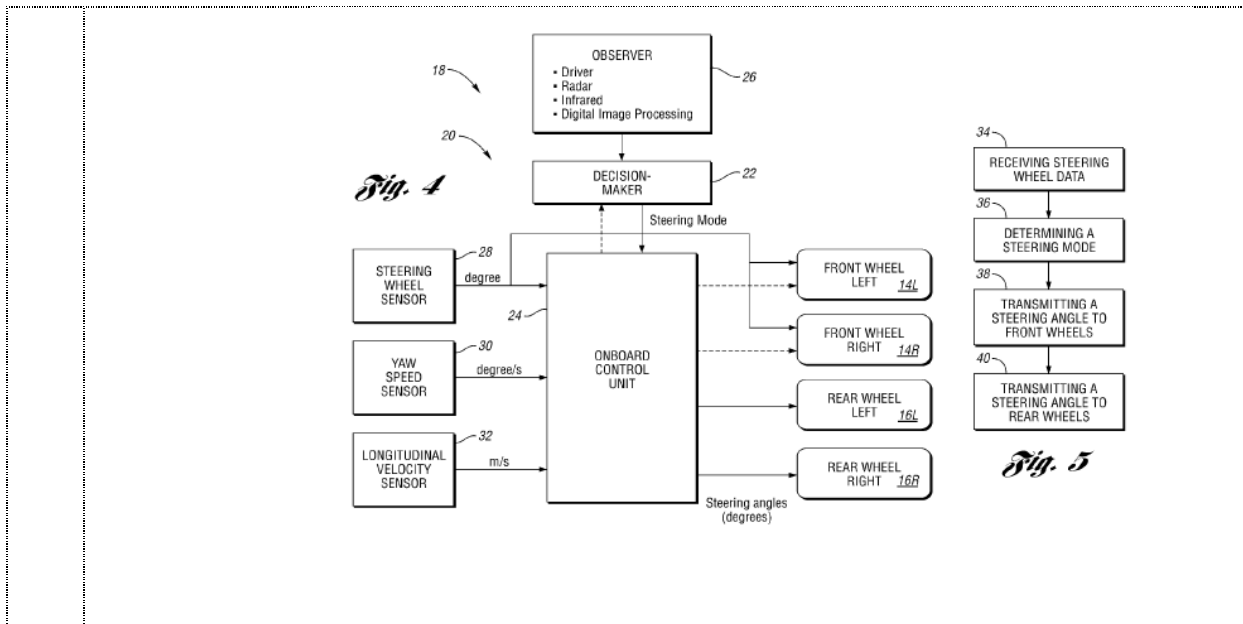
Fig 3: Illustration from invention No. EP1795433
[http://www.europatentbox.com/patent/EP1795433A1/abstract/655704.html].

3. 'A braking system and a method for braking a vehicle', No. EP1935737, 21 Dec 2006.
    Today, electrical machines are mechanically disconnected by clutches to the wheels during ABS braking. This invention shows instead how electrical machines for propulsion can be used to enhance ABS braking. The electrical machines allow wheel torques to be quickly actuated in order to reach and stay at maximum longitudinal brake force.
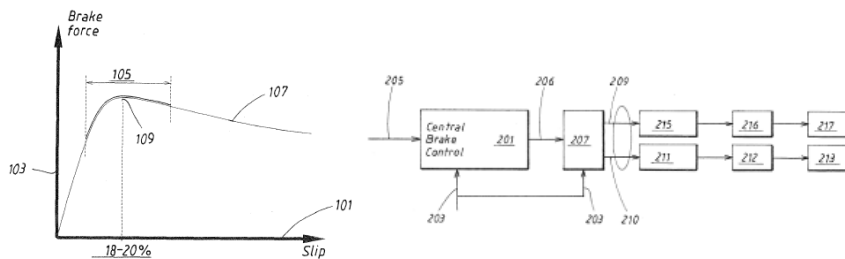

Fig 4: Illustration from invention No. EP1935737
[http://www.europatentbox.com/patent/EP1935737A1/abstract/407259.html].

4. 'Method and arrangement for controlling a suspension of a vehicle wheel', No. EP1935679 and EP1935679, 21 Dec 2006.
    This invention relates to an arrangement to controlling a vehicle suspension. The arrangement is a combined unit of a damper and a spring. They have each an electrical machine connected to provide active damping as well as levelling. The unit is based on a rotational mechanism connected mechanically to an upper arm, which is fixed at the wheel hub.
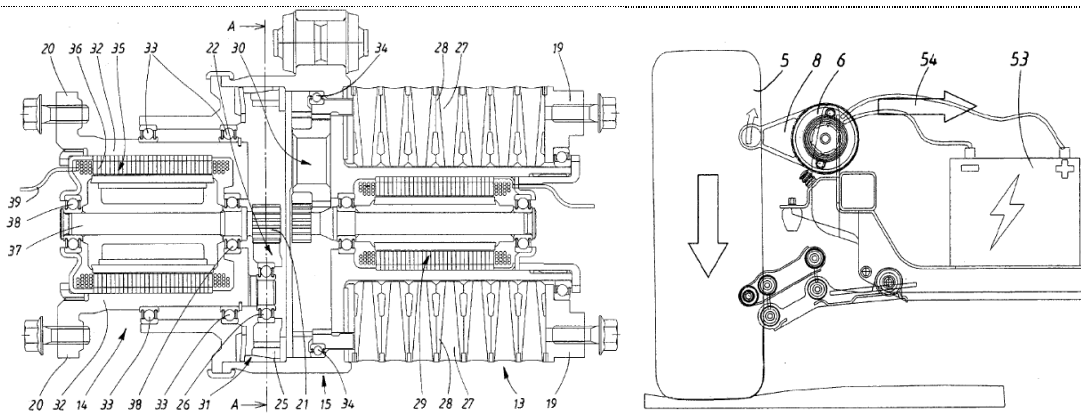
Fig 5: Illustration from invention EP1935679
[http://www.europatentbox.com/patent/EP1935679B1/abstract/794184.html]

5. Method and arrangement for assisting a driver of a vehicle to turn the vehicle when driving during glare ice conditions, US8738265 B2, patent granted 27 Aug 2014.
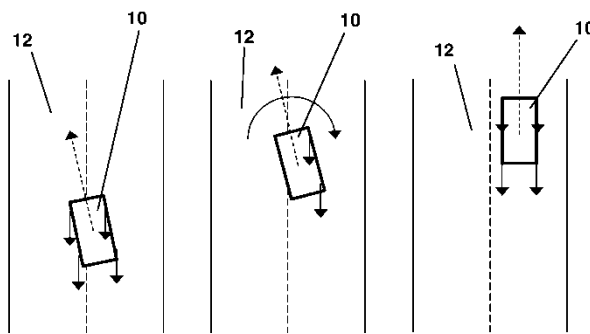

Fig. 1a   Fig. 1b   Fig. 1c

Fig. 6: Illustration from invention US8738265

6. Vehicle tyre to road friction value estimation arrangement, P1868EP00 (2013-12-16, pending). This patent application shows how the friction coefficient can be estimated during a collision.

7. Threat based feedforward control of a vehicle's understeering, P1919EP00. This patent application (2014-03-18, pending) shows how a vehicle could be controlled to reduce understeering during a threat of collision.

8. Differential braking for steering redundancy, P2049EP00 (2015-05-05 pending), This patent application shows how differential braking can be used as redundancy for steering system.

9. Method and apparatus for a critical evasive manoeuvre assist system, P2061EP00 (2015-05-20 pending). This patent application shows the principle behind a steering assist function.

10. Simultaneous vehicle dynamics state estimation using pitch-rate sensor, P2187EP00, 16193753.7 (2016-10-13)

11. Tyre to road friction estimation arrangement by exiting wheel torques, P2053EP00, EP15172369.9, (2015-06-17, pending). This patent application shows how friction can estimated by using propulsion and braking simultaneously on different axles.

12. Method to Estimate Road Friction Using Wheel Torque Control and Rack Force Sensing (P2189EP00), 16193749.5, 2016-10-13

   13. Method to Estimate Road Friction Using Wheel Torque Control and Rack Force Sensing (

50   50   50

Fig. 1a   Fig. 1b   Fig. 1c
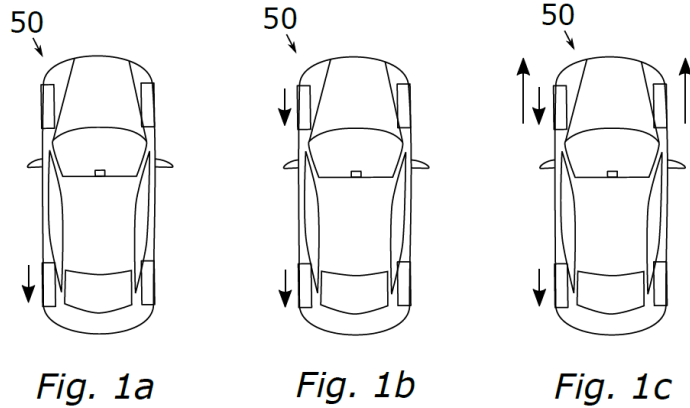
P2189EP00)

Fig. 7. Illustration of wheel torque actuation in invention P2049EP00

3.5.	Describe the funds which you have received as principal or co-applicant over the past five years. State the principal and co-applicants. Attach certificates. • Funds from research councils etc. • Funds from the EU and foundations. • Funds from trade and industry as well as authorities. • Other funds. As affiliated researcher to KTH Vehicle Dynamics Jonasson have been involved in formulating and writing research proposals. SHC project Generic vehicle motion modelling and control for enhanced driving dynamics and energy management. Project duration: 2008-02 to 2014-06, funding 4500 kkr. SHC project Fault-tolerant over actuated HEVs. Project duration 2009-08 to 2015-07 , funding 4500 kkr. SHC project Säkra och energieffektiva fordonskonstruktioner. Project duration 2014-10 - 2015-06, funding 255 kkr. Several applications where Jonasson is co-applicant have been submitted during 2014-2015.
3.6.	Describe active participation in national and international conferences over the past five years. State activities, such as plenary lectures, invited lectures, articles or items, chairmanship, session organisation etc. 1. Presentation of paper at Fisita World Automotive Congress, Yokohama, Japan, Oct 22-27, 2006. 2. Presentation of paper at Electric Vehicle Symposium 22, Yokohama, Japan, Oct. 23-28, 2006. 3. Invited as presenter to Research and Development of Hybrid Vehicles in Japan and Sweden, Gothenburg, Sweden, Nov. 29, 2006. 4. Invited presentation at Review Meeting - MIT Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems, Seattle, U.S.A., 2007. 5. Presentation of paper at the 9th International Symposium on Advanced Vehicle Control, Kobe, Japan, Oct. 6-9, 2008. 6. Invited as a presenter to Energisystem i vägfordon, Skövde, Sweden, Nov. 19-20, 2008. 7. Keynote speech at the 21st International Symposium on Dynamics of Vehicles on Roads and Tracks, Stockholm, Sweden, Aug 17-21, 2009. 8. Principal session chair and presenter of paper at the 10th International Symposium on Advanced Vehicle Control, Loughborough, United Kingdom, Aug. 22-26, 2010.

	9. Presenter of three papers at the 11th International Symposium on Advanced Vehicle Control, Seoul, South Korea, Sep. 8-12, 2012. 10. Presenter of "Evasive Manoeuvre Assist" at Vehicle Dynamics in a cooperative environment, Swedish Vehicular Engineering Association, May 27, 2014, Södertälje, Sweden. 11. Presenter of one paper at the 12th International Symposium on Advanced Vehicle Control, Seoul, Tokyo, 2014. 12. Presenter of "PISC- Post Impact Stability Control (Pre-Crash)" at Safer project day 2015, Gothenburg, Sweden, 2015.
3.7.	National and international prizes. **Best paper award** A. Albinsson, F. Bruzelius, M. Jonasson and B. Jacobson, 'Tire force estimation based on the recursive least square method utilizing wheel torque as a sensor and validation in simulations and experiments', 12th International Symposium on Advanced Vehicle Control, Tokyo, Japan, 2014.
3.8.	Membership in academies etc. Member in SVEA - Swedish Vehiclular association Member in IAVSD - International Association of Vehicle System Dynamics
3.9.	Reviewer experiences/expert assignments • Editorial/advisory board in international journals. • Referee assignments for journals. State the journals and number of assignments per year. • Assignments as faculty examiner. • Expert assignments, such as employment cases and other assignments. Mats Jonasson is a member in Editorial board of International Journal of Vehicle Systems Modelling and Testing since September 2011. He reviews approximately two journal papers per year.
3.10.	Other scientific work • Employment. • Creation of, participation and collaboration in international networks. • Scientific qualifications in trade and industry as well as authorities. • Other scientific leadership or development work which you would like to highlight. Not applicable
4. Teaching qualifications (maximum 12 pages excluding appendices)	
4.1.	Briefly describe your profile as a teacher (maximum half a page). My teaching is within the field of road vehicle dynamics. It covers vehicle modelling, simulation, state estimation and control. I teach students at KTH at different stages as well as internally at Volvo Cars. In addition to my teaching, I am supervising PhD students and Master thesis students. Owing to my employment in academia and industry, my view of learning is associated to applied technical knowledge but in the light of scientific methods. My teaching style is problem based, which means emphasizing the underlying problem that should be solved and thereby increase students motivation for learning.
4.2.	List your experiences of teaching at first cycle, second cycle and third cycle and for further education. You should add comments below point 4.5. **Teaching at KTH during the period 2004 to 2009:** Approximately 10% of this time has been spent on teaching and contact with students. Mats Jonasson took part as a teacher in the following parts: • The course "Vehicle engineering for a better environment" (KTH, 4B1424, 5 credits), which belonged to the Green Vehicle National University Programme. Teaching included leading a laboratory exercise, leading one exercise in power train and leading one project assignment. The laboratory exercise gave insight in emissions of HC, CO and NOx as well as fuel consumption for a combustion engine. Measurements were done in a laboratory with a gasoline engine with a catalytic converter. Students wrote reports that were corrected firstly by exchanging the reports in between the students. Finally, Mats Jonasson judged and corrected the reports. Course assignment through Bilda.

- The course "Fördjupningsarbete i fordonsteknik" (KTH, 4B1430, 10 credits). Mats Jonasson was leading one exercise in power train and leading one project assignment. Students wrote reports that were corrected by Mats Jonasson. Course assignment through Bilda.
- The course "Bachelor Degree project in vehicle engineering" (KTH, SA105X, 15 credits, first cycle). Mats Jonasson was a supervisor for three different projects in the area of regenerative braking and energy consumption of electrical steering system. Course assignment through Bilda.
- The course Vehicle dynamics (KTH, SD2225, 11 credits, second cycle). Mats Jonasson held lectures about vehicle modelling and validation. This course gives knowledge in what vehicle models are typically used and how subsystems and complete vehicles are modelled and validated depending on the particular purposes. Particular attention is paid on how parameters to the models are determined. Course assignment through Bilda.

Teaching after the PhD degree (2009-2015):
- Mats Jonasson is a guest lecturer (2009-2017) in "Vehicle dynamics" (KTH, SD2225, 11 credits, second cycle, approx. 20 students) in vehicle modelling and validation. This is a course for students at the fourth year on the Master level. The overall aim is to give the student a deeper insight in mathematical modeling, computer based simulation, measurements and analysis of a vehicle's motion. Here I teach about how mathematical models can be validated such that they perform equally as the real word vehicle. Course assignment through Bilda.
- Mats Jonasson has contributed to the course design to a completely new course "Applied Vehicle Dynamics Control" (KTH, SD2231, 7.5 credits, second cycle) which started 2014. The course aims to give fundamental knowledge within vehicle dynamics control and vehicle state estimation. Mats have designed a laboratory exercise for vehicle state estimation. Mats is also one of the guest lecturers in the course. Course assignment through Bilda.
- Mats Jonasson is a guest lecturer (2014-2016) in (KTH, SD2231, 7.5 credits, second cycle, approx. 20 students). Mats gives an introductory lecture about vehicle dynamics control in cars.
- Mats Jonasson is a laboratory assistant (2014-2016) in (KTH, SD2231, 7.5 credits, second cycle, approx. 20 students).
- Mats Jonasson has been the main lecturer for the technical project (2014-2017) in the course "Vehicle Engineering" (KTH, SD1001, 9 credits, first cycle) for the students that have selected this road vehicle project. Mats have given lectures in vehicle dynamics theory and a laboratory exercise with a radio controlled down scaled car. Students have presented reports orally and in written form. Course assignment for the whole course in Bilda and the technical project by distributed questionnaire.

Teaching aid production and development
Mats Jonasson has contributed to the design of a laboratory tutorial in the course "Applied Vehicle Dynamics Control" (KTH, SD2231, 7.5 credits, second cycle) which started 2014. The laboratory covers the field of state estimation, and in particular, side-slip estimation of vehicles.

Collaboration within the education programme
Jonasson contributes to the "civilingenjörsprogrammet i Farkostteknik" all the way from year 1, through year 3, 4 and 5 to Master thesis supervision.

In the Master programme in Vehicle Engineering, Jonasson contributes in many courses, se the previous explanation.

Supervision of bachelor and master thesis
- Johan Backmark and Erik Karlsson, "Trajectory optimisation for overactuated vehicles", Master Thesis (30 credits) in Electrical Engineering, Chalmers University of Technology, 2008. Mats Jonasson was main supervisor and Jonas Fredriksson, Chalmers, was examiner.
- Mattias Forslund and Cedric Nyberg, "Energiförbrukning i ACM system", Bachelor thesis (15 credits) in Vehicle Engineering, KTH, 2008. Mats Jonasson was main supervisor and Annika Stensson Trigell, KTH, was examiner.
- Kristian Ahlberg and Ted Holmberg, "Regenerativ bromsning – en analys av regenerativ bromsning med hjulmotorer", Bachelor thesis (15 credits) in Vehicle Engineering, KTH, 2009. Mats Jonasson was main supervisor and Annika Stensson Trigell, KTH, was examiner.
- Sofie Jarelius and Samuel Holt, "Hjulmotorer i hybridfordon – fördel vid regenerativ bromsning", Bachelor thesis (15 credits) in Vehicle Engineering, KTH, 2009. Mats Jonasson was main supervisor and Annika Stensson Trigell, KTH, was examiner.

- Payam Maroufi and Solayman El Masoudi, "En lovande teknik – hybridbil" , Bachelor thesis (15 credits) in Vehicle Engineering, KTH, 2012. Mats Jonasson was main supervisor and Annika Stensson Trigell, KTH, was examiner.
- Abhinav Sengupta and Alexey Gurov, "Evaluating the effectiveness of collision avoidance functions using state-of-the-art simulation tools for vehicle dynamics", Master Thesis (30 credits) in Vehicle Engineering, KTH, 2013. Mats Jonasson was main supervisor and Lars Drugge, KTH, was examiner.
- Ida Petersson and Johanna Risö, "Automotive path following using model predictive control", Master Thesis (30 credits) in Signals and Systems, Chalmers, 2014. Mats Jonasson was main supervisor and Bo Egart, Chalmers, was examiner.
- John Sedin, "Analys av varför bilar styr fram när båtar och flygplan styr bak", Bachelor thesis (15 credits) in Vehicle Engineering, KTH, 2014. Mats Jonasson was main supervisor and Annika Stensson Trigell, KTH, was examiner.
- You Wang and Lokur Preshant, "Driver skill influence on effectiveness of evasive manoeuvre assist functions", Master Thesis (30 credits) in Vehicle Engineering, KTH, and Signal and Systems, Chalmers, 2015 (ongoing). Mats Jonasson is main supervisor and Lars Drugge, KTH, and Jonas Fredriksson, are examiners.
- Rasmus Mehler and Mathias Mattson, "Optimal vehicle speed control using a predictive controller for an overactuated vehicle", Master Thesis (30 credits) in Vehicular Systems, LiU, 2015. Mats Jonasson is main supervisor and Lars Eriksson, LiU is examiner.
- Rudrendu Shekar, "Stability Analysis for Friction Estimation using Active Tire Excitation", Master Thesis (30 credits) in Vehicle Engineering, KTH, Mats Jonasson is main supervisor and Lars Drugge, KTH, is examiner 2016 (ongoing).

Supervision of PhD students
- Mats Jonasson has been a co-supervisor as well as industrial advisor and project leader for Derong Yang at Chalmers, Gothenburg. Her PhD project "Enhanced post-impact stability control" was started 2009 and Derong defended her dissertation in 2013.
- Mats Jonasson has been a co-supervisor and an industrial advisor to Johannes Edrén at KTH Vehicle Dynamics. His PhD project "Generic vehicle motion modelling and control for enhanced driving dynamics and energy management" started in 2008 and Johannes defended his dissertation in December 2014.
- Mats Jonasson is currently a co-supervisor and an industrial advisor to Daniel Wanner at KTH Vehicle Dynamics. His project "Fault-tolerant over actuated HEVs" started in 2010 and Mats Jonasson was engaged in the definition of the project. Two papers written by Mats Jonasson and Oskar Wallmark initiated the embryo to the projects. PhD is planned for 5 June 2015.
- Mats Jonasson is a co-supervisor as well as project leader for Anton Albinsson at Chalmers, Gothenburg. His PhD project "TorqSens" was started 2013 and is ongoing.

Teaching activity outside the university and higher education institution
- Mats Jonasson is also from 2010 appointed as a teacher in an internal course at Volvo Cars. The course, Active Safety & Chassis School (ENG00008), is arranged by Volvo Cars and is held a couple of times every year. Typically, the class has 25 students from different part of the company. Teaching is performed in the area of vehicle control and includes the following parts:
  - Trends and functional architecture within vehicle control
  - Vehicle dynamics theory
  - Tyre characteristics
  - Actuators for motion control
  - Vehicle control algorithms

Education and outreach presentations
- "Volvo styr bilen med alla fyra hjulen". Magazine Ny Teknik, 2006, Accessable through internet http://www.nyteknik.se/nyheter/it_telekom/allmant/article247054.ece
- "Vatten i däcket fäller ut dubben", Magazine Ny Teknik, 2015, Accessable through internet http://www.nyteknik.se/nyheter/fordon_motor/bilar/article3887160.ece
- "Volvo Cars: active safety", Dassault Systèmes Contact Mag, No. 9, 2008, http://www.modelon.com/fileadmin/user_upload/Products/DS/Dymola/References/Dymola_Volvo.pdf

	Electronic teaching Not applicable **Other teaching qualifications, for example, prizes and awards** Not applicable	

4.3.	Theoretical knowledge.
	   • Describe your insights into teaching theory.
	
	One of my expectations of the courses in teaching and supervision was to understand what a good teacher/supervisor is. It turned out that this was not obvious. Many styles could be considered as good. It was also obvious from speeches and fruitful discussions that there is a wide diversity of different successful styles.
	
	The courses also gave me insights in the diversity of traditions in different research fields. I felt that this was problematic for ethical considerations. Acceptable behaviour in one field could be directly unacceptable in another field. I appreciated, as one example among many, the fruitful discussions about student's lack of self confidence, which was shown to be a relatively common problem. This area, and many more, was discussed during the lectures. Group discussions were very valuable in the courses since they contributed with many different perspectives and solutions of supervision and teaching approaches and problems.
	
	The pedagogic education I have passed have provided me with efficient tools for understanding and increase students learning. Owing the education, I have picked up principles for different appropriate learning activities, which results in more active and communicative students. Regarding supervision of students, I have a deeper understanding in how to foster students to work independently.
	
	Finally, an important insight is the need to constantly evaluate my own communication ability with students and have an open mind set. That became clear during my teaching in SD1001 2014/2015, where one of my student is deaf and an interpreter preceded our communication.
	
	Teaching education (list of courses and other relevant education activity)
	   • Fundamental communication and teaching course, LH200V, 2 credits
	   • Doctoral supervision, LH207V, 3 credits, 2011
	   • Learning and teaching, LH201V, 7.5 credits, 2013
	
	See Appendix 2 for Official transcript of records.	

4.4.	Approach. Describe your personal teaching basic outlook as a teacher and supervisor (2-4 pages). **My style** My teaching is characterized by my experience from research and industry. My own research, which is still ongoing, has given me access to scientific secured methods and a critical attitude. Moreover, my research has strengthened the knowledge in my area since I'm well acquainted with current related research. My role in industry has given my insight from the academia that can be applied on real problems which needs to be solved in industry. I try to communicate my knowledge from my research to the students. Commonly, I'm associating to current PhD projects, talking about problems that the research society are striving to solve, etc. These things usually arouse students' curiosity about the subject. **Problem-based learning** Having mentioned my style above, my teaching is characterized by giving the student the ability to be able to apply knowledge to practical problems. "Problem-based learning reflects the way people learn in real life; they simply get on with solving the problems life puts before them with whatever resources are to hand" (Biggs & Tang 2011) By demonstrating the underlying problem, so does the incentive to find solutions and increase student motivation for learning. Since one of the learning in the Vehicle Dynamics course is to apply knowledge on practical problems, it is consequently important to stimulate problem-based learning during my meetings with the students. A good starting point is to discuss the basis of an underlying problem. Problem-based learning encourages students to get involved, resulting in a higher interaction between the students and me. Usually, I hold a	

discussion with the students where I bring in aspects and knowledge from other disciplines.

During exercises, it is also good that students are given either too much information or too little information that is necessary to solve the problem. For a typical real problem in the industry there is a wealth of information that is redundant. However some parts of the information may be difficult to access. Hence, the student must be able to understand which information that is really relevant, or alternatively, make assumptions about information that is not accessible in the task description. I encourage students to understand what information is needed and help them to be able to do assumptions that are good enough.

It has been shown that students who use problem-based learning fail their exam more frequently (Biggs & Tang 2011). Therefor I believe it is important to also adapt the examination to problem-based learning, which probably not is very common among problem-based teachers. As an example, I propose to examine the students' ability to handle over-determined information. I have made observations that the students' engagement, and thereby the effectiveness of their leaning, is increasing during problem-based learning sessions.

Heterogeneity

A challenge I face in my role as a teacher is that there are two different categories of students. One category is car enthusiast students who may have a solid experience in cars. Typically, these like to repair cars and handle mechanical tools. Often they have cars as their own private hobby. The second category is students who view the course as a theoretical challenge, but without having any practical experience of cars. This is a problem because it is difficult to teach the subject to a crowd with too diverse backgrounds.

The Vehicle Dynamics course requires good knowledge of mathematics, which is considered to be difficult. It helps also if you have car experience. Without the latter, it may be difficult to relate and understand the object car that is central. As a teacher, it becomes difficult to judge whether focus should be put on mathematics or practice. In these situations teachers tend to add the level too high (Hedin 2006).

Heterogeneity of prior knowledge is a real challenge and I deal with it by starting with a short rehearsal to cover abilities that do not exist in the class. To deal with this problem I plan to introduce an activity with mixed groups starting in the beginning of the course. Each group will solve a problem that involves both practical and mathematical solution capability. The idea of this group work is to equalize differences in prior knowledge and the practically oriented students can instruct the non-practice oriented ones. The results will be reported in writing and verbally in groups.

In order to get a better view of the heterogeneity, I will also hand out a test in the beginning of the course to gain an understanding of the variance of prior knowledge of the class. Simultaneously with this test, I will ask questions about what the expectations students have for the course, so-called "Introductory questionnaire" see (Mazur 1997), where I can get feedback what form of teaching that the students expect.

Equalization of math skills will not be fully accessed by the above mentioned group work. It is also difficult to tone down those elements of teaching as the course objectives include parts that require math skills. Therefore, I plan to early in the course hand out repetition document that summarizes the most important mathematical skills required, i.e. a sort of formulas with typical solutions. The idea here is that those with the worst skills in math should be able to raise their level.

Provide students with tools

My experience is that teachers commonly solve tasks during lectures and tutorials with little reflection about the choice of methods available. My own depth interviews with students in the course Vehicle Dynamics confirm this picture, where the students tell us that they spend a majority of their time writing of the teacher's solutions on the whiteboard, although these are available in written form from start. Students complain "teachers do not tell how to solve a problem, but just start writing." This way of teaching stimulates superficial learning that minimizes effort and worries but with constraints to manage the task. Memorization often used instead of understanding. What we want to achieve is deep learning where the student finds the task meaningful.

I think it is important for students to understand which methods are available to solve a given problem. This is important because the students should bring a "toolbox" of applied methods that they can use to real problems in their working lives. Tools mean here processes that are needed to reach a solution. Usually I initially present alternative methods available to solve a given problem. I also hold a discussion with students

about the limitations of each method. Finally I motivate the choice of the method that I demonstrate. The focus must be to understand each step that should be performed in the calculation, rather than getting all the details.

Often the teacher summarizes what had just been taught in conjunction with the completion of the lesson. Knowledge, however, is better remembered over time when students themselves actively give their reviews on the content of the lesson (Biggs & Tang 2011). Therefore, my goal is that before learning activities is closing a student should voluntarily summarize the content of the lesson. At best, it will be a fruitful discussion and a good feedback for me as a teacher. To encourage students to sign up for this, I will offer some type of reward.

Peer teaching
One challenge in my teaching situation is that students often are quiet and few dare to ask questions that risk being perceived as "stupid questions." This implies that there are few discussions and I receive poor feedback on what the students have understood. However, there is a need to highlight issues from their own perspective.

"There may be no single best method of teaching, but the second best is student teaching other students" (McKeachie et al. 1986).

The citation concerns so called peer teaching where students teach. At these occasions, students tend to open up and ask "dumb" questions. They can here get help from each other to interpret what I actually had said. One idea that dealt e.g. in (Biggs & Tang 2011) is to have group discussions led by a student tutor.

I recommend about 15 minutes presentations for each group where each presentation is evaluated by me at forehand. Finally, I sum up and fill in where it is needed. This is time consuming, so I prioritize execution of this method only when I suspect there are many students who do not understand. To my help I have now also "Introductory questionnaire" described above. Peer teaching also brings a variety of teaching, which benefits students' different learning styles.

I also have very good experiences of student correction. When a student revises another student's assignment /lab etc. there occurs an excellent learning opportunity since the students can reflect on others results. Often the students invest large efforts because they are reluctant to show themselves incompetent in front of their peers. Another advantage is that the correction burden for me as a teacher is facilitated.

Finally in this educational reflection, I want to highlight the importance of a good education climate. The teacher's role is to me teamwork with other teaching colleagues in the planning, execution and evaluation phases. It is important to have transparency and constantly support each other to improve the teaching.

References

(Biggs & Tang 2011)   Biggs, J. and Tang C. (2011), Teaching for Quality Learning at University, McGraw-Hill and Open University Press, Maidenhead, UK.
(Elmgren 2011)   Elmgren, M. and Henriksson, A. (2011), Universitetspedagogik, Norstedts, Sweden.
(Hedin 2006)   Hedin, A. (2006), Lärande på hög nivå, Uppsala Universitet, Sweden.
(Mazur 1997)   Mazur, E. (1997), Peer Instruction: A User's Manual, Prentice Hall. ISBN 0-13-565441-6.
(McKeachie et al. 1986)   McKeachie, W. J., Pintrich, P., Lin, Y., and Smith, D. (1986), Teaching and learning in the college classroom: A review of the research literature. University of Michigan, US.

4.5.	Teaching skills. Here you should describe skills you have attained as a teacher on all levels. Relate to the areas you have mentioned below points 4.3 and 4.4. Write sub-headings corresponding to those in point 4.2. Verify your work with course analyses and other documents.

- **Teaching.**
  See the attached course evaluation "Kursutvärdering av teknikprojektet "Utvärdering av kurvtagningsförmåga för en radiostyrd bil"" valid for SD2001 2015 (Appendix 3) regarding Mats contribution as a lecturer.
- **Teaching aid production and development.**
  See the attached course evaluation "Kursanalys -KTH" (Appendix 4) regarding Mats contribution to the Laboratory exercise 3 valid for SD2231 2014. The exercise is new and based on feedback from students, we will improve the Lab by e.g. give a deeper introduction to Simulink and encourage students motivation by a competition.
- **Supervision.**
  I contemplate supervision as a way of establish cooperation between myself, the students and all

other supervisors. The process of discussing problems and seeing the progress of the student is very stimulating. One of the most important keys turns out to be the maturity of being an independent researcher.

During my development as a supervisor to PhD students, I have understood the importance of early writing. I encourage writing the first paper during the first year of studies. I also, nowadays, want the student to regularly write a summary of related references where I let him/her explain differences from own findings. Moreover I'm helping the student to establish a viable network of people.

I expect sometimes students to go into a side track outside what has been decided in the plan. This side track may be very interesting, but does not give any answer to the dictated research question. Here, I think I must release the power of the student and his/her creativeness. Good results could be achieved when allowing the student to follow a dead end (Maybe not for sure a dead end, results can be publishable).

A happy student is a good prerequisite for good result. As a supervisor I must be alert to anomalies and to secure that the student function well in a group of other PhD students and supervisors. The student is also expected to take initiative him/herself and work independently between meetings. After a while the student must feel that he/she "owns" the project.

References for Mats role as co-supervisor for PhD students (See also certificate in Appendix 6):
PhD student Derong Yang, contact Prof. Bengt Jacobson, Chalmers
PhD student Johannes Edren, contact Prof. Annika Stensson Trigell, KTH
PhD student Daniel Wanner, contact Prof. Annika Stensson Trigell, KTH
PhD student Anton Albinsson, contact Prof. Bengt Jacobson, Chalmers

- **Teaching activity outside the university and higher education institution.**
  See course evaluation of "Active Safety & Chassis School (ENG00008) 13w48" (Appendix 5) regarding Mats contribution as a lecturer in the Vehicle control part at Volvo Cars.

4.6.	Further development of teaching. Describe your development as a teacher and how you want to continue developing your teaching.

The meaning of a good supervisor is difficult to grasp. Nevertheless, I believe it is important to bring more knowledge in my way of supervise and what the student expects from me.

I would like to improve my communication with main supervisor to avoid conflicting advice and secure project to go in a unitary direction. I would also like to utilize the competence of student in a better way. This means that I must be willing to take risks to leave my safe area that I know and control.

In my role as a teacher at Volvo Cars, I am a member in our internal teacher network. I regularly train my communication skills by attending lectures, seminars and courses in communication. I believe it is important to further develop the communication ability between myself and students. As one example, my focus just now is to act and reflect more on how to figure out students expectations before a lecture starts. By improving the understanding of expectations, lecture will proceed more efficiently and students will be satisfied. |

5. Other assignments	
5.1.	Administrative assignments.
- Experience of unit supervision specifying the duration and unit's size. Unit refers to research group, department and school etc.
- Membership in boards/councils within universities over the past five years.
- Other professional administrative assignments.
Not applicable
5.2.	Research policy assignments.
- Member of state research councils or committees within them.
- Member of other boards or committees providing grants.
- Assessment of Swedish and foreign research applications (number/year over the past five years).
- Member of international research councils, programmes, committees or advisory groups.

		• Other important expert and leadership assignments.
		Not applicable
5.3.		External contacts and external activities.
		• Collaboration with trade and industry as well as authorities.
		• Member of boards within companies and authorities.
		• Other work within the third assignment.
		Since I am employed by industry and works 20% of my time as affiliated researcher at KTH I have a natural and daily contact between industry/university. Also, through my engagement in SHC - Swedish Hybrid Vehicle Centre I have also contact to other universities in Sweden (Chalmers, LiU, LTH and Uppsala University) as well as the other vehicle manufacturers (Scania CV AB, AB Volvo and previously Saab Automobile and BAE Systems Hägglunds). Also, I have contact to the Energy Agency, since they funded my PhD research and at that time engaged me in several conferences and seminars.

6. Attached publications	
6.1.	List maximum ten publications which you would like to cite in the first instance. Write a list and brief explanation for the choice. Attach publications to your application.

1. M. Jonasson, S. Zetterström and A. S. Trigell, 'Autonomous corner modules as an enabler for new vehicle chassis solutions', FISITA Transactions 2006, paper F2006V054T, 2006.

2. M. Jonasson and O. Wallmark, 'Control of electric vehicles with autonomous corner modules: implementation aspects and fault handling', International Journal of Vehicle Systems Modelling and Testing, Vol. 3, No. 3, pp. 213–228, 2008.

3. M. Jonasson and J. Andreasson, 'Exploiting autonomous corner modules to resolve force constraints in the tyre contact patch', International Journal of Vehicle System Dynamics, Vol. 46, No. 7, pp. 553–573, 2008.

4. M. Jonasson and F. Roos, 'Design and evaluation of an active electromechanical wheel suspension system', Journal of Mechatronics, Vol. 18, Issue 4, pp. 218–230, 2008.

5. M. Jonasson, J. Andreasson, A. S. Trigell and B. Jacobson, 'Utilisation of actuators to improve vehicle stability at the limit: from hydraulic brakes towards electric propulsion', Journal of Dynamic Systems, Measurement and Control, Vol. 133, Issue 5, 27 July 2011.

6. M. Jonasson, J. Andreasson, B. Jacobson and A. S. Trigell, 'Global force potential of over-actuated electric vehicles', International Journal of Vehicle System Dynamics, Vol. 48, No. 9, pp. 983–998, 2010.

7. D. Yang, T. J. Gordon, B. Jacobson, M. Jonasson and M Lidberg, 'Optimized brake-based control of path lateral deviation for mitigation of secondary collisions', Proceedings of the Institution of Mechanical Engineers, Part D, Journal of Automobile Engineering, Vol. 225, Issue 12, December 2011.

8. D. Yang, T. J. Gordon, B. Jacobson and M. Jonasson, 'A nonlinear post-impact path controller based on optimized brake sequences', International Journal of Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Vol. 50, Sup. 1, pp. 131-149, 2012.

9. D. Yang, T. Gordon, B. Jacobson and M. Jonasson. 'An optimal path controller minimizing longitudinal and lateral deviations after light collisions', Transactions on Intelligent Transportation Systems, Vol.13, No. 4, 2012.

10. J. Edrén, M. Jonasson, J. Jerrelind, A. S. Trigell and L. Drugge, 'Utilization of optimization solutions to control active suspension for decreased braking distance', International Journal of Vehicle System Dynamics, 2014.

I would like to append paper 1 and 4 since those papers give a brief description of the ACMs, which has been one of my focus areas. Papers 2, 3, 5, 6, 10 explains vehicle dynamics potential benefits of over-actuated systems. The papers 7-9 summarizes my contribution in the field of post impact stability control.

Proposal to appoint Dr. Mansoor Khurshid as 'affiliated faculty' at The Department of Aeronautical & Vehicle Engineering (AVE) at KTH

Mansoor Khurshid received a Ph.D. in Vehicle and Maritime Engineering from KTH in April 2017. During his Ph.D studies he started to work at Cargotec Sweden AB Bromma Conquip in Stockholm Sweden as Structural calculations engineer R&D. Since his appointment at Cargotec Sweden AB Bromma Conquip, he and colleagues at AVE at KTH are working on Vinnova funded mutual research projects Varilight and Digfog. Cargotec Sweden AB Bromma Conquip is one of the main industrial partners in these projects. Mansoor Khurshid is also currently assisting in the supervision of PhD and master thesis students at AVE and spends at least one day a week working on above mentioned projects.
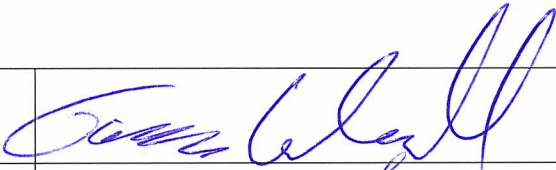
The Department of AVE wishes to formalize the contacts with Mansoor Khurshid through the "affiliated faculty" programme. His employer is very positive to this idea and has approved this affiliation. Cargotec Sweden AB Bromma Conquip have a strategic plan to collaborate and have affiliations with research universities around the globe which are excellence and conducts world leading research in their field of expertise.

Mansoor Khurshid research interests are integrity of welded steel structures, finite element analyses, strength analyses, and material selection for lightweight design etc.

Mansoor Khurshid's responsibility within this affiliation will include:
- Co-supervision of PhD. students working at the Department of Aeronautical & Vehicle Engineering, Division of Lightweight Structures. The student's major research topic is design and fabrication of lightweight high strength welded structures.
- Co-application of research funding through funding agencies in Sweden, and European Union.
- Common research publications in international conferences and journals.
- Development of PhD course on various topics related to fatigue and fracture which is planned to be given to students in KTH and engineers in Cargotec Sweden AB Bromma Conquip.
- Planned work time at KTH is on average one day/week with flexible planning.
- Access to the lab facilities and softwares within the frame of affiliation.

The Department proposes a standard 3 year affiliation, with extension foreseen. The Department hope that Mansoor Khurshid can be appointed as "oavlönad docent" in the future based on the research merits achieved during his time as "affiliated faculty".

Tomas Lundvall *Manager, R&D Sweden Mechanics* *Cargotec Sweden AB, Bromma Conquip*	
Michael Thysell *Vice President, Product Business Management* *Cargotec Sweden AB, Bromma Conquip*	
Professor Sebastian Stichel *Head of Department of Aeronautical and Vehicle* *Engineering, KTH*	

Motivation letter to appoint Dr. Mansoor Khurshid as 'affiliated faculty' at The Department of Aeronautical & Vehicle Engineering (AVE) at KTH

Cargotec Sweden AB Bromma Conquip is the industry's most experienced spreader manufacturer, known worldwide for crane spreaders of exceptional reliability. Welding is a primary joining technique and steel is the primary material used in the manufacturing of Bromma spreaders. Some of the welded joints in Bromma spreaders are identified as critical sections and prone to mechanical failures. Bromma spreaders are designed against these failures to ensure their integrity.

Mansoor Khurshid received a Ph.D. in Vehicle and Maritime Engineering from KTH in 2017. He is working as Structural Calculations Engineer R&D at Cargotec Sweden AB Bromma Conquip since October 2016. His expertise in welded steel structures, finite element analyses, strength analyses, and material selection for lightweight design are relevant and beneficial for ensuring the structural integrity of our products. Since his appointment at Cargotec Sweden AB Bromma Conquip, he and colleagues at AVE at KTH are working on Vinnova funded mutual research projects Varilight and Digfog. Within these projects various components in different Bromma's products are being investigated together with KTH.

Bromma wishes to formalize the research collaboration with KTH by enrolling Mansoor Khurshid in the "affiliated faculty" programme. Main benefits for Bromma under the affiliated faculty programme are as follow:

- Bromma's research projects will need a close to university approach for methods and expertise which will be realised with this affiliation by knowledge transfer.
- Master/PhD students will be available for performing research on Bromma tasks through Master/PhD thesis projects.
- The affiliation will help with planning and material for internal courses in fatigue design and thus knowledge sharing from a renowned university will be carried out. This will increase our understanding about welded structures and update our design methodologies.
- This collaboration will assist in minimizing the need for consultant work when expertize help is needed.
- Bromma will get access to KTH software licenses through masters and PhD students and to KTH Lab facilities at lower cost.
- Bromma can write on various documents and mention in campaigns that we have official co-operation with the leading technical university in Sweden, tightly connected to International Institute of Welding where Associate Professor Dr. Zuheir Barsoum is a chairman, when it comes to design for long fatigue life in welded steel structures which is a core business for Bromma and essential to our success as the quality leader in our market.
- Mansoor Khurshid will be appointed as a Docent ("oavlönad docent") based on the results at the end of the affiliation upon performance and achievements.

Tomas Lundvall Manager, R&D Sweden Mechanics Cargotec Sweden AB, Bromma Conquip	
Mansoor Khurshid Structural Calculation Engineer R&D Cargotec Sweden AB, Bromma Conquip	

Curriculum Vitae (Mansoor) (Khurshid)

6 years of professional and academic experience in the design of welded structures against static and fatigue loading

Summary

I am well accomplished professional with a solid background in Engineering mechanics. I have experience of multidisciplinary areas like static strength design, fatigue strength design, improvement methods for welded structures, testing and verification, finite element analysis, teaching, supervising and leading projects. I am well-determined to complete tasks in a timely manner. I appreciate to work effectively and hard, and always with positive attitude.

I have done my **PhD** at the **Royal Institute of Technology (KTH), Sweden in April 2017**. Since October 2016, I am working as a Structural Calculation Engineer R&D at Cargotec Sweden AB Bromma Conquip.

Status: Single
Year of birth: 1986
Address: Nockebybacke 2G lgh 17202, 168 40 Stockholm, Sweden
Driving license: Category B
Languages: English, Swedish,Urdu,Pashto
Email:
mansoor.khurshid@bromma.com
Mobile number: +46736947752

Work Experience

October2016-ongoing	**Structural Calculation Engineer R&D, Cargotec Sweden AB Bromma Conquip** **Responsibilities:** Collaborating research projects with academia and research institutes, project management and project leading, calculations group leading, Structural calculations, internal course teaching on fatigue of welded joints, Product support, and sales support etc
Sept 2012-April 2017	**PhD, Department of Aeronautical and Vehicle Engineering, Division of Lightweight Structures, KTH, Sweden.** **Thesis title:** Static and fatigue analyses of welded steel structures - Some aspects towards lightweight design
April 2012 –May 2013	**Research Engineer, Department of Aeronautical and Vehicle Engineering, Division of Lightweight Structures, KTH, Sweden.**

June -December   Masters Thesis Work
2011   **Project title:** Static and fatigue design of load carrying welded joints in high strength steels.
                          Project sponsor: Cargotec Sweden AB Bromma Conquip

Education, activities & awards

Basic & further education

2012 to 2017   KTH (The Royal Institute of Technology), Stockholm, Sweden
                    PhD studies

2011   KTH (The Royal Institute of Technology), Stockholm, Sweden
                    Masters of Science-Engineering Mechanics, 120p

2008   National University of Sciences and Technology, Islamabad, Pakistan
                    Bachelors in Engineering-Mechatronics

Activities

2012, 2013,   **Lab assistant, SD 2411**, FEM and lightweight structures, KTH
2014,2015

2011, 2013   **Lab assistant, SD 2420**, Advanced design of welded structures, KTH
2013   Guest lecture International Welded Structures Designer program, KTH

2014, 2015,
2016,2017   **Supervising master thesis students**, KTH

Awards
2013   Finalist paper ASME pressure vessel and piping conference 2013, Paris, France

Publications

1. M. Khurshid, Z. Barsoum , N.A. Mumtaz. Ultimate strength and failure modes for fillet welds in highstrength steels. Materials & Design, Volume 40, September 2012, Pages 36-42.

2. M. Khurshid, Z. Barsoum, I. Barsoum. Load carrying capacities of butt welded joints in high strengthsteels. ASME Journal of Engineering Materials and Technology, October 2015, Vol. 137 / 041003-1.doi: 10.1115/1.4030687

3. M. Khurshid, Z. Barsoum, I. Barsoum, T. Däuwel. Multiaxial weld root fatigue of butt welded jointssubjected to uniaxial loading. Fatigue & Fracture of engineering materials & structures. Volume 39,Issue 10, October 2016 Pages 1281–1298.

4. M. Khurshid, Z. Barsoum , T. Däuwel, I. Barsoum. Multiaxial weld root fatigue of fillet welded tubeto plate joints subjected to non-proportional multiaxial stress state. International Journal of Fatigue. Volume 101, Part 2, August 2017, Pages 209-223

5. M. Khurshid, Z. Barsoum, G. Marquis. Behavior of compressive residual stresses in HSS weldsinduced by HFMI treatment. ASME journal of pressure vessel technology, August 2014, Vol. 136 /041404-1

6. Lasse Suominen , Mansoor Khurshid, Jari Parantainen. Residual stresses in welded componentsfollowing post-weld treatment methods. Procedia Engineering 66 (2013) 181 – 191

7. M. Khurshid, M. Leitner, Z. Barsoum, C. Schneider. Residual stress state induced by High FrequencyMechanical Impact Treatment in different steel grades -numerical and experimental study.International Journal of Mechanical Sciences. Volume 123, April 2017, Pages 34-42

8. M. Leitner, M. Khurshid, Z. Barsoum. Stability of High Frequency Mechanical Impact (HFMI) posttreatmentinduced residual stress states under cyclic loading of welded steel joints. Journal ofengineering structures.vol.143.2017.589-602

9. Z. Barsoum, M. Khurshid, I. Barsoum. Fatigue strength evaluation of friction stir welded aluminiumjoints using the nominal and notch stress concepts. Materials & Design, Volume 41, October 2012,Pages 231-238

10. E. Mikkola, M. Dore, G. Marquis, M. Khurshid. Fatigue assessment of high-frequency mechanicalimpact (HFMI)-treated welded joints subjected to high mean stresses and spectrum loading. FatigueFract Engng Mater Struct 00, 1–14.(2015) doi: 10.1111/ffe.12296

11. A.A. Bhatti, Z. Barsoum, M. Khurshid. Development of a finite element simulation framework for theprediction of residual stresses in large welded structures. Computers and Structures 133 (2014) 1-11.

Conference proceedings

12. M. Khurshid, Z. Barsoum, G. Marquis. Behavior of compressive residual stresses in HSS weldsinduced by HFMI treatment. ASME PVP July Paris. France, 2013 (Awarded finalist paper prize inPhd Student paper competition)

13. E.Mikkola, M. Doré, M. Khurshid. Fatigue strength of HFMI treated structures under high R-ratio andvariable amplitude loading. Proceedia Engineering 66 (2013) 161-170

14. M. Khurshid, Z. Barsoum. Static behavior of fillet welded cruciform joints in S600MC high strengthsteel. Proceedings of 2nd Swedish conference on design and fabrication of welded structures, October9-10, 2013, Borlänge, Sweden.

References

To be provided upon request

Avtal rörande anknytning som affilierad fakultet

Mellan Kungliga Tekniska högskolan (KTH) och företaget Cargotec Sweden AB Bromma Conquip (nedan enskilt benämnda "Part" och gemensamt "Parterna")

har denna dag träffats följande avtal angående samverkan inom området [*dimensionering av svetsade strukturer*].

1.   Affiliering

KTH avser att för tiden 2017-04-10-2020-04-10 anknyta Mansoor Khurshid , som affilierad fakultet i ämnet Lättkonstruktioner, under förutsättning att gällande behörighetskrav anses uppfyllda efter sedvanlig behörighetsprövning. Detta avtal avser att bland annat reglera ersättnings- och arbetstidsfrågor samt rätten till de resultat som kan komma att genereras av den affilierade.

2.   Lön och andra kostnader

Den affilierade ska ha rätt att avsätta 20 % av sin anställning vid Företaget för verksamheten som affilierad fakultet vid KTH. Inget avdrag från den affilierades ordinarie lön vid Företaget ska göras.

Beträffande andra kostnader förenade med anknytningen som affilierad fakultet skall detta överenskommas mellan partnerna i förhållande till olika projekt.

3.   KTH:s åtagande

För den affilierades verksamhet vid KTH åtar sig KTH att tillhandahålla nödvändiga resurser inklusive lokaler och teknisk utrustning samt se till att verksamhetsförhållandena är i enlighet med gällande lagar, bestämmelser och avtal inom utbildningssektorn och att tillhandahålla tillämpliga säkerhetsföreskrifter som den affilierade ska följa.

4.   Den affilierades verksamhet

Den afflierades verksamhet vid KTH ska bedrivas inom området [*dimensionering av svetsade strukturer*] och omfatta arbetsuppgifter enligt överenskommelse mellan parterna (bilaga).

Den affilierade är införstådd med att gränsdragningsproblem kan uppstå i verksamheten och förbinder sig att i sådana fall samråda med ansvarig på berörd institution samt ansvarig chef på Företaget. För det fall den affilierades verksamhet kommer att inbegripa medverkan i samverkansprojekt med annan industripart ska ett samverkansavtal tecknas mellan alla i projektet ingående Parter.

5.   Publicering

Forskningsresultat som uppkommer i samband med den affilierades verksamhet vid KTH får publiceras fritt i enlighet med gällande vetenskaplig praxis och i övrigt nyttjas i Parternas utvecklings- och forskningsarbete. Företagets rätt till skydd av företagshemligheter ska dock iakttas. Inför publicering av forskningsresultat som den affilierade kan ha varit med och genererat ska Företaget få ett utkast av publikationen för granskning. Företaget äger att inom en månad från mottagandet av utkastet begära att publiceringen fördröjs i syfte att Parterna ska komma överens om att undanta företagshemligheter som tillhör Företaget eller för att Företaget ska kunna söka patentskydd. Har Företaget inte gjort någon invändning mot publiceringen inom en månad är publiceringen tillåten. En publicering kan som längst fördröjas med tre (3) månader från det att Företaget lämnat invändning mot publiceringen. Vid patentering kan publiceringen skjutas upp under totalt maximalt fyra (4) månader från det att utkastet för den planerade publiceringen har mottagits.

6.   Äganderätt

Äganderätt till resultat som den affilierade generar med stöd av finansiering enligt detta avtal tillkommer Företaget. Rättigheter som den affilierade genererar tillsammans med anställd eller student vid KTH tillfaller respektive rättighetshavare enligt lag. Gemensamt genererat resultat kan således bli gemensamt ägt.

KTH har rätt att fritt och utan att utge ersättning nyttja samtliga resultat för forskning, utveckling och undervisning.

7.   Ansvar

Part ansvarar för skada eller förlust som denne uppsåtligen eller av vårdslöshet vållat den andre Parten under utförandet av detta avtal eller genom att bryta mot detta avtal. Ansvaret omfattar inte ersättning för indirekt skada eller förlust, förlust till följd av att resultatet inte kan nyttjas på avsett sätt eller följdskador såsom inkomstbortfall, utebliven vinst och kapitalkostnader. Part ansvarar endast för skada som har upptäckts inom ett (1) år efter avtalets upphörande.

8.   Sekretess

Parterna är införstådda med att offentlighetsprincipen gäller vid KTH. Undantag härifrån kan endast ske i den utsträckning offentlighets- och sekretesslagen så medger.

9.   Avtalstid

Avtalet gäller från och med den dag då utnämning som affilierad fakultet sker till och med den tidpunkt som beslutet om utnämning anger. En förutsättning är också att den affilierade samtidigt är anställd vid Företaget. För det fall den affilierades anställning vid Företaget upphör, upphör detta avtal automatiskt att gälla samma datum som anställningen upphör. Företaget äger skyldighet att informera KTH för det fall den affilierades anställning är på väg att upphöra.

I samband med en eventuell prövning av frågan om förlängd affiliering ska även frågan om förlängning av villkoren i detta avtal prövas.

10.   Tvist

Tvist angående detta avtal ska avgöras i allmän domstol, där första instans ska vara Stockholms tingsrätt.

11.   Godkännande

Parterna godkänner avtalet genom sina underskrifter.

2017-10-18   2017-10
Tomas Lundvall   Skolchef

Manager R&D Sweden Mechanics   Leif Kari

Cargotec Sweden AB Bromma Conquip   KTH

Jag har tagit del av detta avtal och förbinder mig att med avseende på allt som berör mina rättigheter och skyldigheter enligt detta avtal följa vad som avtalats mellan Parterna.

2017-10-18
Den affilierade

Mansoor Khurshid

Structural Calculation Engineer R&D

Cargotec Sweden AB Bromma Conquip

Anställningsprofil för gästprofessor i teoretisk fysik med inriktning mot partikelfysik

Ämnesområde
Teoretisk fysik med inriktning mot partikelfysik

Ämnesbeskrivning
Ämnet omfattar teoretisk och fenomenologisk elementarpartikelfysik med fokus på icke-Abelska gaugefältteorier inriktade mot kvantkromodynamik.

Arbetsuppgifter
Anställningen innefattar forskning, undervisning och handledning.

Behörighet
Behörig att anställas som gästprofessor är den som visat såväl vetenskaplig som pedagogisk skicklighet.

Bedömningsgrunder
Som bedömningsgrunder vid anställning som professor vid KTH ska graden av sådan skicklighet som är ett krav för behörighet för anställning gälla. Därutöver gäller de bedömningsgrunder som anges i KTH:s anställningsordning, bilaga 1, i förhållande till fastställd anställningsprofil.

Av högsta vikt är sökandes vetenskapliga skicklighet inom ämnesområdet, dokumenterad genom publikationer i internationella tidskrifter av hög kvalitet. Forskning med fokus på både gitterversioner av kvantkromodynamik och med dem förenliga numeriska simuleringar är särskilt meriterande.

Av näst högsta vikt är pedagogisk skicklighet inom ämnesområdet.

Av betydelse är skicklighet att utveckla och leda verksamhet och personal, i vilken ingår kunskap om mångfalds- och likabehandlingsfrågor med särskild fokus på jämställdhet. Av betydelse är även administrativ skicklighet och annan skicklighet samt samarbetsförmåga.

Central Appointments Committee
KTH

2017-11-20

Visiting professor position – Leonardo Giusti

Leonardo Giusti is associate professor at the Physics Department of University of Mailano Bicocca since November 2008. Leonardo is a theoretical particle physicist who works on the strong interaction and flavour phenomenology in, and beyond, the Standard Model of particle physics. Lattice field theory is a prominent tool in his research, as well as comparisons to experimental data from the LHC and other facilities. To this end, Giusti is on leave of absence at CERN until the end of 2017.

The Department of Physics wishes to establish a Visiting Professor position for Giusti (2 years duration). The position is primarily motivated by the proposed recruitment of Giusti's wife to a professorship at KTH connected to the WASP (Wallenberg Autonomous Systems and Software Program) initiative. Giusti's research is complementary to that pursued in the Particle and Astroparticle Physics Division at the Physics Department. At the Division, there are strong activities concerning both theoretical particle physics and LHC experiments.

The Department would be pleased to host Giusti on the understanding that the position is fully financed by central KTH as a part of the WASP recruitment package.

Sincerely,

Mark Pearce, professor
Head of Physics Department

Approved:

Anders Forsgren
Vice dean, School of Engineering Sciences, KTH

CV template for the employment and promotion of teachers
Established by the Employment Committee 13 December 2016, minutes no. 20/2016

In order to facilitate the processing of applications, KTH uses a CV template which specifies the data required in the process. Different points in the template hold more relevance depending upon the position applied for. The following instructions apply to the applicant:

1. The CV template should be used with the retained numbering.
2. Applications should be written in English.
3. Applications should be addressed to the President (a signature is not necessary).
4. Apply online via the KTH recruitment system.
   a) CV and the attachments are to be uploaded in one file.
   b) Publications are to be uploaded separately.
5. Your application must be received no later than the date stated in the advertisement.
6. KTH conducts reference checks on the candidate proposed for the position.

The application of employment as <Visiting Professor > in <Physics> (<VL-2017-0168>).

1. Basic information	
1.1.	Leonardo Giusti
1.2.	05/04/1971
1.3.	Male
1.4.	Via Sebenico 25 I-20124 Milano Italy Phone: +39 02 36561103
1.5.	Dip. di Fisica G. Occhialini Universita' di Milano-Bicocca Piazza della Scienza 3 20126 Milano – Italy Phone:+39 02 64482532 e-mail:Leonardo.Giusti@mib.infn.it
1.6.	Since November 2008 Associate Professor at the University of Milano Bicocca, Physics Department (On leave of absence from 2008 to 2010 and from 2016 to 2017 at CERN)
1.7.	2016-2017 Research Associate at the Theory Department of CERN 2005-2010 Staff member at the Theory Department of CERN 2004-2005 Associate Member at the Theory Department of CERN 2001-2008 Permanent Researcher (CR2 and CR1) at CNRS, Section 02 – France (on leave of absence at CERN from 2001 to 2003 and from 2005 to 2008) 2001-2003 Fellow at the Theory Department of CERN 1998-2001 Postdoc at Boston University, Physics Department
1.8.	

2. Higher education degrees and evaluations	
2.1.	1995-1998 Ph.D at Scuola Normale Superiore - Pisa Thesis: Light Quark Masses and CP Violation in K^0 - $\overline{K}{}^0$ and B^0 - $\overline{B}$ mixing Supervisor: Prof. Guido Martinelli Grade: **70/70 cum laude** 1989-1995 Master degree at Università di Roma La Sapienza Thesis: Lattice Gauge fixing: problems and methods Supervisor: Prof. Massimo Testa Grade: **110/110 cum laude**
2.2.	2008 MIUR Associate Professor (chiamata diretta) in Physics at the University of Milano Bicocca
2.3.	2014 Italian Abilitation to full professor
2.4.	2014 Referee reports on the national project QCDLAT (see below) are attached.

3. Research merits	
3.1.	The recently discovered Higgs boson is the last dowel of the Standard Model that was found. The Model explains the results of all experiments conducted in laboratories. Yet there are astrophysical evidences and theoretical arguments that it cannot be the ultimate theory.

The main subjects of my research are the theory of the strong interactions and flavour phenomenology in the Standard Model and beyond. Quantum field theory applied to particle physics is the theoretical framework that I use to develop new ideas and to carry out new computations which are needed to cast the forthcoming results from LHC and other experiments into a coherent theory, possibly new.

Lattice field theory plays a special role in my research. It allows us to advance the theoretical non-perturbative knowledge on strongly interacting theories in the SM and beyond starting from the fundamental equations and keeping track of all systematic and statistical errors. Eventually an unambiguous and precise comparison between theory and experiment becomes possible, thus paving the way for the discovery of New Physics and/or Phenomena in Nature.

My five main scientific achievements are (reference numbers are those of the short publication list):

The first unambiguous definition and computation of the leading anomalous contribution to the mass of the lightest singlet pseudoscalar meson in Quantum Chromo Dynamics (QCD). The value that I have found proves that the bulk of the eta' mass in Nature is generated by the anomaly of the Abelian chiral symmetry due to the quantization procedure, and solves the so called $U(1)\_A$ problem in QCD. Refs.[6,9].

A numerical proof that the picture of spontaneously broken chiral symmetry in QCD is indeed correct. The rate of condensation of the low quark modes of the Dirac operator turned out to be equal to the slope of $Mpi^2 Fpi^2/2$ with respect to the quark mass m in the chiral limit. This is the distinctive feature of the presence of spontaneous chiral symmetry breaking in the theory (The final two papers of this study were selected as PRL and PRD Editor's Suggestions and publicized on the Home pages of these journals). Refs.[2,4,5,7,8].

Lattice path-integral formulation of thermal field theories in a moving frame. The computation of the Equation of State of QCD results greatly simplified, and several orders of magnitude in the temperature can be spanned on the lattice. Ref.[3].

Factorization of the gauge-field dependence of the fermion determinant in lattice QCD, paving the way for multi-level Monte Carlo integration in the presence of fermions, and opening new perspectives in lattice gauge theory. First preparatory studies for computing the hadronic contributions to g-2, and the form factors of the semileptonic B decays at low values of the dilepton invariant mass Q^2. Ref.[1]

The first computation of Delta M_K and epsilon_K in SUSY with Wilson coefficients of the Weak Hamiltonian computed at the next-to-leading order in QCD and the long-distance contributions determined in Lattice QCD. Ref. [10] |
| 3.2. | My main research objective is to advance the theoretical knowledge on strongly interacting theories in the Standard Model and beyond, thus paving the way for the discovery of New Physics and/or New Phenomena in Nature. Whenever possible, I study quantities which can be predicted entirely by analytical methods. Otherwise I use a combination of analytic and numerical techniques.

In the short and medium term, I will conduct my research mainly within the lattice field theory regularization, where the dynamics of strongly interacting theories can be studied non-perturbatively from first principles, i.e. starting from the fundamental |

equations and keeping track of all systematic and statistical errors throughout the calculation. I aim at computations of lattice quantities with a precision of a few percent or less, which is the accuracy required for the interpretation and the analysis of the wealth of experimental results expected both for sub-nuclear particles and for matter at non-vanishing temperature and/or chemical potential.

I will build on the recent extraordinary theoretical and algorithmic advances in the simulation of gauge theories with light quarks, and on the ongoing spectacular progress in HPC hardware. The success of my research will stem from conceptual, theoretical, algorithmic and technical advances. I will strive to formulate new computational strategies which guarantee computations from first principles. The results will enable me not only to link the experimental findings to the (hopefully new) fundamental theory, but also to move beyond what can be measured in experiments and address questions which may open new horizons in theoretical physics.

In the short and medium term, my research activity will be organized along the following three groups of objectives (themes).

Theme 1: QCD and flavor physics in SM and beyond
The factorization of the gauge dependence of the fermion determinant in QCD, Ref.[1], paves the way for multi-level Monte Carlo integration in the presence of fermions, opening new perspectives in lattice QCD. It is a turning point for the computation of many interesting quantities sensitive to Standard Model and hopefully to beyond Standard Model physics. In the next few years I will use this technique to compute (see arXiv:1710.09212 for details):

- the Hadronic vacuum polarization and light-by-light contribution to the muon g-2 with a precision of approximatively half a percent and a few percent respectively;

- the form factors of the semileptonic B decays $B \rightarrow \pi(K) l \nu$, $B \rightarrow K(K^*) l l$, at values of invariant dilepton mass Q^2 much smaller than before, see arXiv:1710.09212 for details;

- the nucleon mass and matrix elements of quark bilinear operators needed to compare the experimental results on the neutron electric dipole moment with the fundamental parameters of the theory (SM and beyond).

Theme 2: QCD at high temperature and phases of QCD
The long-term goal is to study the properties of QCD at finite temperature and baryon chemical potential in order to determine its equation of state and the parameters characterizing its phase diagram in the T-mu plane, and to understand whether critical points are related to chiral transitions.

I will determine the equation of state of QCD with 2+1 quark flavors at zero chemical potential in a range of temperature values never explored so far, up to O(10) GeV, an order of magnitude higher than the results which can be found in the literature. I will follow an innovative approach that I have recently proposed, namely the temperature is changed by introducing a shift in the (anti) periodic boundary conditions along the temporal direction. The Equation of State is then extracted from the expectation value of the off-diagonal components of the energy-momentum tensor. The main limitations of the standard integral method for going to temperatures higher than O(1) GeV, i.e. the ultraviolet power-divergent subtraction and the involute process of determining lines of constant physics, do not plague this strategy.

As a by-product, I will compute the topological susceptibility in full QCD up to temperatures of few GeVs by defining the topological charge with the Yang--Mills gradient flow. This will provide a unique information on the temperature dependence of the axion potential which, together with its mass, control the relic abundance of axion today (if it exists).

Theme 3: Computational strategies
I will continue to develop new algorithms to simulate QCD which combine a domain decomposition of the fermion determinant and of the quark propagator with multi-level integration techniques. The goal is to soften or eliminate the problem of the exponential depletion of the signal-to-noise ratio which affects most of the QCD correlation functions computed via standard Monte Carlo techniques. As a by-product I will explore the possibility of extending these ideas to the computation of tetraquark and pentaquark masses.

Technological and economic impact:
Historically research in elementary particle physics has boosted new technological applications and industrial innovation. Even ignoring the WWW - developed by CERN physicists - the growing demand for large resources required by experimental data and by the most advanced lattice QCD simulations, represent a strong motivation for the commercial development of fast parallel platforms and innovative systems for (Big) data storage.
Together with GRID, the machines of the APE family or the Columbia University Supercomputer project are striking examples of the driving force of "Big Science" for commercial realizations.

Here I tackle the most challenging problems in fundamental computational physics by efficiently evolving together new algorithms and their implementations. The synergy with the leading high-performance computing centers will help to define the road-map to exascale computing in Europe. I am among the developers, for instance, of several benchmarks used by CINECA to choose the next tier-0 supercomputer.

The need for expertise in managing big data is present in everyday life, as the activity in this respect of companies like Amazon, Facebook, and Google shows. I mention the case of Luigi Scorzato who has accumulated a great experience in computational physics in the lattice community and in my national project QCDLAT, and is now data scientist and associate manager at Accenture Digital Analytics, big data team for Austria-Switzerland-Germany. Another successful example is one of my postdocs Georg Engel who is a permanent researcher at AEE – Institute for Sustainable Technologies in Austria.

Author of 116 publications: 61 papers on peer-reviewed international journals and 55 proceedings at international conferences. Please see the list of publications for more details. More than 60 talks and seminars given at international conferences and universities.

Articles in journals with peer review

1. Equation of state of the SU(3) Yang–Mills theory: A precise determination from a moving frame
   L. Giusti, M. Pepe
   Phys. Lett. B769 (2017) 385

2. A local factorization of the fermion determinant in lattice QCD
   M. Ce`, L. Giusti, S. Schaefer
   Phys. Rev. D95 (2017) 3, 034503

3. The topological susceptibility in the large-N limit of SU(N) Yang–Mills theory
   M. Ce`, M. Garcia Vera, L. Giusti, S. Schaefer
   Phys. Lett. B762 (2016) 232-236

4. Domain decomposition, multi-level integration and exponential noise reduction in lattice QCD
   Marco Ce`, L. Giusti, S. Schaefer
   Phys. Rev. D93 (2016) 9, 094507

5. Color structure of Yang-Mills theory with static sources in a periodic box
   L. Giusti, A.L. Guerrieri, S. Petrarca, A. Rubeo and M. Testa
   Phys. Rev. D 92 (2015) 3, 034515

6. Non-Gaussianities in the topological charge distribution of the SU(3) Yang--Mills theory
   M. Ce`, C. Consonni, G. P. Engel and L. Giusti
   Phys. Rev. D 92 (2015) 7, 074502

7. Energy-momentum tensor on the lattice: Nonperturbative renormalization in Yang-Mills theory
   L. Giusti and M. Pepe
   Phys. Rev. D 91 (2015) 11, 114504

8. Spectral density of the Dirac operator in two-flavor QCD
   G. P. Engel, L. Giusti, S. Lottini and R. Sommer
   Phys. Rev. D 91 (2015) 5, 054505

9. Chiral Symmetry Breaking in QCD with Two Light Flavors
   G. P. Engel, L. Giusti, S. Lottini and R. Sommer
   Phys. Rev. Lett. 114 (2015) 11, 112001

10. Equation of state of a relativistic theory from a moving frame
    L. Giusti and M. Pepe
    Phys. Rev. Lett. 113 (2014) 031601

11. Implications of Poincare symmetry for thermal field theories in finite-volume
    L. Giusti and H. B. Meyer
    JHEP 1301 (2013) 140

12. Thermodynamic potentials from shifted boundary conditions: the scalar-field theory case
    L. Giusti and H. B. Meyer
    JHEP 1111 (2011) 087

13. A novel approach for computing glueball masses and matrix elements in Yang-Mills theories on the lattice
    M. Della Morte and L. Giusti
    JHEP 1105 (2011) 056

14. Thermal momentum distribution from path integrals with shifted boundary conditions
    L. Giusti and H. B. Meyer
    Phys. Rev. Lett. 106 (2011) 131601

15. Chiral symmetry breaking and the Banks--Casher relation in lattice QCD with Wilson quarks
    L. Giusti and M. Luscher
    JHEP 0903 (2009) 013

16. Symmetries and exponential error reduction in Yang-Mills theories on the lattice
    M. Della Morte and L. Giusti
    Comput. Phys. Commun. 180 (2009) 819

17. Exploiting symmetries for exponential error reduction in path integral Monte Carlo
    M. Della Morte and L. Giusti
    Comput. Phys. Commun. 180 (2009) 813

18. Testing chiral effective theory with quenched lattice QCD
    L. Giusti et al.
    JHEP 0805 (2008) 024

19. Theta dependence of the vacuum energy in the SU(3) gauge theory from the lattice
    L. Giusti, S. Petrarca and B. Taglienti
    Phys. Rev. D 76 (2007) 094510

20. Spontaneous chiral symmetry breaking in QCD: a finite-size scaling study on the lattice
    L. Giusti and S. Necco
    JHEP 0704 (2007) 090

21. QCD with light Wilson quarks on fine lattices (II): DD-HMC simulations and data analysis
    L. Del Debbio, L. Giusti, M. Luscher, R. Petronzio and N. Tantalo
    JHEP 0702 (2007) 082

22. QCD with light Wilson quarks on fine lattices (I): first experiences and physics results
    L. Del Debbio, L. Giusti, M. Luscher, R. Petronzio and N. Tantalo
    JHEP 0702 (2007) 056

23. On K-->pipi amplitudes with a light charm quark
    L. Giusti et al.
    Phys. Rev. Lett. 98 (2007) 082003

24. Non-perturbative renormalisation of left-left four-fermion operators with Neuberger fermions
    P. Dimopoulos et al.
    Phys. Lett. B 641 (2006) 118

25. Stability of lattice QCD simulations and the thermodynamic limit
    L. Del Debbio, L. Giusti, M. Luscher, R. Petronzio and N. Tantalo
    JHEP 0602 (2006) 011

26. Topological susceptibility in the SU(3) gauge theory
    L. Del Debbio, L. Giusti and C. Pica
    Phys. Rev. Lett. 94 (2005) 032003

27. A strategy to study the role of the charm quark in explaining the Delta I =1/2 rule
    L. Giusti et al.
    JHEP 0411 (2004) 016

28. Non-perturbative renormalization of lattice operators in coordinate space
    V. Gimenez et al.
    Phys. Lett. B 598 (2004) 227

29. Topological susceptibility in full QCD with Ginsparg-Wilson fermions
    L. Giusti, G. C. Rossi and M. Testa
    Phys. Lett. B 587 (2004) 157

30. LECs of QCD from from current correlators near the chiral limit
    L. Giusti, P. Hernandez, M. Laine, P. Weisz and H. Wittig
    JHEP 0404 (2004) 013

31. Low-energy couplings of QCD from topological zero-mode wavefunctions
    L. Giusti, P. Hernandez, M. Laine, P. Weisz and H. Wittig
    JHEP 0401 (2004) 003

32. Lattice QCD in the epsilon-regime and random matrix theory
    L. Giusti, M. Luscher, P. Weisz and H. Wittig
    JHEP 0311 (2003) 023

33. B_K from quenched QCD with exact chiral symmetry
    N. Garron, L. Giusti, C. Hoelbling, L. Lellouch and C. Rebbi
    Phys. Rev. Lett. 92 (2004) 042001

34. Numerical techniques for lattice QCD in the epsilon-regime
    L. Giusti, C. Hoelbling, M. Luscher, H. Wittig
    Comput. Phys. Commun. 153 (2003) 31

35. Remarks on the gauge dependence of the RI/MOM renormalization procedure
    L. Giusti, S. Petrarca, B. Taglienti and N. Tantalo
    Phys. Lett. B 541 (2002) 350

36. A study of the t'Hooft model with the overlap-Dirac operator
    F. Berruto, L. Giusti, C. Hoelbling and C. Rebbi
    Phys. Rev. D 65 (2002) 094516

37. Fermions on tori in uniform abelian fields
L. Giusti, A. Gonzalez-Arroyo, C. Hoelbling, H. Neuberger and C. Rebbi
Phys. Rev. D 65 (2002) 074506

38. The U_A(1) problem on the lattice with Ginsparg-Wilson fermions
L. Giusti, G. C. Rossi, M. Testa and G. Veneziano
Nucl. Phys. B 628 (2002) 234

39. Light quark masses with overlap fermions in quenched QCD
L. Giusti, C. Hoelbling and C. Rebbi
Phys. Rev. D 64 (2001) 114508

40. Problems on lattice gauge fixing
L. Giusti, M. L. Paciello, C. Parrinello, S. Petrarca and B. Taglienti
Int. J. Mod. Phys. A 16 (2001) 3487

41. Schwinger model with the overlap-Dirac operator: exact results versus a physics motivated
approximation
L. Giusti, C. Hoelbling and C. Rebbi
Phys. Rev. D 64 (2001) 054501

42. Analysis of the Delta I =1/2 rule and epsilon'/epsilon with overlap fermions
S. Capitani and L. Giusti
Phys. Rev. D 64 (2001) 014506

43. Perturbative renormalization of weak Hamiltonian four-fermion operators with overlap
fermions
S. Capitani and L. Giusti
Phys. Rev. D 62 (2000) 114506

44. RI/MOM renormalization window and Goldstone pole contamination
L. Giusti and A. Vladikas
Phys. Lett. B 488 (2000) 303-312

45. B0-B0 mixing and decay constants with the NP improved action
D. Becirevic et al.
Nucl. Phys. B 618 (2001) 241

46. NNLO unquenched calculation of the B quark mass
V. Gimenez, L. Giusti, G. Martinelli and F. Rapuano
JHEP 03 (2000) 018

47. Lattice gauge fixing for parameter dependent covariant gauges
L. Giusti, M. L. Paciello, S. Petrarca and B. Taglienti
Phys. Rev. D 63 (2001) 014501

48. Renormalization group invariant matrix elements of Delta S = 2 and Delta I = 3/2 four-
fermion operators without quark masses
A. Donini, V. Gimenez, L. Giusti and G. Martinelli
Phys. Lett. B 470 (1999) 233

49. Combined analysis of the UT and CP violation in the standard model
M. Ciuchini, E. Franco, L. Giusti, V. Lubicz and G. Martinelli
Nucl. Phys. B 573 (2000) 201

50. Fermion masses and symmetry breaking of a U(2) flavour symmetry
R. Barbieri, L. Giusti, L. J. Hall and A. Romanino
Nucl. Phys. B 550 (1999) 32

51. Natural ranges of supersymmetric signals
L. Giusti, A. Romanino and A. Strumia
Nucl. Phys. B 550 (1999) 3

52. Delta M _K and epsilon_K in SUSY at the next-to-leading order
M. Ciuchini et al.,
JHEP 10 (1998) 008

53. The QCD chiral condensate from the lattice
L. Giusti, F. Rapuano, M. Talevi, A. Vladikas
Nucl. Phys. B 538 (1999) 249

54. B-parameters for Delta S =2 supersymmetric operators
C.R. Allton et al.
Phys. Lett. B 453 (1999) 30

55. Non-perturbative renormalization of quark bilinears
V. Gimenez, L. Giusti, F. Rapuano and M. Talevi
Nucl. Phys. B 531 (1998) 429

56. On the definition of gauge field operators in lattice gauge-fixed theories
L. Giusti, M.L. Paciello, S. Petrarca, B. Taglienti, M. Testa
Phys. Lett. B 432 (1998) 196

57. Lattice quark masses: a non-perturbative measurement
V. Gimenez, L. Giusti, F. Rapuano and M. Talevi
Nucl. Phys. B 540 (1999) 472

58. Atomic parity violation and the Hera anomaly
L. Giusti and A. Strumia
Phys. Lett. B 410 (1997) 229

59. A high statistics lattice calculation of heavy-light meson decay constants
C. R. Allton et al.
Phys. Lett. B 405 (1997) 133

60. Lattice gauge fixing for generic covariant gauges
L. Giusti
Nucl. Phys. B 498 (1997) 331

61. Light quenched hadron spectrum and decay constants on different lattices
C. R. Allton, V. Gimenez, L. Giusti and F. Rapuano
Nucl. Phys. B 489 (1997) 427

Preprints submitted to journals with peer review:

Proceedings of invited talks

62. Mechanisms of chiral symmetry breaking in QCD: a lattice perspective
L. Giusti, Plenary at the XI International Conference on Quark Confinement and the Hadron Spectrum
AIP Conf.Proc. 1701 (2016) 020010

63. Recent Progress on Chiral Symmetry Breaking in QCD
L.Giusti, Plenary at 33rd International Symposium on Lattice Field Theory (Lattice 2015)
PoS (LATTICE 2015) 001

64. Light dynamical fermions on the lattice: toward the chiral regime of QCD
L. Giusti, Plenary at 24th International Symposium on Lattice Field Theory (Lattice 2006)
PoS (LAT2006) 009

65. A lattice perspective of kaon phenomenology
L. Giusti, International Europhysics Conference on High Energy Physics HEP2003, Aachen, Germany
Eur. Phys. J. C 33 (2004) S881

66. Exact chiral symmetry on the lattice: QCD applications
    L. Giusti, Plenary at 20th International Symposium on Lattice Field Theory (Lattice 2002)
    Nucl. Phys. (Proc. Suppl.) 119 (2003)

67. Quark masses and weak matrix elements from the lattice
    L. Giusti, Plenary at LEP Phsycs
     LEP Physics - Rome 2001, 245

68. Weak matrix elements without quark masses on the lattice
    L. Giusti, Plenary at High Energy Physics International Euroconference
    on Quantum Chromo Dynamics - QCD '99, Montpellier
    Nucl. Phys. (Proc. Suppl.) 86 (2000) 299

Proceedings of other Giusti's talks

69. A novel computation of the thermodynamics of the SU(3) Yang-Mills theory
    L. Giusti and M. Pepe
    PoS (LATTICE 2015) 211

70. Thermal field theories and shifted boundary conditions
    L. Giusti and H. B. Meyer
    PoS (LATTICE 2013) 214

71. Thermal momentum distribution from shifted boundary conditions
    L. Giusti
    PoS (Lattice 2011) 194

72. Glueball masses from ratios of path integrals
    L. Giusti and M. Della Morte
    PoS (Lattice 2011) 308

73. Symmetries and exponential error reduction in YM theories on the lattice: theoretical aspects
    and simulation results
    M. Della Morte and L. Giusti
    PoS (LAT2009) 029

74. Topological susceptibility for the SU(3) Yang-Mills theory
    L. Del Debbio, L. Giusti and C. Pica
    Nucl. Phys. (Proc. Suppl.) 140 (2005) 603

75. Quenched results for light quark physics with overlap fermions
    L. Giusti, C. Hoelbling and C. Rebbi,
    Nucl. Phys. (Proc. Suppl.) 106 (2002) 739

76. Exact results and approximation schemes for the Schwinger model with the overlap-Dirac
    operator
    L. Giusti, C. Hoelbling and C. Rebbi
    Nucl. Phys. (Proc. Suppl.) 94 (2001) 741

77. Matrix elements without quark masses on the lattice
    A. Donini, V. Gimenez, L. Giusti, and G. Martinelli
    Nucl. Phys. (Proc. Suppl.) 83 (2000) 238

78. Quark masses and the chiral condensate with a non-perturbative renormalization procedure
    V. Gimenez, L. Giusti, F. Rapuano, M. Talevi and A. Vladikas
    Nucl. Phys. (Proc. Suppl.) 73 (1999) 210

79. A high statistics lattice calculation of quark masses with a non-perturbative renormalization
    procedure
    L. Giusti
    Nucl. Phys. B (Proc. Suppl.) 63 (1998) 167

80. Quenched hadron spectrum and decay constants on the lattice
L. Giusti
Surveys High Energy Phys. 13 (1998) 211

81. Light quenched hadron spectrum and decay constants on different lattices
C. R. Allton, V. Gimenez, L. Giusti, F. Rapuano
Nucl. Phys. B (Proc. Suppl.) 53 (1997) 203

Other proceedings

82. Domain decomposition and multilevel integration for fermions
M. Ce`, L. Giusti, S. Schaefer
PoS LATTICE2016 (2016) 263

83. Thermodynamics of strongly interacting plasma with high accuracy
L. Giusti, M. Pepe
PoS LATTICE2016 (2016) 061

84. The large N limit of the topological susceptibility of Yang-Mills gauge theory
M. Ce`, M. Garcia Vera, L. Giusti, S. Schaefer
PoS LATTICE2016 (2016) 350

85. Renormalization of the energy-momentum tensor on the lattice
M. Pepe and L. Giusti
PoS (EPS-HEP2015) 376

86. Non-perturbative renormalization of the energy-momentum tensor in SU(3) Yang-Mills theory
M. Pepe and L. Giusti
PoS LATTICE2014 (2014) 322

87. Testing the Witten-Veneziano mechanism with the Yang-Mills gradient flow on the lattice
M. Ce`, C. Consonni, G. P. Engel and L. Giusti
PoS LATTICE2014 (2014) 353

88. Measuring the entropy from shifted boundary conditions
L. Giusti and M. Pepe
PoS (LATTICE 2013) 489

89. Chiral condensate from the Banks-Casher relation
G. P. Engel, L. Giusti, S. Lottini and R. Sommer
PoS (LATTICE 2013) 119

90. Glueball masses with exponentially improved statistical precision
M. Della Morte and L. Giusti
PoS (Lattice 2010) 250

91. Towards a precise determination of the topological susceptibility in the SU(3) Yang-Mills theory
L. Giusti, S. Petrarca, B. Taglienti
PoS (LAT2009) 229.

92. Non-leptonic kaon decays and the chiral regime of the strong interaction
L. Giusti et al.,
NIC Symposium 2006 - Juelich.

93. Large statistics study of the topological charge distribution in the SU(3) gauge theory
L. Giusti, S. Petrarca, B. Taglienti
PoS (LAT2006) 058

94. On the determination of low-energy constants for Delta S = 1 transitions
L. Giusti et al.,
PoS LAT2005 (2005) 344

95. Low-mode averaging for baryon correlation functions
    L. Giusti and S. Necco
    PoS LAT2005 (2005) 132

96. Correlation functions at small quark masses with overlap fermions
    L. Giusti et al.
    Nucl. Phys. (Proc. Suppl.) 140 (2005) 417

97. Non perturbative renormalization in coordinate space
    V. Gimenez et al.
    Nucl. Phys. (Proc. Suppl.) 129 (2004) 411

98. B_K from quenched overlap QCD
    N. Garron, L. Giusti, C. Hoelbling, L. Lellouch and C. Rebbi
    Nucl. Phys. (Proc. Suppl.) 119 (2003) 356

99. Numerical exploration of the RI/MOM scheme gauge dependence
    L. Giusti, S. Petrarca, B. Taglienti and N. Tantalo
    Nucl. Phys. (Proc. Suppl.) 119 (2003) 962

100. A simulation of the t'Hooft model at finite N_c with the overlap-Dirac operator
     F. Berruto, L. Giusti, C. Hoelbling, C. Rebbi
     Nucl. Phys. (Proc. Suppl.) 106 (2002) 733

101. Quark and gluon propagators in covariant gauges
     L. Giusti, M. L. Paciello, S. Petrarca, B. Taglienti and N. Tantalo
     Nucl. Phys. (Proc. Suppl.) 106 (2002) 995

102. The $U_A(1)$ problem on the lattice
     L. Giusti, G. C. Rossi, M. Testa, G. Veneziano
     Nucl. Phys. (Proc. Suppl.) 106 (2002) 1001

103. Results on the gluon propagator in lattice covariant gauges
     L. Giusti, M. L. Paciello, S. Petrarca, C. Rebbi and B. Taglienti
     Nucl. Phys. (Proc. Suppl.) 94 (2001) 805

104. Preliminary results with lattice covariant gauges
     L. Giusti, M. L. Paciello, S. Petrarca and B. Taglienti
     Lattice fermions and structure of the vacuum
     Dubna 1999, 253

105. epsilon'/epsilon from lattice QCD
     M. Ciuchini, E. Franco, L. Giusti, V. Lubicz, G. Martinelli
     Kaon Physics 1999, 305

106. How to fix non-perturbatively a parameter dependent covariant gauge on the lattice
     L. Giusti, M. L. Paciello, S. Petrarca and B. Taglienti
     Nucl. Phys. (Proc. Suppl.) 83 (2000) 819

107. NNLO unquenched calculation of the B quark mass
     V. Gimenez, L. Giusti, F. Rapuano and G. Martinelli
     Nucl. Phys. (Proc. Suppl.) 83 (2000) 286

108. Considerations on Neuberger's operator
     L. Giusti, C. Hoelbling and C. Rebbi
     Nucl. Phys. (Proc. Suppl.) 83 (2000) 896

109. New results from Ape with nonperturbatively improved Wilson fermions
     D. Becirevic et al.,
     Nucl. Phys. (Proc. Suppl.) 73 (1999) 222

		110. B-parameters for Delta S =2 supersymmetric operators C.R. Allton et al., Nucl. Phys. (Proc. Suppl.) 73 (1999) 315 111. On the definition of gauge field operators in lattice gauge-fixed theories L. Giusti, M. L. Paciello, S. Petrarca, B. Taglienti and M. Testa Nucl. Phys. (Proc. Suppl.) 73 (1999) 862 112. Critical dynamics of the hybrid Monte Carlo algorithm TChiL. Collaboration (G. Bali et al.), Nucl. Phys. B (Proc. Suppl.) 63 (1998) 946 113. Glueballs and string breaking from full QCD SESAM Collaboration and TChiL Collaboration (G.S. Bali et al.), Nucl. Phys. B (Proc. Suppl.) 63 (1998) 209 114. Light quark physics with dynamical Wilson fermions SESAM Collaboration and TChiL. Collaboration (H. Hoeber et al.), Nucl. Phys. B (Proc. Suppl.) 63 (1998) 218 115. Sesam and TChiL results for Wilson action: a status report TChiL. Collaboration (G. Bali et al.), Nucl. Phys. B (Proc. Suppl) 60A (1998) 311 116. Full QCD with dynamical Wilson fermions on a 24^3X40 lattice: a feasibility study TChiL. Collaboration (L. Conti et al.), Nucl. Phys. B (Proc. Suppl.) 53 (1997) 222
3.4.		

3.5.	Funding ID
	Since 2011 Leonardo Giusti has been coordinator and principal investigator of research grants for a total of approximatively **600 K Euros** and **170 M corehours** on HPCs (equivalently to approximately **1.7M Euros** at market price). This funding have supported research in the fields of lattice QCD and its application to phenomenology. Until September 2010 Leonardo was a staff member of the Theory Department of CERN, where he regularly had postdocs, travel money and funding for HPCs without the need to apply to competitive calls.
	
	2016-2017 University of Milano Bicocca: competitive allocations for postdocs
	        PI and Coordinator of the lattice group. Budget **70K Euros**
	
	2013-2017 INFN National Research Network
	        Title: QCDLAT - New frontiers in lattice field theory for the Standard Model and beyond
	        (Strong interactions in the Standard Model and beyond and lattice field theory until 2016)
	        PI and Coordinator of the project. Budget **240K Euros**.
	        Computer time allocated by CINECA 150M core hours (equivalently to
	        approximatively **1.5M Euros** at market price)
	
	2012-2017 INFN allocations for postdocs to the lattice group of Milano Bicocca
	        PI and Coordinator of the group. Budget **204K Euros**
	
	2011-2013 MIUR National Research Network
	        Title: Lattice Field Theory at the LHC Epoch
	        Coordinator of the Milano Bicocca Unit. Budget for Bicocca Unit **84K Euros**
	
	2015-2017 ISCRA Call – CINECA
	        Title: Topological susceptibility in large-N Yang-Mills theory
	        PI and Coordinator of the project. Budget 6M core hours (equivalent to
	        approximatively **60K Euros**)
	
	2010-2011 CSCS Swiss National Supercomputing Center
	        Title: Numerical lattice gauge theory with a symmetry constrained Monte Carlo
	        PI and Coordinator of the project. Budget 15M core hours (equivalent to
	        approximatively **150K Euros**)

3.6.	**Invited plenary talks at international conferences**

2017   Lattice 2017 - University of Granada - Granada
      Title: Multi-boson block factorization of fermions
2015   Lattice 2015 - RIKEN Advanced Institute for Computational Science - Kobe
      Title: Recent progress on chiral symmetry breaking in QCD
2014   XI Int. Conf. on Quark Confinement and the Hadron Spectrum - St. Petersburg
      Title: Mechanisms of chiral symmetry breaking in QCD: a lattice perspective
2008   VIII Quark confinement and the hadron spectrum - University of Mainz
      Title: The Banks--Casher relation with Wilson fermions in two-flavour QCD
2006   Lattice 2006 - University of Tucson (AZ)
      Title: Light dynamical fermions on the lattice: toward the chiral regime of QCD
2005   XXXXth Rencontres de Moriond - La Thuile
      Title: Unquenched flavor physics with TeraFlop machines ?
2002   Lattice 2002 - MIT Cambridge (MA)
      Title: Exact chiral symmetry on the lattice: QCD applications
1999   QCD 99 - University of Montpellier
      Title: Weak matrix elements without quark masses on the lattice

Invited plenary talks at international workshops
2017   SIGN 2017: Sign Problem in QCD and Beyond - INT Seattle
      Title: A local factorization of the fermion determinant in lattice gauge theories
2016   CERN TH Institute on emergent properties of space-time - CERN
      Title: Non-perturbative definition of the energy-momentum tensor on the lattice
2015   XVI workshop on Statistical Mechanics and non Perturbative Field Theory - Bari
      Title: Implications of Poincaré symmetry for thermal field theories
2015   Origin of Mass 2015 - Odense
      Title: Implications of Poincaré symmetry for thermal field theories
2013   STRONGnet 2013 - Workshop - Graz
      Title: Implications of Poincaré symmetry for thermal field theories
2012   New Horizons for Lattice Computations with Chiral Fermions - BNL Brookhaven
      Title: Thermodynamic potentials from shifted boundary conditions
2011   Chiral dynamics with Wilson fermions - ECT* Trento
      Title: Thermodynamic potentials from shifted boundary conditions
2009   2009 Taipei Workshop on Lattice QCD - Taiwan
      Title: On the Banks--Casher relation with Wilson fermions
2009   QCD Green's Functions, Confinement and Phenomenology - ECT* Trento
      Title: Chiral symmetry breaking and the Banks--Casher relation
2006   Lattice QCD simulations with light quarks - Max Planck Inst., Ringberg
      Title: Lattice QCD with light quarks compares to chiral perturbation theory
2005   Chiral perturbation theory confronts lattice QCD - University of Valencia
      Title: Low-energy constants of the $\Delta S=1$ effective Hamiltonian from lattice QCD
2005   Perspectives in lattice QCD - Japan Soc. for Promotion of Science, Nara
      Title: First results for two-flavor QCD with light quarks
2005   DESY Theory Workshop 2005 - Hamburg
      Title: Unquenched flavor physics with TeraFlop machines ?
2004   Lattice QCD: present and future - University of Paris sud
      Title: Flavor physics on the lattice with TFlop machines

Other invited talks
2009   Conference on computational physics 2009, Taiwan
      Title: Exploiting symm. for exp. error reduction in path integral Monte Carlo
2006   Chiral Dynamics 2006 - Durham/Chapel Hill USA
      Title: Lattice QCD simulations with two light dynamical (Wilson) quarks
2004   Conference on computational physics 2004, Genova
      Title: Flavor physics with TFlop machines
2003   FIS - Parma
      Title: Witten-Veneziano formula with GW fermions
2003   Europhysics Conference on High Energy Physics (HEP2003) - Aachen
      Title: A lattice perspective of kaon phenomenology
2003   IFAE - Lecce
      Title: Lattice Matrix Elements for unitarity triangle analysis

	2001 LEPTRE - Rome
	    Title: Quark masses and weak MEs from the lattice
	
	Organization of international conferences and workshops
	2014 VII Parma International School of Theoretical Physics
	    Title: Lectures on Lattice: Methods and Applications
	2014 CERN TH-Institute
	    Title: Conceptual advances in lattice gauge theory
	2010 CERN TH-Institute
	    Title: Future directions in lattice gauge theory
	2005 Conference - Marseille
	    Title: Rencontre de physique des particules
	2004 Workshop - Paris
	    Title: Lattice QCD: present and future
	    Coordinator of the Working Group on flavor physics

3.7.	2005 Offer of a tenure-track position at MIT - Boston 1997 Amos De-Shalit scholarship, Ettore Majorana center – Erice 1996 Giuseppe P.S. Occhialini scholarship, Ettore Majorana center - Erice 1993 CERN Summer Student scholarship - Geneva 1992 Enrico Persico scholarship, Accademia Nazionale dei Lincei - Rome
3.8.	2016 Member of the International Advisory Committe of Lattice 2016 2015 Member of the International Advisory Committe of Lattice 2015 2008- Physics Department executive committee at University of Milano Bicocca 2006-2010 Fellow committee at CERN PH-TH 2005-2010 Staff committee at CERN PH-TH 1997-1998 Entry undergraduate committee at Scuola Normale Superiore - Pisa

3.9.	**Service to the community**
	2016- Referee for EPJA
	2014 Ph.D thesis opponent of Dr. Mattia Dalla Brida, Trinity College - Dublin
	2005- Referee for JHEP
	2004 Ph.D thesis opponent of Dr. Nicolas Garron, CNRS - Marseille
	2003- Referee for Nucl. Phys. and Phys. Lett.
	1999- Referee for Phys. Rev. Lett. and Phys. Rev.
	
	Service to national funding agencies
	2016- Reviewer for ANVUR - Italy
	2015- Reviewer for MIUR - Italy
	2015- Reviewer for Swiss National Science Foundation (SNSF)
	2015- Reviewer for DiRAC HPC supercomputer center - UK
	2014- Reviewer for the Hungarian Scientific Research Fund (OTKA)
	2007- Reviewer for the Science and Technology Facilities Council (former PPARC/CCLRC) - UK
	    PPRP projects: major new projects that are considered to have significant scientific priority
	    in Several branches of physics
	    http://www.stfc.ac.uk/About/Strat/Council/AdCom/oth/PPRP/Contents.aspx
	
	2007- Reviewer for the Netherlands Foundation for Fundamental
	    Research on Matter (FOM) – Projectruimte

3.10.	2006-2010 Research Training Network funded by EU (contract MRTN-CT-2006-035482)
	    Title: Entering the high-precision era of flavour physics through the alliance
	    of lattice simulations, effective field theories and experiment (FLAVIAnet)
	    Member of the Bern-CERN node
	
	2002-2006 Research Training Network funded by EU (contract HPRN-CT-2002-00311)
	    Title: European Investigations on Dafne and other International Collider
	    Experiments using Effective Theories of Colors and Flavours from the Phi
	    to the Upsilon (EURIDICE)
	    Member of the Marseille node
	
	2001-2003 Research Training Network funded by EU (contract HPRN-CT-2000-00145)

		Title: Hadron Phenomenology from Lattice QCD
		Member of the Orsay-Marseille node

4. Pedagogical merits		

4. Pedagogical merits

To support the reporting and assessment of pedagogical merits, KTH uses a pedagogical portfolio. The following items and titles are based on that portfolio. For an in-depth description, see the basic document "Pedagogical portfolio at KTH Teacher Support Web": https://www.kth.se/en/om/work-at-kth/cv-mall-for-anstallning-av-larare-1.471907

Expected extent of descriptive and reflective sections in paragraph 4.1, 4.3, 4.4 and 4.6: 3-5 pages.

4.1.	Since a decade I have been teaching regularly at all levels within the University and beyond: bachelor, master, Ph.D and at international schools for Ph.D students and postdocs. I have been supervising 8 postdocs, 2 PhD students and 3 master students. All of them have investigated several theoretical and phenomenological aspects of lattice QCD. My previous students become successful PhD students, postdocs, researchers and faculties at prestigious institutions and companies such as University of Odense, Mainz, Roma Tor Vergata, Trento, Wuppertal and AEE.

4.2.	**Invited courses at international schools**

Invited courses at international schools

2017   Three lectures at the CP³ Origins Lattice Winter School - Odense
     Title: Factorization of fermions

2017   Three lectures at the ICPT Summer School on Particle Physics - Trieste
     Title: Broken symmetries and lattice gauge theory

2016   Ten lectures at the Galileo Galilei Institute for Theoretical Physics - Florence
     Title: Quantum field theory beyond perturbation theory

2006   Two lectures at College de France - Paris
     Title: Lattice QCD with Wilson and Ginsparg--Wilson fermions

2005   Two lectures for the Japan Soc. for Promotion of Science - Nara
     Title: QCD applications for Ginsparg--Wilson fermions

2002   Two lectures at EU IHP workshop - University of Bern
     Title: Chiral fermions and their phenomenological applications

Teaching experience

2017-2018 Title: Quantum field theory II
     Full course of 48 hours for master students at the
     Physics Department of University of Milano Bicocca

2017-2018 Title: Computational Physics
     Full course of 90 hours for master students at the Physics
     Department of University of Milano Bicocca

2016   Title: Quantum field theory I
     Full courses of 48 hours for master students at the
     Physics Department of University of Milano Bicocca

2016   Title: Quantum field theory II
     Full course of 48 hours for master students at the
     Physics Department of University of Milano Bicocca

2012-2015   Title: Numerical methods for theoretical physics
     Full course of 96 hours for bachelor students at the Physics
     Department of University of Milano Bicocca

2010-2015 Title: Advanced quantum mechanics
     Full course of 64 hours for bachelor students at the
     Physics Department of University of Milano Bicocca

2009-2011 Title: Numerical methods for theoretical physics
     Full course of 90 hours for master students at the Physics
     Department of University of Milano Bicocca

Supervision of postdocs

2017-2019 Dr. Tim Harris
           Postdoctoral researcher at University of Milano Bicocca
2016-2020 Dr. Mattia Dalla Brida
           Postdoctoral researcher at University of Milano Bicocca
2014-2016 Dr. Alejandro Vaquero
           Postdoctoral researcher at University of Milano Bicocca
           From October 2016 postdoc at University of Utah
2012-2014 Dr. Georg Engel
           Postdoctoral researcher at University of Milano Bicocca
           Now permanent researcher at AEE - Institute for Sustainable Technologies - Austria
2009-2010 Dr. Harvey Meyer
           Fellow at CERN PH-TH
           Now Associate Professor at University of Mainz.
2008-2010 Dr. Silvia Necco
           Fellow at CERN PH-TH
           Now secondary school teacher in Geneva.
2006-2008 Dr. Michele Della Morte
           Fellow at CERN PH-TH
           Now Associate Professor at University of Southern Denmark.
2004-2005 Dr. Silvia Necco
           Postdoctoral researcher at CPT (CNRS) - Marseille

Supervision of students

2013-2016 Mr. Marco Cè
           Ph.D at Scuola Normale Superiore di Pisa
           From October 2016 postdoc at University of Mainz
2013   Mr. Marco Cè
           Master degree in Physics at University of Milano Bicocca
2013   Mr. Cristian Consonni
           Master degree in Physics at University of Milano Bicocca
           Now computer science PhD student at University of Trento
2010   Mr. Marco Furlan
           Bachelor degree in Physics at University of Milano Bicocca
2001   Co-supervisor of Nazario Tantalo
           Laurea degree in Physics at University of Rome La Sapienza
           Now permanent researcher at University of Tor Vergata
1999-2001 Co-supervisor of Christian Höelbling
           Ph.D in Physics at Boston University
           Now permanent researcher at University of Wuppertal

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4.3.   A key aspect of my teaching style is to deliver engaging, high-quality lectures. I have never received any formal training in teaching, but it has been always clear to me that certain seminar and colloquium speakers are so much better, more exciting and engrossing than others.

I have been exposed for eight years to the seminars and colloquia of the PH and TH Department of CERN, being also the organizers of some of them. They have been a source of inspiration for the preparation of my courses in Advanced Quantum Mechanics and Quantum field theory I and II. A concrete example is the colloquium given at CERN in October 2006 by Prof. C. N. Yang on the development of gauge theories in the 20th century. I still keep the video of that colloquium which I regularly pass to my students during one of the lectures of Quantum field theory I.

When in 2009 I started teaching my own courses, I also spent some time in understanding the key points in the "art of presenting" a lecture, with a lot of trail-and-error. I started studying how successful presentations are prepared and delivered also by reading specialized books, and pondered over how that excellence could be transferred and add value to my lectures.

I believe a well-organized, engaging lecture is one that possesses a core topic, clearly outlined at the beginning of class, a motivation as to why we care about it and how it is relevant, all explained with a rigorous logic. I try to put the core topic's relevance in perspective at various levels: for the course itself, for physics more broadly intended, and, crucially, for current research. This is followed by examples

| | during the course of the lecture, when possible at all three levels, to reinforce the notion that we are learning something of value. The core of the lecture is then the proof of the argument in the general case with the most rigorous logic possible at the level of the lecture given. The lecture is concluded circularly, reiterating the key take-home aspects of the core topic. I consider reaffirming important concepts multiple times one of the most effective approaches to transferring knowledge.

Each course I teach presents unique challenges: striving to draw connections from Newton's mechanics to cutting-edge particle physics research; engaging students in a course on Quantum Field theory through a diverse set of exciting physics examples; helping our first-year master students through the delicate transition into graduate school; finding the optimal balance between individualized attention and collaborative learning during office hours, especially for courses with large enrolments.

A crucial aspect of my teaching philosophy is the belief that the faculty are doing cutting-edge research. We are not telling a story that others are writing. We are authors of the story of contemporary research. The students must clearly feel it, and become aware that they can be the next contributors to this endeavour. The Lagrangian we write down for a simple harmonic oscillator is the same we use to quantize particles in quantum field theory, and to understand how electrons and protons (and particles yet to be discovered) behave at the most fundamental level.

One of the first thing I do in class at the beginning of the course is to present in quite some detail my research, the work of other members of the theory group, and especially the topics of the thesis of current Ph.D students. I introduce the topics of the weekly Theoretical Physics seminar and the monthly colloquia well before these events. It is my strong believe that much of the value added of getting an high education in a University comes from having a formidable research environment. |
|---|---|
| 4.4. | I am committed about sharing with my students my knowledge of physics as well as the passion I feel about it. I strive to listen to and to understand my students' issues and concerns, and to learn from their feedback. Specifically, my view on teaching is based on the following points:

1.   I see as essential to deliver engaging, high-quality lectures aiming at forming the scientific thinking of the pupils, rather than just informing them. A good lecture should stimulate the curiosity and interest of students, illustrate the theoretical concepts presented in class emphasizing their relevance to fundamental results in the literature, and/or open research problems, while introducing students to the practice of doing scientific research. For each lecture, objectives should be clear and the key concepts should be broken down into pieces, finding a balance between being small enough to be digestible, yet contain enough substance to remain interesting.

2.   I strive to be as interactive as possible as a teacher, making all possible efforts to engage students in discussions during and after the lecture. This means finding the optimal balance between individualized attention and collaborative learning in the classroom and during office hours. I have found over time particularly effective organizing students in small groups for solving exercises: these forms of collaborative learning motivate students and help in establishing closer professor-student ties. I also find very effective asking students to present weekly assignments in front of the class, as this not only push them to engage and delve more into the topic, but also hones their scientific presentation skills, as I believe that orally explaining science to others is a skill that can and should be learned by anyone interested in successfully pursuing scientific research.

3.   I always work directly with the Master and PhD students that I supervise, defining the scientific problem on which they will work, helping them breaking it down in consecutive steps in several one-to-one interactive sessions. I help them to make progress in their research while learning both from their success and their mistakes. My ultimate goal, overarching the actual success of the research plan devised with them, is to make sure that they develop a high level scientific method, a crucial skill that will stay with them forever. |
| 4.5. | Student evaluation of my last course in quantum field theory (file Opinioni_degli_Studenti_campi.pdf attached): Organization of the course 2.67/3.0, Teaching effectiveness 2.5/3.0, Overall satisfaction 2.33/3.0. Similar grades in the previous years. |
| 4.6. | Experience, time spent in the classroom, and the feedback from my students keep helping me to improve my teaching skills, and have prompted me to test sometimes innovative practices, at both the undergraduate, master and the graduate level. Every time I start a new class I like to think that I will both deliver a better set of lectures and that I will be experimenting with something new in how I organize my classes. Talking with colleagues about their teaching strategies and eagerly attending the many campus |

	events and colloquia on teaching techniques and skills are key resources in this challenging, yet stimulating endeavour.
	I regularly teach at high-level international schools (GGI and ICTP the two latest) for Ph.D students. Each of these schools gather of the order of 50-100 students in theoretical high energy physics from all over the world. The interaction with those high qualified students, such as questions during lectures and exercise sessions or even discussions during coffee breaks and dinners, suggests me always ways to improve my lectures and make the presentation of the material easier to be understood. Such tight interactions with the best pupils are crucial to identify the points which are more difficult to be understood in my lectures, and to simplify as much as possible the presentation.
	Engaging the local community at large is also important. I invest in outreach efforts wherever I go, which has helped and will help to sharpen my skills as an educator. From visiting or hosting classes from local schools to bringing physics to local organizations that work with kids. A concrete example is the yearly program to host secondary school students in the Physics Department of the University of Milano Bicocca. We engage 5-10 students every year in the theory group to work in our research groups for a week. The live day-by-day with master and Ph.D students, postdocs and professors. Typically, they carry out elementary analyses of physics problems but with real data. It is a unique experience for me to sharpen my skills in teaching at pupils of this age. I would like certainly to develop further this aspect of my teaching experience.

5. Management and collaboration

5.1.	The pillars of the accademic leadership are: the excellence in research at the highest international level, the vision to pave new ways, and the broadness of competences in his own research field. It is also crucial to educate the new generations with high quality teaching, and make the pupils excited about their own research field and science in general.
	A crucial aspect is to create the conditions for students and postdocs to work in the best possible conditions so to be able to fully concentrate on research. This means good salaries and good working conditions. In particular trying to solve two body problems when needed, and to find good solutions for families. An example: Dr. Georg Engel was a postdoc o mine few years ago. At that time he had already two children and the wife did not have a job in Milan. As Physics Department we made sure that his children were taken in the nursery school here in Bicocca, and we helped the wife in finding a new job by presenting her case whenever was needed. After few months she found a very good job in a consulting company here in Milan. For long periods I allowed Georg to work one day from home to help him to fulfil his family duties.
5.2.	
5.3.	2008-2017 Physics Department executive council at University of Milano Bicocca 2012-2017 Coordinator of the postdoc committee of the Theory Group at the Physics Department – University of Milano Bicocca
5.4.	Committees 2016 Member of the International Advisory Committe of Lattice 2016 2015 Member of the International Advisory Committe of Lattice 2015 2006-2010 Fellow committee at CERN PH-TH 2005-2010 Staff committee at CERN PH-TH 1997-1998 Entry undergraduate committee at Scuola Normale Superiore – Pisa
5.5.	

6. Attached publications

6.1.	1. A local factorization of the fermion determinant in lattice QCD
	    M. Ce`, L. Giusti, S. Schaefer
	    Phys. Rev. D95 (2017) 3, 034503
	
	2. Chiral Symmetry Breaking in QCD with Two Light Flavors
	    G. P. Engel, L. Giusti, S. Lottini and R. Sommer
	    Phys. Rev. Lett. 114 (2015) 11, 112001
	
	3. Implications of Poincare symmetry for thermal field theories in finite-volume
	    L. Giusti and H. B. Meyer
	    JHEP 1301 (2013) 140

	4.	Chiral symmetry breaking and the Banks--Casher relation in lattice QCD with Wilson quarks L. Giusti and M. Luscher JHEP 0903 (2009) 013
	5.	QCD with light Wilson quarks on fine lattices (I): first experiences and physics results L. Del Debbio, L. Giusti, M. Luscher, R. Petronzio and N. Tantalo JHEP 0702 (2007) 056
	6.	Topological susceptibility in the SU(3) gauge theory L. Del Debbio, L. Giusti and C. Pica Phys. Rev. Lett. 94 (2005) 032003
	7.	Lattice QCD in the epsilon-regime and random matrix theory L. Giusti, M. Luscher, P. Weisz and H. Wittig JHEP 0311 (2003) 023
	8.	Numerical techniques for lattice QCD in the epsilon-regime L. Giusti, C. Hoelbling, M. Luscher, H. Wittig Comput. Phys. Commun. 153 (2003) 31
	9.	The U_A(1) problem on the lattice with Ginsparg-Wilson fermions L. Giusti, G. C. Rossi, M. Testa and G. Veneziano Nucl. Phys. B 628 (2002) 234
	10.	Delta M _K and epsilon_K in SUSY at the next-to-leading order M. Ciuchini et al., JHEP 10 (1998) 008
7		Summary of documents and certificates that should be attached to your application
7.1		Scan your documents and certificates in the same order as listed below. The file should be attached to your complete CV and uploaded in the KTH recruitment system. Enclose following where relevant: 1. Section 1.6 Certificate of employment from your current employer with title, period of employment and placement: Milan_certificate001.pdf (Tenured position, indefinite duration) 2. Previous contracts: cern_contracts_2001_2017001.pdf, CNRS_certificates001.pdf, BU1.pdf 3. Section 2.1 Certificates for Higher Education degrees. Specify year of graduation, type of qualification: lasapienza_certificate001.pdf (master degree), SNS001.pdf (Ph.D) 4. Section 2.2 Certificate for docent with year of appointment: Milan_certificate001.pdf 5. Section 2.3 Italian abilitation to full professor: abilitazione_short.pdf 6. Section 2.4 You may attach previous expert opinions (for the last five years): QCDLAT_2014.pdf 7. Section 3.5 Certificates for funding you have received : dichiarazione_lerda_2017.pdf postdocs_infn001.pdf FA_premiale001.pdf tempo_macchina001.pdf 8. Section 4.5 Student evaluation of my last course: Opinioni_degli_Studenti_campi.pdf

Bilaga 7

Ämne: Tage Erlanders gästprofessor i matematik med inriktning mot dynamiska system
Från: Anders Forsgren <andersf@kth.se>
Datum: 2017-11-24 12:29
Till: Personalfunktionsansvarig SCI <persadm@sci.kth.se>
Kopia: Leif Kari <leifkari@kth.se>, Anna Delin <annadel@kth.se>, Sandra Di Rocco <dirocco@kth.se>

Till SCI-skolans strategiska råd

Skolan för teknikvetenskap anhåller om inrättande av Tage Erlanders gästprofessor i matematik med inriktning mot dynamiska system Anatole Katok till en omfattning av 100% under perioden 1 maj 2018 – 31 oktober 2018.

Information om Tage Erlanders gästprofessur samt den ansökan till vetenskapsrådet som beviljats bifogas.

Rektor har beviljat ansökan om inrättande av en gästprofessur för Anatole Katok som undantag från beslutet om att inte anställa professorer som fyllt 67 år.

På uppdrag av Skolan för teknikvetenskap,

Leif Kari   Anders Forsgren
Skolchef   Vice skolchef

Bilagor:

TageErlander2017.pdf	789 kB
Beslut om Tage Erlanders gä stprofessur - Vetenskapsrå det.pdf	47.1 kB
Tage Erlanders gä stprofessur - Vetenskapsrå det.pdf	137 kB

Beslut om Tage Erlanders gästprofessur

2018 års innehavare av Tage Erlanderprofessuren blir professor Anatole Katok – en internationellt framstående forskare inom matematik, verksam vid Penn State University,

Under sin tid i Sverige kommer professor Anatole Katok huvudsakligen att vara verksam vid Kungliga tekniska högskolan, KTH.

➡ Läs mer om Tage Erlanders gästprofessur

Tage Erlanders gästprofessur

Vetenskapsrådets bidrag till gästprofessorer syftar till att ge universiteten möjlighet att utveckla ett område genom att rekrytera en internationellt ledande professor under en kortare period.

Genom Tage Erlander-professuren kan en internationellt framstående utländsk forskare tillbringa ett år vid universitet, högskola eller forskningsinstitut i Sverige. Tage Erlander-professuren inrättades 1981 för att hedra Tage Erlander (1901–1985) på hans 80-årsdag. Tage Erlander var Sveriges statsminister 1946–1969.

Sammanfattning

Typ av bidrag	Miljö- och samverkansstöd
Område	Naturvetenskap och teknikvetenskap
Inriktning	Den forskare som kan nomineras till 2017 års gästprofessur ska vara verksam inom något eller flera av följande områden: matematiska vetenskaper, datavetenskap, signaler och system, teknisk mekanik, medicinsk teknik.
Söks av	Svenska universitets- eller högskoleinstitutioner inom naturvetenskap och teknikvetenskap är välkomna med förslag till innehavare av gästprofessuren.
Bidragstid	6-12 månader
Bidragsbelopp	Max 1 900 000 kronor för professuren och max 400 000 kronor för finansiering av en ung forskare som knyts till professuren.
Utlysningen stänger	21 februari 2017 (kl. 14.00)
Bidragsbeslutet publiceras	Senast i slutet av september 2017
Bidragsperioden startar	Tidigast i januari 2018

➥ Läs mer om tidigare innehavare av professuren. ▱

Villkor för att ansöka

Nedanstående villkor måste vara uppfyllda för behörighet att ansöka om bidraget. Vi utför kontroller som gör att obehöriga ansökningar avvisas från fortsatt hantering.

Sökande

Ansökan med nominerad kandidat lämnas in av den institution som vill agera värd för gästprofessuren. Den forskare som föreslås för gästprofessuren ska ha erhållit professorstitel eller motsvarande vid ansökningstillfället. Forskaren måste också vara införstådd med att hen blir nominerad och vad ett accepterande av professuren innebär. Om den nominerade kandidaten avstår att acceptera professuren kan institutionen inte föreslå en ersättare.

Innehavare av Tage Erlander-professuren utses bland nominerade internationellt mycket framstående forskare. Forskningsområdena inom vilka forskare kan nomineras alternerar enligt ett rullande schema. Se beskrivning av årets inriktning ovan.

Bidrag från Vetenskapsrådet ska förvaltas av ett svenskt universitet eller högskola eller någon annan svensk offentlig organisation som uppfyller våra krav på medelsförvaltare. För att kunna ansöka måste organisationen alltså vara godkänd som medelsförvaltare.

Den beviljade gästprofessorn ska vara anställd av medelsförvaltaren under vistelsen, om inte Vetenskapsrådet, medelsförvaltaren och eventuell annan arbetsgivare kommer överens om något annat.

När ansökan registreras och signeras i Prisma (se nedan) förbinder sig den nominerande universitetsinstitutionen att svara för det lokala värdskapet och praktiska arrangemang i samband med den gästande forskarens vistelse i Sverige om gästprofessuren beviljas.

Antal ansökningar

En institution kan nominera flera kandidater i separata ansökningar. En kandidat kan dock endast nomineras av en institution.

Kostnader och bidragsbelopp

Bidrag kan sökas om upp till 1 900 000 kronor, inklusive indirekta kostnader, för finansiering av lönekostnader inklusive sociala avgifter och försäkringar, hyra av bostad samt resor. Bidragets storlek påverkas av exempelvis medföljande familjemedlemmar och lokala boendekostnader. Vetenskapsrådet förutsätter att medelsförvaltaren, såsom ansvarig arbetsgivare, täcker eventuella kostnader utöver det erhållna schablonbidraget.

Därutöver kan bidrag om upp till 400 000 kronor, inklusive indirekta kostnader, sökas (via Vetenskapsrådet) från Tage Erlander-stiftelsen för finansiering av en ung forskare (doktorand eller postdok) som kan knytas till gästprofessuren.

Bidragstid

Vistelsen i Sverige ska vara minst sex månader, dock högst ett år. Vistelsen kan delas upp på mer än en period.

Professuren ska tillträdas under 2018. Hela bidragsbeloppet kommer att utbetalas under 2018 oavsett när tillträde sker. Första utbetalning sker tidigast i januari 2018.

Hur ansöker jag?

Du ansöker elektroniskt i Prisma ⊡, som är Vetenskapsrådets ansökningssystem. För att kunna ansöka måste din organisation ha godkänts som medelsförvaltare och skapat ett organisationskonto i Prisma ⊡.

Ansökan skapas hos medelsförvaltaren (av organisationskontoansvarig eller ansvarig för organisationens ansökningar). Den som har skapat ansökan bjuder därefter in dig som utsetts av den nominerande institutionen att ansvara för inbjudan till gästprofessuren som projektledare och ansvarig för att fylla i ansökans innehåll (hädanefter kallad uppgiftsansvarig).

För de flesta moment i Prisma finns ett användarstöd⊡ som beskriver hur du ska göra, samt svar på vanliga frågor⊡. Vi uppmanar dig att ta del av dessa när du skriver din ansökan.

Skapa personkonto i Prisma

Innan du ansöker måste du skapa ett personligt konto i Prisma ⊡där du sparar dina personuppgifter. Du kan även lägga in dina meriter och publikationer för framtida bruk, de är dock inte nödvändiga för denna ansökan. Informationen behöver bara läggas in en gång, och kan därefter kompletteras eller ändras vid behov. Tänk på att skapa ditt personliga konto i god tid. De ansökningar du registrerar i Prisma kopplas till ditt personliga konto.

Även eventuella medverkande administratörer måste skapa ett personligt konto i Prisma och före sista ansökningsdag även godkänna sin medverkan i ansökan.

Text

Vissa textfält går att formatera, vilket innebär att du kan formatera typsnitt och teckenstorlek och infoga vissa tabeller, formler och symboler. Om du har skrivit texten på förhand i Microsoft Word kan du även klistra in den med bibehållen formatering. Bilder kan dock inte infogas i textfälten.

Alla textfält har begränsningar för antal tecken, vilket illustreras av teckenräknare. Om du fyller i för många tecken går ansökan inte att registrera.

Signering

Alla signeringar utförs i samband med registrering av ansökan, av den person vid medelsförvaltaren som skapat den. Se mer information under Registrera ansökan nedan.

Vad ska ansökan innehålla?

Vi ber dig att orientera dig i ansökningsformuläret i Prisma parallellt med att du läser nedanstående instruktioner.

Språk

Utländska experter används i den vetenskapliga bedömningen av ansökningarna. För att säkerställa att bedömningen sker på ett likvärdigt och effektivt sätt ber vi dig därför att utforma din ansökan på engelska.

Ansökans delar

Ansökningsformuläret innehåller följande flikar:

- Beskrivande information
- Forskningsbeskrivning
- Nominerad gästprofessor
- Budget och forskningsresurser
- Medelsförvaltare
- Medverkande

Nedan följer beskrivningar av vad som efterfrågas under respektive flik. Då obligatorisk information efterfrågas är detta markerat i Prisma med en asterisk*.

Beskrivande information

Under denna flik fyller du i den nominerade forskarens namn, nuvarande säte och land som projekttitel (exempelvis "Anna Smith, University of xx, USA)", projekttid (gästprofessurens längd i antal månader), samt väljer nyckelord och SCB-koder. Här fyller du även i abstract, se anvisningar nedan.

Abstract

Sammanfattningen ska innehålla en kort beskrivning av:

- Den nominerade forskarens namn, universitet och land
- Tid för vistelsen
- Kort motivering för vistelsen
- Planerat program

Redogörelsen får omfatta högst 1 500 tecken inklusive mellanslag (motsvarande cirka en halv A4-sida i Times New Roman, teckenstorlek 12, enkelt radavstånd).

Forskningsbeskrivning

Under denna flik anger du en forskningsplan för nomineringen samt beskriver etiska överväganden.

Etiska överväganden

Redovisa de etiska frågor som forskningen aktualiserar och redogör för hur de behandlas i forskningsarbetet. Ange även om hantering av persondata, djur- eller humanförsök ingår i forskningen. Om inga etiska frågor är aktuella anger du detta.

Forskningsplan

Här bifogar du en forskningsplan i pdf-format. Observera att bilagan endast kan utgöras av en fil om högst 10 MB.

Forskningsplanen ska bestå av en kortfattad men komplett information kring nomineringen, högst åtta A4-sidor i Times New Roman, teckenstorlek 12, enkelt radavstånd, referenser inkluderade. Fokus för forskningsplanen ska vara framåtblickande. Observera att eventuellt innehåll utöver det angivna maximala sidantalet inte kommer att beaktas vid beredning av din ansökan.

Följande information måste finnas med i forskningsplanen under separata rubriker som

anges i nedanstående ordning:

- **Forskaren och hens forskning (The researcher and his/her research).** Presentera den nominerade forskaren och hens forskning.
- **Motivering (Motivation).** Motivera gästforskarens vistelse.
- **Bidrag till forskningen (Contribution to research).** Beskriv hur gästforskaren kan bidra till svensk forskning inom det aktuella området.
- **Plan för institutionsmedverkan (Plan for department participation)** Specificera planeringen för den gästande forskarens medverkan vid värdinstitutionen samt övriga institutioner i landet.
- **Ung forskare (Junior researcher).** Uppgifter om namn och arbetsplats rörande ung forskare (doktorand eller postdok), om en sådan ska knytas till gästprofessuren.

Nominerad gästprofessor

Under denna flik anger du:

- Namn, titel, nuvarande befattning och arbetsplats för den nominerade personen
- Vilken kompetens som gästforskaren förväntas tillföra värdinstitutionen
- Uppgifter om vistelsens längd och eventuell uppdelning
- Namn på prefekt(er) och vid vilken eller vilka institution(er) professuren ska förläggas.

Nominerad persons cv och publikationslista

Bifoga en kortfattad cv i pdf-format med fullständiga adressuppgifter och aktuell tjänstetitel för den nominerade forskaren. Bifoga även en publikationslista i pdf-format, uppdelad i peer review-artiklar, övriga artiklar och böcker.

Bilagorna kan endast utgöras av enstaka filer om högst 4 MB vardera. Om en bilaga består av flera dokument måste du därför sammanfoga dessa till en fil. Observera även att inga cv-uppgifter eller publikationer ska hämtas in på annan plats i ansökan.

Budget och forskningsresurser

Under denna flik tar du upp löner och övriga kostnader.

Löner

Ange sökt lön, både som andel av heltidslön och som faktiska årsbelopp (inklusive

sociala avgifter och försäkringar), för gästprofessorn respektive den unga forskaren (om en sådan ska knytas till professuren). Ange hela belopp i kronor.

Driftskostnader

Beskriv kostnader för hyra av bostad eller resor. Ange hela belopp i kronor.

Total kostnad för projektet

Ansökningssystemet summerar automatiskt dina angivna budgetposter i en tabell. Det totala belopp du ansöker om ska även inkludera indirekta kostnader. Du lägger själv till dessa i tabellen. Här lägger du även till eventuella ytterligare kostnader projektet omfattar (som du inte söker finansiering för i denna ansökan).

För frågor om vad som räknas som indirekta och direkta kostnader, kontakta ditt lärosäte.

Motivering av sökt budget

Motivera kort varje sökt kostnad i den budget som du angivit. Redogörelsen får omfatta högst 4 000 tecken inklusive mellanslag (motsvarande cirka en A4-sida i Times New Roman, teckenstorlek 12, enkelt radavstånd).

Medelsförvaltare

Under denna flik anger du hemvist för projektet. Medelsförvaltare är det universitet eller lärosäte där gästprofessorn ska vara anställd och fylls i automatiskt när ansökan skapas. Som hemvist väljer du den institution eller motsvarande organisatoriska enhet där gästprofessorn kommer att vara anställd under bidragsperioden.

Om din hemvist saknas, kontakta organisationskontoansvarig för din medelsförvaltare. Du kommer inte att kunna slutföra registrering av din ansökan om hemvist saknas.

Medverkande

Här kan du som uppgiftsansvarig bjuda in medverkande administratörer till din ansökan. En medverkande administratör är en person som inte deltar i projektet men som kan hjälpa sökande att lägga in och redigera information. Observera att du inte kan inkludera medverkande forskare i denna ansökan.

Du kan bjuda in medverkande administratörer som ännu inte har ett konto i Prisma, men för att de ska kunna medverka på din ansökan måste samtliga registrera egna personliga

konton i Prisma.

Alla medverkande måste acceptera inbjudan innan du kan slutföra registreringen av ansökan. Tänk på att säkerställa att du använder rätt e-postadress när du bjuder in medverkande, och att adressen är kopplad till personens Prismakonto.

Registrera ansökan

När du går in under fliken Registrera ansökan kontrollerar systemet om någon obligatorisk information saknas och informerar om vad som eventuellt behöver kompletteras. Först när du klickar på knappen Registrera så genomförs registreringen av ansökan.

Kom ihåg att förhandsgranska din ansökan innan du registrerar den.

Observera! Alla du bjudit in att medverka i din ansökan måste acceptera inbjudan innan du kan registrera ansökan. Om en inbjudan inte accepterats måste den tas bort.

Den registrerade ansökan hittar du som uppgiftsansvarig därefter i ditt personliga Prismakonto under menyvalet Ansökningar under fliken Ansökningar och bidrag. Fram till dess utlysningen har stängt kan en registrerad ansökan avregistreras och vid behov ändras och registreras på nytt.

Du ansvarar för att ansökan är fullständig, det vill säga att ansökningsformuläret är korrekt ifyllt, att rätt bilagor är bifogade och att den efterfrågade informationen har lämnats i enlighet med instruktionerna. Lämna bara in material som vi uttryckligen efterfrågar. Vi godkänner inte kompletteringar efter sista ansökningsdatum, bortsett från sådana som vi ber om.

Signering

Ansökningar där en organisation är sökande signeras automatiskt vid registrering av ansökan.

Signering av den sökande innebär en bekräftelse av att:

- uppgifterna i ansökan är korrekta och följer Vetenskapsrådets instruktioner
- eventuella bisysslor och kommersiella bindningar har redovisats för medelsförvaltaren och att det där inte framkommit något som strider mot god forskningssed

- nödvändiga tillstånd och godkännanden finns vid projektstart, exempelvis avseende etikprövning
- den beskrivna forskningen, anställningen och utrustningen kan beredas plats under den tid och i den omfattning som anges i ansökan
- medelsförvaltaren godkänner kostnadsberäkningen i ansökan
- den forskning som utförs inom projektet bedrivs i enlighet med svensk lagstiftning

Vad händer sedan?

När utlysningen har stängt (klockan 14.00 på utlysningens sista dag) slutregistreras din ansökan automatiskt och tilldelas ett diarienummer.

Information om status på ansökan, diarienummer och signering av ansökan hittar du som uppgiftsansvarig därefter på ditt konto under fliken Ansökningar och bidrag.

Bedömning

Den vetenskapliga bedömningen av ansökan görs av aktiva forskare. Forskarna bedömer ansökan i konkurrens med övriga ansökningar utifrån Vetenskapsrådets bedömningskriterier.

Följande aspekter kommer att bedömas:

- Gästforskarens forskningsmeriter och ställning internationellt
- Betydelsen av gästforskarens besök för värdinstitutionen och mervärdet för svensk forskning generellt inom det aktuella området

Om ansökan inte är utformad enligt instruktionerna så kommer det vägas in i bedömningen.

➡ Beredningsgrupp 🗗

➡ Granskningsprocessen

➡ Vetenskapsrådets jävshantering

➡ Vetenskapsrådets jämställdhetsstrategi 🗗

Beslut

Kort efter att bidragsbeslutet fattats publiceras besked om bidragsfinansiering på

Vetenskapsrådets webbplats. Därefter finner du som uppgiftsansvarig underrättelse om beslut för ansökan i ditt personliga konto i Prisma, under fliken Ansökningar och bidrag.

Kontakt

Frågor om ansökans innehåll

Frågor om ansökans innehåll kan ställas till:

Paola Norlin, e-post: paola.norlin@vr.se, telefon: 08-546 44 311

Emma Olsson, e-post: emma.olsson@vr.se, telefon: 08-546 44 204

Tekniska frågor

Vi ber dig vänligen att i första hand konsultera hjälpmenyn i Prisma för att ta del av instruktioner samt frågor och svar inklusive utförliga användarstöd som beskriver de flesta momenten i Prisma.

Om du inte hittar svaret på din tekniska fråga i ovanstående material kan du kontakta vår tekniska support. Notera att det kan dröja 1-2 arbetsdagar innan du får svar, beroende på aktuell arbetsbelastning.

| **2017-00305** | **Kungliga Tekniska högskolan** | **NT-GAST** |

Information about project leader

Name: Danijela Damjanovic

Birthdate: 19731108

Gender: Female

Doctorial degree:

Academic title: Docent

Employer: Kungliga Tekniska högskolan

Administrating organisation: Kungliga Tekniska högskolan

Project site: Institutionen för Matematik

Information about application

Call name: Visiting Professor Grant 2017 (Vetenskapsrådet)

Type of grant: Visiting Professor Grant

Focus: Tage Erlander

Call for proposals subject area: NE

Project title (english): Tage Erlander Visiting Professor: Dynamical Systems

Project start: 2018-01-01

Project end: 2018-06-30

Review panel applied for: NT-GAST

Classification code: 10199. Other Mathematics, 10101. Mathematical Analysis, 10102. Geometry

Keywords: Dynamical systems, Higher-rank actions, Partial hyperbolicity, Elliptic dynamics, Parabolic dynamics

Funds applied for

Year: 2018

Amount: 1,721,888

Descriptive data

Add the nominated researchers name, present university and country as the project title.

Project title (Swedish)*

Tage Erlanders Gästprofessur: Dynamiska system

Project title (English)*

Tage Erlander Visiting Professor: Dynamical Systems

Abstract (English)*

The nominee is Professor Anatole Katok, from Penn State University, USA. The proposed time of the visit is 6 months: 1.5. 2018 to 30.10. 2018. Prof. Katok works in the areas of dynamical systems and ergodic theory. He is one of the most influential and most broad contributors in these fields since 1960's. His work spreads over many directions: geodesic flows, interval exchange transformations, billiards and twist maps, spectral theory, combinatorial constructions, application od KAM theory to stability of Abelian group actions, perturbative and measure rigidity of Lie group actions and application towards Diophantine approximation in number theory. Professor Katok is acknowledged in dynamics community for having remarkable intuition on the future directions and development of the field. He has proposed conjectures and problems which prompted large body of work in the field. The KTH group in dynamical systems is diverse, and our interests overlap with interests of Prof. Katok: we work on rigidity of group actions, billiards and Hamiltonian dynamics, and connections between dynamics and number theory. We trust that Prof.Katok's visit will serve as a cohesion factor for our group and will also be a boost for our individual research as well as research of of our PhD students. Prof. Katok agreed to give 2 mini-courses, colloquia talks for the whole department, and to participate actively in special meetings we will organize for researchers from Sweden and several other countries.

Calculated project time*

2018-01-01 - 2018-06-30

Research description

Reporting of ethical considerations*

The proposed research raises no ethical issues. The research does not include animal experiments, experiments involving human subjects, or the handling of personal data.

Ethical considerations

No

The project includes animal experiments

No

Account of experiments on humans

No

Research plan*

See following page for attachment

1. The researcher and his research

While the discipline of dynamical systems is over a century old and one can trace its origin to the classical work of Poincaré, it was in the 1960s that it imerged as an independent discipline due to seminal works of Kolmogorov, Anosov, Sinai, Smale and Moser. In this exciting time of transition, young mathematicians found this rapidly developing theory very attractive. Anatole Katok stands out for his ability to be involved in essentially all areas of dynamical systems from the start. He has always been working in the theory of dynamical systems in the broad sense, and his interests range widely, both scientifically and in terms of the character of his publications and activities.

Anatole Katok's contributions are many, we mention here only few which were most influential and for which he is most well known. In his PhD thesis Katok developed a theory of periodic approximations commonly known as Katok-Stepin approximations. The theory helped solve some long standing problems going back to von Neumann and Kolmogorov. The next major achievement was the theory of Kakutani equivalence which is based on far reaching generalisation of the concept of time change in flows. There are many constructions in the theory of dynamical systems which go back to Katok and reveal interesting and surprising phenomena. Among these are Anosov-Katok construction of smooth ergodic area-preserving diffeomorphisms, the construction of Bernoulli diffeomorphisms with non-zero Lyapunov exponents on any surface, construction of a foliation for which Fubini theorem fails in the worst possible way. After that, Katok had a series of results in nonuniformply hyperbolic theory: density of periodis points and lower bounds, and exhaustion of topological entropy by horseshoes. When it comes to geodesic flows, Katok proved that the topological and Liouville entropies of a geodesic flow on a negatively curved surface agree only if the curvature is constant, i.e. the metric is locally symmetric, and he conjectured that the same is true in any dimension. He not only worked on this conjecture himself, but put much effort into popularizing it. This is known as Katok's Entropy Conjecture and it connects important geometric and dynamical properties of geodesic flows. There is now major body of work related to this conjecture that includes substantial partial results which give insight into the question. Besides this conjecture, there are many other conjectures and problems in the filed which originate from Katok and bare his name.

The classical theory of dynamical systems deals with systems with discrete or continuous *one* dimensional time. These are diffeomorphisms and flows. However, dynamical methods recently have found other applications to physics and some other areas of mathematics, such

1

as number theory, that require dynamical systems with *multidimensional* time - the actions of large groups. These applications include quantum field theory (that requires actions of locally compact groups), statistical physics of ferromagnetic materials (that deals with actions of multidimensional lattice $\mathbb{Z}^k$) and number theory where actions of some semisimple Lie groups have been used with great success. Katok has been working in the past three decades intensely on various rigidity phenomena for group actions. In collaboration with several colleagues (R. Spatzier, B. Kalinin, D. Damjanović, M. Einsiedler, E. Lindensrauss, F. Rodriguez Hertz, S. Katok, K. Schmidt, to name a few) he made fundamental contributions to perturbative, cohomological, geometric and measure rigidity of higher-rank abelian group actions [II.67, II.75, II.78, II.80, II.87, II. 90, II.94, II.96, II.97, II.98, II.99, II.100, II.101, etc]. One of the big breakthroughs noticed in the wider mathematical community was an application of the measure rigidity result for certain homogeneous abelian rank 2 action, towards proving that the exceptional set in the Littlewoods conjecture on simultaneous Diophantine approximation, is small in the dimension sense: it has Hausdorff dimension 0 [II.87]. This is the best existing result towards this big open problem in number theory, and it is achieved by purely dynamical systems means. This development popularised even more the ideas of applying dynamical system methods to problems in number theory and brought about more exciting developments in the same direction.

An important feature of Katok's mathematical work is to always keep up with the development of the theory of dynamical systems as a whole and to express his views and understanding by lecturing and writing lecture notes, surveys and books. He wrote 8 books. Together with B. Hasselblatt he has written a book on dynamical systems which is in dynamics circles known as "the bible"; it is broad, exhaustive, and precise acount which every PhD student in dynamical systems should study while embarking into the field.

Katok's conference, colloquia and seminar presentations are always rich with ideas, wide ranging and engaging. His presence in the audience usually guarantees a lively, informed and provocative discussion.

Throughout his career Katok has been extremely active in mentoring younger generations. He attracts many students and by all accounts is demanding but at the same time very helpful supervisor, spending countless hours with his students. Katok has supervised 39 students, most of whom have been very successful in their professional careers.

Current and future plans of Katok's research, which is related to his visit to KTH, are described below. In summary, there are three directions he is most interested in pursuing:

rigidity for group actions, flexibility paradigm, and various phenomena in elliptic dynamics.

In his future research plans Katok aims at advancing several directions of research across the principal areas of the modern structural theory of dynamical systems: uniformly and non-uniformly hyperbolic, parabolic and elliptic. In hyperbolic dynamics there is a contrast between behavior of classical smooth systems (diffeomorphisms and flows) and actions of higher rank abelian groups. The latter, which have been at the center of Katok's research during the last decade exhibit remarkable rigidity of behavior. Classical systems, on the other hand, are quite flexible: under properly understood general restrictions, within a fixed class of dynamical systems, principal quantitative and qualitative dynamical invariants should take arbitrary values. This is a brief and imprecise formulation of the flexibility paradigm that plays a prominent role in Katok's research program. The principal challenge of the flexibility program is that numerical dynamical invariants can only be precisely calculated in very few cases, mostly of algebraic origin. Most known constructions are perturbative and hence at best would allow to cover a small neighborhood of the values allowed by the model, or more often, not even that, since homogeneous systems are often "extremal". So establishing flexibility calls for non-perturbative or large perturbation constructions in large families to cover possible values of invariants. This calls for a combination of methods from the theory of Lyapunov characteristic exponents, smooth ergodic theory, and geometry. While the principal problems are relatively easy to explain to a fairly broad audience of mathematicians and scientists familiar with the key notions of the modern theory of dynamical systems, the point of view is quite new and has been explicitly formulated by Katok only within the last couple of years.

Second direction is further development of the rigidity program for actions of higher rank abelian groups. The combinations of techniques and insights that goes under the name "non-uniform measure rigidity" resulted in the almost definitive description of maximal rank actions, i.e. measure-preserving actions of $\mathbb{Z}^k$, $k \geq 2$ on $k+1$-dimensional manifolds such that Kolmogorov entropy of each non-identity element of the suspension action is positive. Those actions turn out to have an arithmetic nature from measure-theoretic and, with proper qualifications, also geometric point of view. There are non-trivial implications for the topology of manifold that can carry such actions. Planned research includes further study of topology of maximal rank actions, as well as extension of arithmeticity results to broader classes of actions whose rank is not related to the dimension of the ambient manifold. Part of the planned research dealing with parabolic behavior concerns area preserving flows on

3

surfaces with saddle-type singularities. The principal goal of this direction of research is to show that spectral multiplicity for such flows is bounded, and, in particular, they may have simple or finite multiplicity Lebesgue spectrum.

In the direction of Elliptic dynamics several projects are planned dealing with Liouvillean behavior: smooth realization of Kronecker gaussian processes, general approximation by conjugation construction in the real analytic setting, and embedding of odometers as quasi-periodic motions near an elliptic fixed point of a generic area-preserving diffeomorphism.

The following are several focal points of planned research:

•*Uniformly hyperbolic dynamics*: Tame and wild behavior in the classification of Anosov systems up to a differentiable conjugacy.

•*Nonuniformly hyperbolic dynamics*: Global rigidity of hyperbolic measures for actions of higher rank abelian groups and applications to Zimmer program.

•*Partially hyperbolic dynamics*: Completing the program of differentiable rigidity of partially hyperbolic algebraic actions of higher rank abelian groups.

•*Parabolic dynamics*: Applications of the theory of unitary group representations and KAM method to rigidity of unipotent homogeneous actions; commencement of a comprehensive program of investigation of non-homogeneous parabolic systems.

•*Elliptic dynamics*: Non-standard KAM-types invariant curve theorems; investigation of low-dimensional systems with zero topological entropy.

2. Motivation.

Professor Anatole Katok is one of the most significant contributors in the field of dynamical systems since 1960's, when the field had a big expansion. He participated in some of the core developments in the field and is a founder of several new directions of research. His broad understanding of the area, and mathematics in general, his intuition and views into the future of the whole field, are very rare among living mathematicians working in the field. Markedly, he has done brilliant work on applying dynamical systems methods to problems in number theory.

The dynamical systems and number theory group at the KTH mathematics department is somewhat diverse, which we consider an advantage. However, our impact on advancing research, in particular Swedish research in the field, would be even more significant if we would have more collaboration projects between each other and also with researchers in the top centers for dynamical systems in US. We are strongly motivated to have Professor Katok

visit our department, both because we believe that he will act as a strong cohesion force for our group, which can fundamentally change our contributions to mathematics, but we are also certain that he can make significant contribution to advancing our individual research.

Moreover, lengthy visit of Professor Katok at KTH offers us many opportunities for bringing together researchers in the field from other universities in Sweden, such as Uppsala and Lund; but also from other European research universities: Copenhagen, Bristol, and Warsaw, for working seminars and meetings.

We expect this visit to have a strong and positive effect on our graduate students. We would like to expose our graduate students to Professor Katok's lectures and his influence. For young people talking to a researcher with such depth and breadth of knowledge can positively effect students' perspective and view of the field, and can be groundbreaking influence for their future work and careers.

3. Contribution to research

Professor Katok's research background and current research interests overlap to large extent with research interests of the Dynamical Systems and Number Theory (DSNT) group at the KTH mathematics department. With some members of the group Professor Katok has prospective or on going research plans, and with other members of the group initiation of new projects is expected. Below we list the members of the DSNT research group, their interests and their research connection with Professor Katok.

The DSNT group at KTH mathematics department consists of the following researchers:

- **Maria Saprykina** (Associate professor) works in Hamiltonian Dynamics and Ergodic Theory. Her main interest is the study of stability and instability in nearly integrable Hamiltonian systems. Integrable Hamiltonian systems provide examples of stable behavior. Although exact integrability is rare in nature, KAM theory asserts that, under certain general conditions, this stability can be found in nearly integrable systems, that is, systems that are close to integrable ones. Which conditions are necessary to guarantee the stability of the perturbed system? In which ways does instability and chaotic behavior occur? These are the the guiding questions of Maria's research. During his talk at KTH at the Dynamical systems conference in May 2016, Professor Katok launched very interesting questions and ideas in these directions.

- **Kristian Bjerklöv** (Associate Professor) is mainly working on the dynamics of systems exposed to quasi-periodic perturbations or forcing. Topics include: describing

5

statistical properties of orbits, classifying mechanisms for the break-down of uniform hyperbolicity, as well as understanding the emerging of strange attractors. In particular he has worked on problems related to the quasi-periodic Schrödinger cocycle under low regularity assumptions. Lately he has also started investigating the dynamics of (non-smooth) outer billiard map, jointly with M. Saprykina.

- **Danijela Damjanović** (Associate professor), works on the dynamics of multidimensional time systems with some chaotic properties. While dynamics of a single smooth hyperbolic diffeomorphism is often well understood and typically suggests chaotic behavior such as a number of invariant ergodic measures, large first cohomology and instability of differentiable orbit structure, a group generated by smooth hyperbolic diffeomorphisms dynamically can have very different, and often opposite, properties. This phenomenon is labeled by "rigidity" for a group action in question, and it often has surprising implications to some number theoretic questions. One highlight of her work is the discovery with A. Katok that KAM theory can be applied to give local rigidity of a wide class of partially hyperbolic abelian actions on the torus. The collaboration of Damjanović and A. Katok continued successfully over many years with results concerning rigidity of abelian actions of parabolic and partially hyperbolic nature. Damjanović and A. Katok have an on-going project regarding local rigidity for certain parabolic and partially hyperbolic abelian homogeneous actions. Most recently, Damjanović works on proving Katok-Greenfield-Wallach conjecture on nilmanifolds.

- **Pär Kurlberg** (Professor), primarily works on number theory, often with relation to mathematical physics (quantum chaos) and dynamical systems. Recent topics include the dynamical Mordell-Lang conjecture (a non-linear analog of the Skolem-Mahler-Lech theorem for zeros of recurrence sequences), orbit length statistics of dynamics on finite rings, quantum ergodicity and scarring for arithmetic toral point scatterers, and computational number theory (in particular, statistic of class numbers and groups of quadratic imaginary fields.)

- **Michael Benedicks** (Professor- retired and research active, currently holding a VR research grant), is one of the most well known Swedish mathematicians in the area of dynamical systems. He is widely acknowledged for his seminal work with Professor Lennart Carleson and the work on Hénon maps. He is also a member of the Royal Swedish Academy of Sciences.

6

- **Doctoral students**: **Thomas Ohlson Timoudas** (advisor: Kristian Bjerklöv), **Davit Karagulyan** (advisor: Michael Benedicks), **Gerard Farré** (advisor: Maria Saprykina), **Boris Petković** (advisor: Danijela Damjanović). Our students work in diverse areas: interval exchange transformations, Möbius function and orthogonality conjecture, Hamiltonian dynamics, Schrödinger operators and dynamics of abelian actions. We expect that mini-courses given by Professor Katok will broaden our students' perspectives and will help them in their research careers.

- **Postdoctoral researchers.** Starting in March 2017 we will have a postdoctoral researcher **Dr. Disheng Xu** who recently finished his PhD under the supervisiion of Professor Artur Avila. He will work on the project of Danijela Damjanović regarding rigidity properties of higher rank abelian group actions with partial hyperbolicity. As a part of this proposal we are also applying for one more post doctoral position, for Zhiyuan Zhang, who is also a student of Professor Artur Avila. Zhiyuan Zhang works in several different directions which overlap with the research of our group and with the research of Professor Katok. More information about Zhiyuan Zhang can be found in Section 5.

4. Plan for department participation

- In the months of May and June of 2018, Professor Katok will give a 6 week mini-course for the researchers in the field. We expect that the audience will consist of several KTH mathematics department members working in different fields (harmonic analysis, determinantal processes, ergodic theory, dynamical systems, number theory) as well as researchers from Stockholm University and Uppsala University.

- In the months of September and October of 2018, Professor Katok will give a 6 weeks mini-course for graduate and masters students in the field. We will have graduate students in dynamics who will attend, but we also have usually students from other areas of Analysis who will be interested. In the fall semester of 2018 we give a standard introductory course in dynamical systems for the masters students and we expect that the mini-course by Prof. Katok will complement the standard course and that it will be attended by masters students (usually we have about 15 students in the standard course on dynamical systems).

- Professor Katok will participate in our weekly Analysis seminar.

7

- We will start bi-weekly working group meetings where the group members (including postdocs and graduate students) will speak of their on-going and prospective research, followed by group discussion, and Prof. Katok will take active part in these meetings.

- We will organise 4 meetings titled "Dynamics Day" during the 6 months stay of Prof. Katok. These meetings will be one-day meetings where we plan to invite researchers from other nearby universities such as Uppsala and Lund, to participate, and for each day, the theme of the day will be centered around a visit of one prominent researcher from one of the dynamical systems centers in Europe, such as Bristol, Paris and Warshaw. Professor Katok will take active part in these events.

- Professor Katok will give two colloquium style lectures during his stay at KTH, one at the KTH Analysis seminar and the other at the Stockholm Mathematics Centar Colloquium series. The colloquium talks will be accessible to the whole department and to the wide mathematics audience.

5. Junior researcher

As a part of this proposal we are applying for one postdoctoral position. Our institution does not have funding specifically for postdoctoral positions and having one more postdoctoral researcher would be of great interest to us. We propose to invite Zhiyuan Zhang as a postoc during the stay of Anatole Katok at KTH.

Zhiyuan Zhang is finishing his PhD studies in Paris VII under the supervision of the recent Fields medallist Professor Artur Avila. Before that, Zhang was a master student in École normale supérieure. He did his undergraduate study in Peking University in China.

Zhiyuan Zhang's research is very diverse for such a young researcher. His work so far and his future interests lie in the general direction of smooth dynamical systems and some topics closely related to the interests of the dynamical systems and number theory group at KTH mathematics department: Zhang studied ergodic and topological aspects of conservative partially hyperbolic systems and group actions by volume preserving diffeomorphisms. He also has results in conservative surface dynamics, SRB measures, Schrödinger operators, and on mode-locking phenomenon. Zhang has already 6 papers and 4 works in progress. His productivity and ability to work in diverse directions is admirable. We are certain that he will greatly contribute to our group and to the productivity of Prof. Katok's visit.

Nominated visiting professor

Name of nominee*

Anatole Katok

Title*

Professor of Mathematics

Present position*

Raymond N. Shibley Professor of Mathematics

Current working address for nominee*

The Pennsylvania State University, Department of Mathematics, State College, PA 16801 USA

Special competence contribution to the host institution*

Special contribution to the Dynamical Systems and Number theory group at KTH Deparmtent of Mathematics.

Total duration of visiting professor's stay in Sweden*

6 months

Is the stay divided into several occasions?

☐

Head of department or equivalent at nominating faculty/institution *

Sandra di Rocco

Faculty/Institution for visiting professorship*

KTH, Department of Mathematics, Stockholm

Nominees CV*

See following page for attachment

Curriculum Vitae

ANATOLE KATOK

Born: August 9, 1944 Washington, D.C.
Marital Status: Married, 3 children

EDUCATION

Moscow State University, M.A., 1965
Moscow State University, Ph.D., 1968

ACADEMIC POSITIONS

1996- Raymond N. Shibley Professor, The Pennsylvania State University.
1990- Professor, The Pennsylvania State University.
1984-90 Professor, California Institute of Technology.
1978-84 Professor, University of Maryland, Chair in Analysis.
1973-78 Senior Scientific Research Worker, Central Economics- Mathematics Institute (USSR Academy of Science).
1968-73 Jr Scientific Research Worker, Central Economics- Mathematics Institute (USSR Academy of Science).

VISITING APPOINTMENTS (from one month to one year)

2017 Jussieu Institute of Mathematics, Paris (Projected for Fall)
2017 Weizmann Institute of Science, Rehovot, Israel (Projected for Fall)
2017 Yeshiva University, NYC
2016 Yeshiva University, NYC
2010 Weizmann Institute of Science, Rehovot, Israel
2010 University of Paris VI
2010 Institute Mittag-Leffler, Stockholm
2009 Morningside Institute/Mathematics Institute Chinese Academy of Sciences, Beijing
2008 University of Paris XIII
2007 Mathematical institute Polish Academy of Sciences, Warsaw
2006 Nicolas Copernicus University, Torun
2005 University of Paris VII
2003 Invitation Fellowship from the Japan Society for the Promotion of Science
2002 University of Paris XIII
2002 ETH Zurich
2001, 2002, 2003 Independent University of Moscow
2000 Cambridge University
1999 Tsin Hua University, Taiwan
1997 ETH, Zurich
1997 University of Rome II
1996-97 Erwin Schroedinger institute for Mathematical Physics, Vienna
1996 National University of Uruguay
1996 Tata Unstitute for Fundamental Research, Bombay, India
1995 Stefan Banach Center, Polish Academy of Sciences, Warsaw

1994 Mathematics Research Center, University of Warwick

1993 University of Paris VI

1993 Université de Grenoble I

1992 Mathematical Sciences Research Institute, Berkeley

1991 IHES, Bures-sur-Yvette.

1989 ETH, Zurich

1988 Federal University, Mexico City

1987 SFB "Geometrie und Analysis," Gottingen

1986 Federal University, Mexico City

1986 SFB "Geometrie und Analysis," Gottingen

1983-84 Mathematical Sciences Research Institute, Berkeley

1982 IHES, Bures-sur-Yvette

1982 Hebrew University, Jerusalem

1981 IMPA, Rio de Janeiro, Brazil

1980 Hebrew University, Jerusalem

1979 IMPA, Rio de Janeiro, Brazil

1979 Stanford University

1978 IHES, Bures-sur-Yvette

1978 University of Rome.

GRANTS, CONTRACTS, AWARDS AND PRIZES

MMS Annual Prize for Young Mathematicians, 1967
NSF Grant MCS 78-15278
NSF Grant MCS 79-03046
U.S.-Israel Binational Science Foundation Grant 1981-83
NSF Grant MCS 82-04024
U.S.-Israel Binational Science Foundation Grant 1985-87
NSF Grant DMS 85-14630, 1985
NSF Grant DMS 90-11749, 1990
NSF Grant DMS 90-17995, 1990
NSF Grant DMS 94-04061, 1994
NSF Grant DMS 97-04776, 1997
NSF Grant DMS-00-71339 (five years), 2000
NSF Grant DMS-05-05539, 2005
NSF Grant DMS-08-03880, 2008
NSF Grant DMS-10-02554, 2010
NSF Grant DMS-13-04830, 2013
NSF Grant DMS-16-02409, 2016
Several special travel grants from NSF
Penn State Graduate Faculty Teaching award, 2001
Penn State VIGRE NSF grant co-PI (with D. Arnold, N. Higson, and G. Mullen)
NSF Grant 0502205, Penn State MASS Program, PI (with G. Andrews, S. Katok and S. Tabachnikov)
NSF Grant DMS-0940732 PI (with D. Burago, S. Katok, Ya. Pesin) Workshop in Dynamical Systems and Related Topics
NSF Grant DMS-1343081 PI (with S. Katok, Ya. Pesin, F. Rodriguez Hertz) Workshop in Dynamical Systems and Related Topics
NSF Grant DMS-09-43603, EMSW21-MCTP: Penn State MASS Program, PI (with G.Andrews, S. Katok. J. Roe, S. Tabachnikov)

MEMBERSHIP IN HONORARY SOCIETIES

American Academy of Arts and Sciences, elected 2004
Inaugural class of Fellows of the American Mathematical Society, 2012.

SELECTED PROFESSIONAL ACTIVITIES

Director, Center for Dynamical Systems and Geometry, Department of Mathematics, The Pennsylvania State University.

Chairman, Scientific Advisory Board, MASS, Department of Mathematics, The Pennsylvania State University.

Journal of Modern Dynamics, founder and Editor-In-Chief, 2006–

Ergodic Theory and Dynamical Systems journal published by Cambridge University Press, Executive Editor 1981-1987, Editorial Board 1988-1993, Survey Editor 1994- 2011, Editor 1997- 2011, Editorial Board, 2011-

Mathematical Research Letters, Editorial Board,1994-2004

Discrete and Continuous Dynamical Systems, Editorial Board, 1995–

Moscow Mathematical Journal, Editorial Board,2000–2007, Editor 2008–

Journal of Fixed Point Theory and Applications, Editorial Advisory board, 2006–

Electronic Research Announcements in Mathematical Sciences Advisory board, 2007–

Editor of the book series "Cambridge Tracts in Mathematics" "Cambridge Studies in Advanced Mathematics", and "New Cambridge monographs" Cambridge University Press, 1999–

Organizer of Special Year in Ergodic Theory and Dynamical Systems at Maryland, 1979-80 and Editor of *Proceedings* published by Birkhauser in 2 volumes in *Progress in Mathematics* series.

Program Committee for Mathematical Sciences Research Institute in Berkeley (MSRI) for 1983-84.

NSF Advisory Committee in Mathematical Sciences, 1983-86.

Trustee, MSRI Berkeley, 1985 - 1991.

Chairman, Membership Committee, MSRI Berkeley, 1986-89.

Research Briefing Panel on Non-linear Science, National Research Council, 1987.

AMS Committee on Translations, 1988 - 1992.

MSRI Scientific Advisory Council, 1989 - 1993

International Science Foundation, Panel on Mathematics 1993-94

Institute for Mathematics and its Applications Board of Governors, 1993-96

Civilian Research and Development Foundation, Panel in Mathematics and Computer Science, 1996

Co-organizer of the Semi-annual Regional Workshop in Dynamical Systems and Related Topics, Penn State and Maryland, 1990 -

Organizer and co-organizer of a series of conferences and workshops known under the general name "Geometric Rigidity": 1984-

Program Committee and organizer of workshops for the semester in Dynamical Systems and Ergodic theory at S. Banach Mathematical Center in Warsaw, Poland, 1995.

Organizer, and Editor of two volumes of *AMS Proc. Symp. Pure Math*, AMS Summer Institute in Smooth Ergodic Theory, Seattle, 1999

Organizer, Semester in Ergodic theory, Geometric Rigidity and Number Theory, Newton Insitute, Cambridge, Spring 2000

Oversight panel for IHES, Bures-sur-Yvette, 2001

Reviewing Committee, Centre de mathmatiques de l'Ecole Polytechnique, Palaiseau, 2004

Chairman, Scientific Committee, program "Dynamical systems: Geometric structures and Rigidity", S. Banach Mathematical Center in Bedlewo, Poland, 2008.

Chairman, Scientific Committee, program "Modern Dynamics and its interaction with analysis, geometry and number theory", S. Banach Mathematical Center in Bedlewo, Poland, 2011.

SELECTED INVITED TALKS

I. General Meetings

International Congress of Mathematicians, Moscow, 1966 (15-minute talk)
Plenary sessions of Moscow Mathematical Society, 1966, 1968, 1976, 1999
Plenary session of the London Mathematical Society, Birmingham, 1979
Session of American Mathematical Society, Birmingham, Alabama, 1979 (one-hour invited talk)

International Congress of Mathematicians in Warsaw, 1983
International Congress in Mathematical Physics, Boulder, Colorado, 1983
Interdisciplinary Conference on Randomness, Columbus, 1988
Plenary session of Swedish Mathematical Society, Uppsala, 1995
Symposium Mathematics in the Sciences, Leipzig, 1998
Spitalfields Day, Cambridge, 2000
Fundamental Mathematics Today, Moscow, 2001.
Kolmogorov and contemporary mathematics, Moscow 2003
Plenary session of the Mathematical Society of Japan 2003
Modern Analysis and Moscow University, Hebrew University Jerusalem 2004

6

II Memorial and endowed Lecture series

Frank J. Hahn Lectures, Yale University, 1980
Rufus Bowen Memorial Lectures, Berkeley, 1982
Schlumberger Lectures, Rice University, 1982
Ramakant Muzumdar Commemorative Lectures, University of Bombay, 1996
Frontiers in Mathematics lectures, Texas A & M University, 2005
Mordell Lecture, Cambridge University, 2009

III. Lecture Series

Leningrad State University, 1971
Ninth Summer School, Ukrainian Academy of Sciences, 1971
Voronej State University, 1973
Voronej Winter School, 1976
University of Rome, 1978
Symposium on Diffeomorphisms and Foliations, University of Warwick, 1979
Summer Workshop on Ergodic Theory, Stanford University, 1979
IMPA, Rio de Janeiro, 1979
Frank J. Hahn Lectures, Yale University, 1980
Ecole d'Ete de Physique Theorique, Les Houches, France, 1981
Rufus Bowen Memorial Lectures, Berkeley, 1982
Sitges Conference on Statistical Mechanics, Sitges, Spain, 1982
Seventh Latin American School in Mathematics, Caracas, Venezuela, 1984
Semester in Dynamical Systems, Mexico City, Spring 1986
Third Mathematical Summer Institute, Shanghai, China, June 1986
Symposium on Smooth Ergodic Theory, University of Warwick, 1986
Semester in Dynamical Systems, S. Banach Mathematical Center, Warsaw, 1986
Special Year in Dynamical Systems, University of Maryland, 1987
Federal University, Mexico City, 1988
Workshop in Discrete Groups and Ergodic Theory, ICI Gucia, Palermo, 1990
Summer Session of CIME, Montecatini, Italy, 1991
MSRI Berkeley, 1992
Universite de Grenoble I, 1993
University of Warwick 1993, 1994
Euroconferences in Mathematics on Crete 1994
Semester in Dynamical Systems and Ergodic Theory, S.Banach Mathematical
Center, Warsaw, 1995.
Tata Institute for Fundamental Research, Bombay, 1996
Erwin Schroedinger Institute, Vienna, 1997
Max-Planck-Insitute for Mathematics in Natural Sciences, Leipzig, 1997
Tsin Hua University, Taiwan, 1999
AMS Summer Institute in Smooth Ergodic Theory, Seattle, 1999
Newton Institute, Cambridge, 2000
DFG meeting on Ergodic theory, Analysis and Efficient Simulation of Dynamical
Systems, Irsee, Germany, 2000
Universita degli Studi di Cagliari, Italy, 2000
Independent University of Moscow, 2001, 2002, 2003
ETH Zurich, 2002

University of Paris XIII 2002
Cursos de Verano, El Escorial Spain, 2003
Hebrew University of Jerusalem, 2004
First Summer school in Dynamical Systems, Shanghai, 2005
Mathematical institute Chinese Academy of Sciences, 2005
Mathematical Institute Polish Academy of Sciences, 2007
Mathematical institute Chinese Academy of Sciences, 2009
Institute Mittag-Leffler, 2010
Conference Center of the Mathematical Institute, Polish Academy of Sciences, 2011

IV. Conferences (selected)

The Fifth International Conference on Non-linear Oscillations, Kiev, 1969
The Sixth All-union Topological Conference, Tbilisy, 1972
The Fourth International Symposium on Information Theory, Leningrad, Repino, 1976
Symposium on Dynamical Systems and Ergodic Theory, Warsaw, 1977
Conference in Ergodic Theory, Oberwolfach, 1978
International Conference on Non-linear Dynamics, New York, 1979
Conference in Topological Dynamics, Oberwolfach, 1980
Mathematische Arbeitstagung, 1980
London Math. Society Symposium on Ergodic Theory, Durham, 1980
Conference on Dynamical Systems, Warwick, 1980
Workshop in Ergodic Theory, Jerusalem, 1980
International Symposium on Dynamical Systems, Rio de Janeiro, 1981
Conferences in Dynamical Systems (Jurgen Moser conferences), Oberwolfach, 1981, 1983, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2014
Conference in Honor of S. Kakutani, Yale University, 1982
Conference in Ergodic Theory, Luminy, France, 1982
Conference on Combinatorial Structure of Rational Maps, Duluth, 1983
Western States Math. Physics Meeting, Pasadena, 1983
Dynamics Days, San Diego, 1984
MSRI Conference on Two-dimensional Topology, Berkeley, 1984
International Conference in Random Fields, Koszeg, Hungary, 1984
Conference in Spectral Geometry, Stanford, 1985
Conference in Ergodic Theory and Dynamical Systems, Oberwolfach, 1986
Jerusalem-Gottingen Colloquium in Mathematics, Gottingen, 1987
Conference in Global Differential Geometry, Oberwolfach, 1987
Western States Math. Physics Meeting, 1988
Greene Conference on Hamiltonian Mechanics, San Diego, 1988
Conference on Rigidity of Geometric Structures, Boulder, 1989
International Workshop in Dynamical Systems, Rio de Janeiro, 1989
Conference in Measurable Dynamics, Maryland, 1989
Workshop on Measurable Dynamics, Minnesota, 1990
Workshop on Twist Maps, Minnesota, 1990
Conference on Geometric Rigidity, Northwestern University, 1990
Conference on Low-dimensional Dynamics, Maryland, 1990

International Conference in Dynamical Systems, Lyon, 1990

International Dynamical Systems Conference, Northwestern University, 1991

Conference on Foliations and Singularities in memory of C. Godbillon and J. Martinet, Strasbourg, 1991

Workshop on Lie Groups, Ergodic Theory and Geometry, MSRI, 1992

Conference on Nielsen Theory and Dynamical Systems, Mt. Holyoke, 1992

International Conference on Dynamical Systems, Porto, 1992

CIRM Marseilles-Luminy, Conference on Rigidity and Deformations for Hyperbolic Systems, 1993

Dynamics Days, Budapest, 1994

Workshop on Dynamical Systems and Related Topics, University of Maryland, 1992, 1994, 1995

Midwestern Dynamical Systems Conference Northwestern University 1994

International Congress on Dynamical Systems, Montevideo, 1995

Symposium on Ergodic Theory on Riemannian Manifolds, Warwick 1995

Conference on Lie Groups and Ergodic Theory, Bombay 1996

International Conference in Dynamical Systems, Beijing 1996

Geometry Festival, Duke U., 1997

Southwest Dynamical Systems Conference, U.North Texas, 1997

Symposium in Discrete Dynamical Systems in memory of W. Szlenk, Barselona, 1997

Conference on Models for Integrating Research into the Undergraduate Experience, Tuscon, 2000

Conference on Perturbative Methods for Partial Differential Equations and Dynamical Systems Cagliari, Italy 2000

International workshop in Dynamical Systems and Geometry in honor of Michel Herman, IMPA, Rio, 2001

I.G Petrovskii 100th Anniversary Conference, Moscow 2001

Jurgen Moser Memorial Conference, Zurich, 2001.

Progess in Nonlinear Science, Nizhnij Novgorod, 2001

Egrodic Theory and Dynamical Systems, Paris 2001

Fundamental Mathematics today Moscow, 2001

Ergodic Theory and Dynamical Systems, Torun, 2002

Conference dedicated to 60th birthday of J. Mather Princeton, 2002

Colloque International a la memoire de Michel Herman, Paris 2002

Midwest dynamical systems, Evanston, 2003

Probability in Mathematics, Conference in honor of Hillel Furstenberg, Jerusalem 2003

EquaDiff 2003, Plenary talk, Hasselt Belgium

Topology and Foliations, Kyoto, 2003

Hilbert 16th and related problems in dynamics, geometry and analysis, Moscow, 2003

Workshop in Dynamical Systems; Hebrew University of Jerusalem, 2004

Conference in memory of W. Szlenk, Warsaw, 2005

International conference in Dynamical systems Huangshan, China, 2005

Workshop on Partial Hyperbolicity et al, Fields institute, Toronto, 2006

Lie Groups: Dynamics, Rigidity, Arithmetic, conference dedicated to sixtieth birthday of G. Margulis, Yale, 2006

Conference dedicated to seventieth birthday of Ja.G.Sinai, Maryland, 2006

International Workshops on Global Dynamics beyond uniform hyperbolicity: Chicago, 2006; Beijing 2009

Ergodic Theory and Dynamical Systems, Szklarska Poreba, Poland 2006

Geometric Group Theory, Hyperbolic Dynamics and Symplectic Geometry, Oberwolfach 2006, 2008, 2010

Randomness and hyperbolicity in dynamical systems, in honor of Domokos Szasz 65th birthday, Budapest 2006

Conference in honor of H. Furstenberg, Maryland, 2007

Ergodic theory, Paris 13, 2008

Ergodic theory, IHP Paris, 2009

Rice Dynamics Meeting, Houston, TX, 2013

International Conference Beyond Uniform Hyperbolicity, Bedlewo, Poland, 2013

Dynamics on Homogeneous Spaces and Applications (Conference in honor of Grigory Margulis on his Doctorate Honoris Causa from University Lyon 1) Lyon, France, 2013

Fields Medal Symposium, Toronto, Canada, 2013

Research Group Conference-Homogeneous Dynamics, Unipotent Flows, and Applications (in honor of Marina Ratner and her work), Einstein Institute of Mathematics, Hebrew University, Jerusalem, Israel, 2013

Rice Dynamical Systems meeting, Houston, 2014

Ergodic theory and dynamical Systems, Torun, Poland, 2014

Dynamical Systems and their applications, Kiev, 2015

Workshop on Dynamical Systems, KTH, Stokholm, 2016

75th Birthday conference for Domokos Szasz, ESI, Vienna, 2016

Dynamics, Geometry and Number Theory (in honor of Gregory Margulis), IHP, Paris, 2016.

V. Colloquium Talks at North American Universities

1978: Cornell University, University of Minnesota, University of California-Berkeley, Harvard University, Brown University

1979: Rice University, New York University

1980: University of North Carolina, University of Wisconsin, SUNY-Albany

1981: The Pennsylvania State University, New York University, Princeton University

1982: University of Washington, Stanford University, New York University, Johns Hopkins University

1983: California Institute of Technology, Wayne State University, University of Michigan, Michigan State University, Ohio State University, Princeton University, (Math. Physics), University of California-Berkeley

1984: University of Oregon, Stanford University, University of California-Los Angeles

1985: University of Minnesota, University of Arizona (Applied Math.), University of California-San Diego, University of Southern California

1987: Boston University, University of Maryland,

1988: University of Arizona, University of California-Santa Cruz, Northwestern University, University of California-Los Angeles

1989: Caltech (Physics Colloquium), University of Indiana, University of Maryland

1991: University of Pennsylvania, University of California-Berkeley,

1992: University of California-Los Angeles, University of Chicago, Ohio State University, University of Oregon, University of Michigan

1993: Yale University

1994: University of Chicago

1995: Washington University St Louis, University of Missouri

1998: MIT

1999: Georgia Institute of Technology, Carnegie Mellon University, Cornell University

2000: University of Maryland

2003: University of California-Berkeley, California Institute of Technology

2004: MSRI/Evans Lecture at Berkeley, Micihgan State University, Tufts University

2005: Indiana University, MIT, University of Texas-Austin

2006: University of Toronto, Montreal city colloquium

2007: University of South Alabama

2008: Ohio State University, University of North Carolina

2009: Brigham Young University, University of Maryland

2010: University of Houston, Rice University, University of Texas-Austin

2011: Binghamton University; SUNY, Stony Brook

2012: Rice University

2013: Yale University

2015 Yeshiva University

Ph.D. Dissertations Supervised, Ph. D. year and current position of former Ph.D. students:

A.V. Kocergin, 1974, Professor, Moscow State University

M. Brin, 1975, Professor Emeritus, University of Maryland, College Park

Ya. B. Pesin, 1979, Distinguished Professor, Pennsylvania State University

E.A. Satayev, 1978, Professor and Chair, Technical University, Obninsk, Russia; died 2015.

R. Spatzier, 1983, Professor, University of Michigan, Ann Arbor

E.A. Robinson Jr., 1983, Professor, George Washington University, Washington, D.C. (former department chair)

C. Toll, 1983, Director, NSA program in mathematics, U.S. Department of Defense

R. Feres, 1989, Professor, Washington University, St.Louis

B. Hasselblatt, 1989, Professor Tufts University, (former department chair and Associate Provost)

M. Muldoon, 1989, Reader, UMIST, Manchester, UK

D. DeLatte, 1991, Senior Cryptological Mathematician, U.S. Department of Defense;(formerly Associate Professor, University of North Texas)

C.-B. Yue, 1991, Professor, Mathematics Institute, Academia Sinica, Beijing, China; (formerly Associate Professor, University of Illinois, Chicago)

N. Qian, 1992, Senior Staff Scientist, Broadcom Corp; (formerly Gibbs Assistant Professor, Yale University)

W.-F. Chen, 1992, System Engineer, Hughes Space & Communication company

M. Degli-Esposti, 1994, Professor, University of Bologna, Italy

V. Nitica, 1995, Professor, West Chester University

A. Török, 1995, Professor, University of Houston

A. Kononenko, 1996 Renaissance Technologies, East Setauket, NY

M. Guysinsky, 1997, Senior Lecturer, Penn State University

S. Ferleger, 1998 Renaissance Technologies, East Setauket, NY

A. Mezhirov, 1999, Member of Technical Staff, MIT, Lincoln Lab, Lexington, MA

S. Yaskolko, 1999, Professor, South University

B. Kalinin, 2000 Associate Professor, Penn State University

V. Lemin, 2002

A. Windsor, 2002 Associate Professor, University of Memphis

R.Gunesch, 2002 Professor, University of Education Vorarlberg, Austria

D. Damjanovic, 2004, Associate Professor, KTH Stockholm

I. Ugarcovici, 2004, Associate Professor, DePaul University

T. Fisher, 2006, Executive Director, Morgan Stanley, New York

D. Mieszkowski, 2006 FactSet Research Systems, Inc.

B. Weaver, 2008, Visiting Assistant Professor, James Madison University

A. Gogolev, 2009, Associate Professor, Binghamton University SUNY

D. Scheglov, 2009 Federal Fluminense University, Brazil

S. Peng, 2010 Assistant Professor, Central University of finance and Economics, Beijing, China

Z. J. Wang 2010 Assistant Professor, Michigan State University

A. Egorov, 2011, Senior Knowledge Engineer, Reasoning Mind Inc., Houston, TX.

L. Zhu, 2012.
W, Wu, 2014, PostDoc, Peking University
K. Vinhage, 2016 NSF Postdoctoral Fellow, University of Chicago

Nominees publication list*

See following page for attachment

ANATOLE KATOK

PUBLICATIONS

I. Books

[I.1] (with V. M. Alexeyev and A.G. Kouchnirenko) *Smooth Dynamical Systems* (in Russian), Kiev, 1972; revised edition Kiev, 1976; Translated into English as *Three papers in Dynamical systems*, AMS translations ser.2, **116**, 1981.

[I.2] (with J.-M. Strelcyn) *Smooth Maps with Singularities, Invariant Manifolds, Entropy and Billiards,* Springer Lecture Notes in Math., **1222**, 1986, 291pp.

[I.3] (with B. Hasselblatt) *Introduction to the Modern Theory of Dynamical Systems*, Cambridge University Press, 1995, xviii+802pp;
paperback edition, 1997; reprints 1996, 1997, 1998, 1999, 2002;
Chinese edition, 2011
translation into Russian, Faktorial, 1999;
translation into Portuguese, Gulbenkian Foundation, 2005.
translation into Chinese, Higher Education Press, 2016

[I.4] (with B.Hasselblatt) *A First Course in Dynamics with a Panorama of Recent Developments*, Cambridge University Press, 2003, x+424pp;
translation into Russian MCCME, 2005.
translation into Chinese, Science Press, 2009
Indian edition, 2010

[I.5] *Combinatorial Constructions in Ergodic Theory and Dynamics*, AMS, University Lecture Series, **30**, 2003, iv+121pp.

[I.6] (with V. Climenhaga) *Lectures on Surfaces. (Almost) everything you wanted to know about them*, AMS, Student Mathematical Library, **46**, 2008, xv+286pp.

[I.7] (with V. Nitica) *Rigidity in higher rank abelian group actions. I. Introduction and cocycle problem*, Cambridge University Press, Cambridge tracts in Mathematics, **185**, 2011,vi+313pp.

[I.8] (with V. Climenhaga) *From groups to geometry and back* , AMS, Student Mathematical Library, in press, approx. 425 pp.

II. Research and research–expository articles (peer-reviewed)

(Items 1–22 originally appeared in Russian; translations into English are mentioned individually)

[II.1] On one-dimensional projections of the Hilbert cube, *Uspehi Mat. Nauk*, **19**, No.6 (1964), 167-173.

[II.2] (with A.M. Stepin) Approximation of ergodic dynamical systems by periodic transformations, *Dokl. Akad. Nauk SSSR*, **171**, No.6 (1966), 1268-1271;
English translation: *Soviet Math. Dokl.* **7**, No.6 (1966), 1638-1641.

[II.3] (with A.M. Stepin) On spectra of ergodic dynamical systems, *ICM, Abstracts of communications*, Section 6, Moscow, 1966.

[II.4] Entropy and approximation of dynamical systems of periodic transformations, *Funct. Anal. and its appl.* **1**, No.1 (1967), 75-85.

2

[II.5] Spectral properties of dynamical systems with invariant integral on torus, *Funct. Anal. and its appl.* **1**, No.4 (1967), 46-56.

[II. 6] (with A.M. Stepin) Approximations in ergodic theory, *Uspehi Mat. Nauk*, **22**, No.5 (1967), 81-106;
English translation: *Russian Math. Surveys*, **22**, No.5 (1967), 77-102.

[II.7] (with C. Foias) On multiplicative operator functions of measure-preserving transformation, *Uspehi Mat. Nauk* **23**, No.3 (1968), 179-180.

[II.8] (with A.M. Stepin) Metric properties of measure-preserving homeomorphisms, *Uspehi Math. Nauk*, **25**, No.2 (1970), 191-220;
English translation: *Russian Math. Surveys*, **25**, No.2 (1970), 193-220.

[II.9] (with D.V. Anosov) New examples of ergodic diffeomorphisms on smooth manifolds, *Uspehi Mat. Nauk*, **25**, No.4 (1970), 173-174.

[II.10] Rotation numbers and Anosov flows, *Uspehi Mat. Nauk*, **25**, No.5 (1970), 243-244.

[II.11] (with D.V. Anosov) New examples in smooth ergodic theory. Ergodic diffeomorphisms, *Trudy Moskov. Mat. Obsc.*, **23** (1970), 3-36;
English translation: *Trans. Moscow Math. Soc.*, **23** (1970), 1-35.

[II.12] Ergodic flows generated by system of weakly interacting oscillators, *Proc. of Fifth International Conference on nonlinear oscillations*, **v.2**, Kiev, 1970, 216-221.

[II.13] Ergodic perturbations of degenerate integrable Hamiltonian systems,*Izv. Akad. Nauk. SSSR*, Ser. Math. **37**, No.3 (1973), 539-576;
English translation: *Math. USSR, Izvestija*, **7**, (1973), No.3, 535-571.

[II.14] Invariant measures of flows on oriented surfaces, *Dokl. Akad. Nauk. SSSR*, **211**, No.4 (1973), 775-778;
English translation: *Soviet Math. Dokl.*, **14**, No.4 (1973), 1104-1108.

[II.15] Dynamical models of production and exchange, in *Mathematical economy and functional analysis*, Moscow, Nauka, 1974, 69-94.

[II.16] (with A.M. Zemlyakov) Topological transitivity of billiards in polygons, *Matem. Zametky*, **18**, No.2 (1975), 291-301, Errata **20**, No.6 (1976), 883;
English translation: *Math. Notes of the Academy of Sciences of the USSR*, **18**, No.2 (1975), 760-764; Errata **10**, No.6 (1976), 1051.

[II.17] Local properties of hyperbolic sets, Appendix to Russian translation of Z. Nitecki, *Differential Dynamics*, Moscow, Mir, 1975, 214-232.

[II.18] Time change, monotone equivalence and standard dynamical systems, *Dokl Akad. Nauk. SSSR*, **223**, No.4 (1975), 789-792;
English translation: *Soviet Mat. Dokl.*, **16** (1975), No.4, 986-990.

[II.19] (with Ya. G. Sinai and A.M. Stepin) Theory of dynamical systems and general groups of measure-preserving transformations, in Mathematical Analysis, Vol.**13**, Moscow, 1975, 129-261;
English translation: *J. Soviet Math.* **7** (1977), 974-1041.

[II.20] (with E.A. Satayev) Standardness of interval exchange transformations and flows on surfaces, *Matem. Zametky*, **20**, No.4 (1976), 479-488;
English translation: *Math. Notes of the USSR Academy of Sciences*, **20**, No.4 (1976).

[II.21] Monotone equivalence in ergodic theory, *Izv. Acad. Nauk SSSR*, Ser.Math. **41**, No.1 (1977), 104-157;
English translation: *Math. USSR Izvestija* **10**, No.1 (1977), 99-146.

[II.22] A Conjecture about Entropy, in *Smooth Dynamical Systems*, Moscow, 1977, 181-203;
English translation: *AMS Transl* (2), **133** (1986), 91-107.

[II.23] The special representation theorem for multi-dimensional group actions, Dynamical Systems, I, Warsaw, *Asterisque*, **49** (1977), 117-140.

[II.24] Bernoulli diffeomorphisms on surfaces, *Ann. Math.*, **110**, (1979), 529-547.

[II.25] Lyapunov exponents, entropy and periodic points of diffeomorphisms, *Publ. Math. IHES*, **51**, (1980), 137-173.

[II.26] Interval exchange transformations and some special flows are not mixing, *Israel J. of Math.*, **35**, (1980), 301-310.

[II.27] Smooth non-Bernoulli K-automorphisms, *Invent. Math.*, **61**, (1980), 291-300.

[II.28] Hyperbolicity, entropy and minimality for smooth dynamical systems, *Proc. of 2nd Brasilian Math. Colloq.*, vol.**2**, 1981, Rio de Janeiro, 571-581.

[II.29] (with M. Brin and J. Feldman) Bernoulli diffeomorphisms and group extensions of dynamical systems with non-zero characteristic exponents, *Ann. Math.*, **113** (1981), 159-179.

[II.30] (with M. Gerber) Smooth models of Thurston's Pseudo-Anosov maps, *Ann. Sci. Ecole Norm. Super. Paris*, **15**, (1982), No 1, 173–204.

[II.31] Some remarks on Birkhoff and Mather twist map theorems, *Ergodic Theory and Dynamical Systems,* **2** (1982), No.2, 185-194.

[II.32] Entropy and closed geodesics, *Ergodic Theory and Dynamical Systems*, 1982, Vol.2, No.3-4, 339-366.

[II.33] (with M. Brin) On local entropy, Proc. of Intern. Symposium on Dynamical Systems in Rio de Janeiro, 1981, *Springer Lecture Notes in Math.*, **1007**, 1983, 30-38.

[II.34] Periodic and Quasi-Periodic Orbits for twist maps, Dynamical Systems and Chaos, *Springer Lecture Notes in Physics*, **179** (1983), 47-65.

[II.35] (with S. Hurder) Secondary classes and transverse measure theory of a foliation, *Bull. AMS*, **11**, No.2 (1984), 347-349.

[II.36] Nonuniform hyperbolicity and structure of smooth dynamical systems, in *Proc. Intern. Congress of Math.*, Vol.**2**, PWN-North Holland (1984), 1245-1254.

[II.37] (with K. Burns) Manifolds with non-positive curvature, *Ergodic Theory and Dynamical Systems*, **5**, N2, 1985, 307-317.

[II.38] (with Y. Kifer) Random Perturbations of Transformations of an interval, *J. Anal. Math.*, **47** (1986), 194-237.

[II.39] (with S. Hurder) Ergodic theory and Weil measures for foliations, *Ann. Math.*, **126**, No.2, 1987, 221-275.

[II.40] The growth rate for the number of singular and periodic orbits for a polygonal billiard, *Comm. Math. Phys.*, **111**, (1987), 151-160.

[II.41] (with D. Bernstein) Birkhoff periodic orbits for small perturbations of completely integrable Hamiltonian systems with convex Hamiltonian, *Invent. Math.*, **88** (1988), 225-241.

[II.42] Four applications of conformal equivalence to geometry and dynamics, *Ergodic Theory and Dynamical Systems*, **8***, (Conley memorial issue), (1988), 139-152.

[II.43] (with E. Gutkin) Weakly mixing billiards, *Springer Lecture Notes in Math.* **1345**, 1988, 163-176.

4

[II.44] (with R. Feres) Invariant Tensor Fields of Dynamical Systems with pinched Lyapunov exponents and Rigidity of Geodesic Flows, *Ergodic Theory and Dynamical Systems*, **9**, No 4, 1989.

[II.45] (with G. Knieper, M. Pollicott and H. Weiss) Differentiability and analyticity of topological entropy for Anosov and geodesic flows, *Invent. Math.*, **98**, (1989), 581-597.

[II.46] (with R. Feres) Anosov flows with smooth foliations and rigidity of geodesic flows in three-dimensional manifolds of negative curvature, Erg. Theory and Dynam. Systems, **10**, No 4 (1990), 657-670.

[II.47] (with S. Hurder) Differentiability, rigidity and Godbillon-Vey classes for Anosov flows, Publ. Math. IHES, **72**, (1990), 5-61.

[II.48] (with G. Knieper, M. Pollicott and H. Weiss) Differentiability of entropy for Anosov and geodesic flows, Bull. AMS, **22** (1990), N2, 285-293.

[II.49] (with L. Flaminio) Rigidity of symplectic Anosov diffeomorphisms on low dimensional tori, *Ergodic Theory and Dynamical Systems*, **11**, (1991), 427-440.

[II.50] (with G. Knieper and H. Weiss) Formulae for the derivative and critical points for topological entropy for Anosov and geodesic flows, *Comm. Math. Physics*, **138** (1991), 19-31.

[II.51] (with J. Lewis) Local Rigidity of certain groups of toral automorphisms, *Israel J. Math.*, **75**, (1991), 203-241.

[II.52] Minimal orbits for small perturbations of completely integrable Hamiltonian systems, in *Twist maps and their Applications*, IMA volumes, **44**, Springer-verlag (1992), 183-199.

[II.53] (with R.Spatzier) First cohomology of Anosov actions of higher rank abelian groups and applications to rigidity, *Publ. Math. IHES*, **79**, (1994), 131-156.

[II.54] (with R. Spatzier) Subelliptic estimates of polynomial differential operators and applications to rigidity of abelian actions, *Math. Res. Letters*, **1**, (1994), 193-202.

[II.55] (in collaboration with K. Burns) Infinitesimal Lyapunov functions, invariant cone families and stochastic properties of smooth dynamical systems, *Ergodic Theory and Dynamical Systems*, **14**, (1994), 757-785

[II.56] (with L. Mendoza) Dynamical systems with non-uniformly hyperbolic behavior, Supplement to *Introduction to the modern theory of smooth dynamical systems*, CUP, (1995), 659-700.

[II.57] (with S. Katok) Higher cohomology for Abelian groups of toral endomorphisms, *Ergodic Theory and Dynamical Systems*, **15**, (1995) 569-592.

[II.58] (with K. Schmidt) The cohomology of expansive Z^d-actions by automorphisms of compact abelian groups, *Pacific. J. Math.*, **170**, (1995), 105-142.

[II.59] (with E.Gutkin) Caustics in inner and outer billiards, *Comm.Math. Phys.*, **173**, (1995),101-133.

[II.60] (with J. Lewis) Global rigidity results for lattice actions on tori and new examples of volume-preserving actions, *Israel J.Math.*, **93**, (1996), 253-280.

[II.61] (with J. Lewis and R. Zimmer) Cocycle super-rigidity and rigidity for lattice actions on tori, *Topology*, **35**, (1996), 27-38.

[II.62] (with R. Spatzier) Invariant measures for higher rank hyperbolic Abelian actions, *Ergodic Theory and Dynamical Systems*, **16**, (1996), 751-778;
Corrections to "Invariant measures for higher rank hyperbolic Abelian actions", *Ergodic Theory and Dynamical Systems*, **18**, (1998), 503-507.

[II.63] (with A.Kononenko) Cocycle stability for partially hyperbolic systems, *Math. Res. Letters*, **3**, (1996), 191-210.

[II.64] Hyperbolic measures and commuting maps in low dimension, *Disc. and Cont. Dyn. Syst.*, **2**, (1996), 397-411.

[II.65] (with R.Spatzier) Non-stationary normal forms and rigidity of group actions, *ERA-AMS*, **2**, (1996), N3, 124-133.

[II.66] (with J-P Thouvenot) Slow entropy type invariants and smooth realization of commuting measure-preserving transformations, *Ann. Inst. H.Poincaré*, **33**, N3, (1997), 323-338.

[II.67] (with R.Spatzier) Differential rigidity of Anosov actions of higher rank Abelian groups and algebraic lattice actions, in Dynamical systems and related topics, (Volume dedicated to D.V.Anosov),*Proc. Steklov Math.Inst.*, **216**, (1997), 287-314.

[II.68] (with M.Guysinsky) Normal forms and invariant geometric structures for dynamical systems with invariant contracting foliations, *Math. Res. Letters*, **5**, (1998), 149-163.

[II.69] (with A. Mezhirov) Entropy and growth of expanding periodic orbits for one-dimensional maps, *Fund. Math*, **157** (1998), 245-254.

[II.70] (with V.Nitica and A.Török) Non-Abelian cohomology of abelian Anosov actions, *Ergodic Theory and Dynamical Systems* **20** (2000), 259–288.

[II.71] (with R. Gunesch) Construction of weakly diffeomorphisms preserving measurable Riemannian metric and smooth measure, *Disc. and Cont. Dyn. Syst.*, **6**, (2000), 61–83.

[II.72] (in collaboration with E. A. Robinson, Jr.) Cocycles, cohomology and combinatorial constructions in ergodic theory in *Smooth Ergodic Theory and its applications*, Proc. Symp. Pure Math., **69**, AMS, 2001, 107–173

[II.73] (with B. Kalinin) Invariant measures for actions of higher rank abelian groups, in *Smooth ergodic Theory and its applications*, in *Proc. Symp. in Pure Math.*, **69** AMS, 2001, 593–637

[II.74] (with B. Fayad and A. Windsor) Mixed Spectrum Reparametrizations of Linear Flows on T^2, *Moscow Math. Journal*, **1**, 2001, 521–537.

[II.75] (with B. Kalinin) Measurable rigidity and disjointness for Z^k actions by toral automorphisms, *Ergodic Theory and Dynamical Systems*, **22** (2002), 507–523.

[II.76] (with B. Hasselblatt) Principal Structures, in *Handbook in Dynamical Systems*, vol **1A** Elsevier, 2002, 1–203.

[II.77] (with R. Feres) Ergodic Theory and Dynamics of G–spaces, in *Handbook in Dynamical Systems*, vol **1A**, Elsevier, 2002, 665-763.

[II.78] (with S. Katok and K. Schmidt) Rigidity of measurable structure for Z^d actions by automorphisms of a torus, *Comm. Math. Helvetici*, **77**, (2002), 718-745.

[II.79] (with B. Hasselblatt) The development of dynamics in the 20th century and contribution of Jürgen Moser, *Ergodic Theory and Dynamical Systems*, **22**, (2002), 1343-1364 .

[II.80] (with M. Einseidler) Invariant measures on G/Γ for split simple Lie Groups G, *Comm. Pure. Appl. Math.*, (Moser memorial issue) **56**, (2003), 1184–1221.

[II.81] (with B. Fayad) Constructions in elliptic dynamics, *Ergodic Theory and Dynamical Systems*, (Herman memorial issue) **24**, (2004), 1477-1520.

[II.82] (with D. Damjanovic) Local rigidity of actions of higher rank abelian groups and KAM method, *ERA-AMS*, **10**, 2004, 142–154.

[II.83] (with D. Damjanovic) Periodic cycle functional and cocycle rigidity for certain partially hyperbolic R^k actions, *Disc. and Cont. Dyn. Syst.*, **13** (2005), 985-1005

[II.84] (with M. Einsiedler) Rigidity of measures –The high entropy case and non-commuting foliations, *Israel Math. J.* , **148**, (2005) 169–238.

[II.85] (with J.-P.Thouvenot), Spectral properties and combinatorial constructions in ergodic theory, in *Handbook in Dynamical Systems*, vol **1B**, (2005) Elsevier, 949–743.

[II.86] (with S. Katok) Higher cohomology for Abelian groups of toral automorphisms II: the partially hyperbolic case, and corrigendum, *Ergodic Theory and Dynamical Systems*, **25** (2005) n. 6, 1909–1917.

[II.87] (with M. Einseidler and E. Lindenstrauss) Invariant measures and the set of exceptions in Littlewood's conjecture, *Ann. Math.*, (2) **164** (2006), no. 2, 513–560.

[II.88] (with B. Kalinin) Measure rigidity beyond uniform hyperbolicity: Invariant Measures for Cartan actions on Tori, *Journal of Modern Dynamics*, **1**, No1, (2007),123–146: errata *Journal of Modern Dynamics*, **4**, No1, (2010), 207–209

[II.90] (with F. Rodriguez Hertz) Uniqueness of large invariant measures for Z^k actions with Cartan homotopy data, *Journal of Modern Dynamics*, **1**, No 2, (2007), 287–300.

[II.91] (with V. Nitica), Rigidity of higher rank abelian cocycles with values in diffeomorphism groups, *Geometriae Dedicata*, **124** (2007), 109–131.

[II.92] (with D. Damjanovic) Local rigidity of restrictions of Weyl chamber flows, *Comptes Rendus Mathematique* **344**, no 8, , 503-508.

[II.93] Fifty years of entropy in dynamics: 1958–2007, *Journal of Modern Dynamics* **1**, no 4, (2007), 545–596.

[II.94](with B. Kalinin and F. Rodriguez Hertz), New Progress in Nonuniform Measure and Cocycle Rigidity, *ERA MS*, 2008. 79–92.

[II.95] (with M. Lemanczyk] Some new cases of realization of spectral multiplicity function for ergodic transformations, *Fundamenta mathematicae*, **206** (2009), 185-215.

[II.96] (with F. Rodriguez Hertz), Rigidity of real-analytic actions of $SL(n, \mathbb{Z})$ on T^n : A case of realization of Zimmer program, *Discrete and Continuous Dynamical Systems* , **27** (2010), 609–615

[II.97] (with D. Damjanovic) Local rigidity of partially hyperbolic actions I. KAM method and actions on the torus, *Annals of Mathematics* , **172**, N3 (2010), 1805–1858

[II.98] (with F. Rodriguez Hertz) Measure and cocycle rigidity for certain non-uniformly hyperbolic actions of higher rank abelian groups, *Journal of Modern Dynamics* **4**, (2010), 487–515.

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[II.100] (with B. Kalinin and F. Rodriguez Hertz) Nonuniform measure rigidity, *Annals of Mathematics.*, **174**, (2011), 361-400.

[II.101] (with D. Damjanovic), Local rigidity of homogeneous parabolic actions: I. A model case, *Journal of Modern Dynamics*, **5** N2, (2011), 203-235.

[II.102] (with B. Fayad) Analytic uniquely ergodic volume preserving maps on odd spheres, *Commentarii mathematici Helvetici* **89** (2014), 963-977.

[II.103] (with S. Katok and F. Rodriguez Hertz) The Fried average entropy and slow entropy for actions of higher rank abelian groups, *Geometric and Functional Analysis*, **24** N4, (2014), 1204-1228.

[II.104] (with F. Rodriguez Hertz), Arithmeticity and topology of higher rank actions of Abelian groups, *Journal of Modern Dynamics* **10** (2016), 135–172.

[II.105] (with F. Rodriguez Hertz), Non-uniform measure rigidity for Z^k actions of symplectic type (with F. Rodriguez Hertz) in Modern Theory of Dynamical Systems: A Tribute to Dmitry Viktorovich Anosov, *Contemporary mathematics*, AMS, 2017, to appear.

III. Selected other publications.

[III.1] (with co-authors) Order, Chaos and Patterns; Report of the Research Briefing panel, National Academy Press, Washington D.S, 1987

[III.2] Vladimir Abramovich Rokhlin, *Ergodic Theory and Dynamical Systems,* **9** (1989), 605-608.

[III.3] (with S. Katok) Women in Soviet Mathematics, *Notices AMS*, **40**, (1993), 108-116.

[III.4] (with S. Katok and S. Tabachnikov) The MASS Program at Penn State, *Focus*, Feb. 2001

[III.5] Economics and Linear inequalities, in *Kvant Selecta I*, AMS, 2001, pp 9–20, translated from Russian.

[III.6] Economics and Linear inequalities (continuation), in *Kvant Selecta I*, AMS, 2001, pp 21–28, translated from Russian.

[III.7] The billiard table as a playground for a mathematician (in Russian), in *Studencheskie chtenja v NMU*, Vol **2**, Moscow MCCME, 2001, pp 8–36;
English translation: in *Surveys in modern mathematics*, London Math. Soc. Lecture Note Ser, **321** Cambridge Univ. Press, Cambridge, 2005, pp 216–242.

[III.8] (with S. Katok and S. Tabachnikov) The MASS Program at Penn State, *Math. Intelligencer*, **24**, no 4, (2002) 50-56

[III.9] Geometric structures, symmetry and elements of Lie groups, in *MASS Selecta*, AMS, 2003, pp 99–119.

[III.10] Moscow dynamics seminars of the Nineteen seventies and the early career of Yasha Pesin, *Discrete and Continuous Dynamical Systems*, **22** no. 1-2 (2008), 1–22.

[III.11] Dmitry Viktorovich Anosov. His life and work, in Modern Theory of Dynamical Systems: A Tribute to Dmitry Viktorovich Anosov, *Contemporary mathematics*, AMS, 2017, to appear.

8

EDITING

[E1] *Ergodic Theory and dynamical systems* Proceedings of Special Year in Ergodic Theory and Dynamical Systems at Maryland, 1979-80 in two volumes Birkhauser Progress in Mathematics **10, 21**; vol. I, 1981 xi+333p, vol 2, 1982, xi+210pp.

[E2] (with R. de la Llave, Ya. Pesin and H. Weiss) *Smooth Ergodic Theory and its applications*, Proc. Symp. Pure Math, **69** AMS, 2001, x+881pp.

[E3] (with B. Hasselblatt) *Handbook in Dynamical Systems*, Elsevier, vol. **1A** , 2002, xii+1220pp.

[E4] (with B. Hasselblatt) *Handbook in Dynamical Systems*, Elsevier, vol. **1B** , 2005, xii+1222pp.

[E5] (with Ya. Pesin and F. Rodriguez Hertz) *Modern Theory of Dynamical Systems: A Tribute to Dmitry Viktorovich Anosov*, AMS, 2017, to appear.

Budget and research resources

Specify the applied amounts for the guest professor, divided between salary and running costs, in accordance with the budget instructions in the call text.

Salaries including social fees*

	Role in the project	Name	Percent of salary
1	Participating researcher	Anatole Katok	100%
2	Participating researcher	Zhiyuan Zhan	100%
	Total		0

		2018	Total
1		735,360	735,360
2		312,528	312,528
	Total	1,047,888	1,047,888

Running Costs

	Running Cost	Description	2018	Total
1	Travel costs	Travel to and from home country	70,000	70,000
2	Rent	Renting an apartment in Stockholm for the visiting professor and the spouse	168,000	168,000
3	Premises	Cost of office space	40,000	40,000
4	Guest speakers	Four guest speakers from Europe for the "dynamics days" meetings	24,000	24,000
	Total		302,000	302,000

Total budget*

	Specified costs	2018	Total, applied	Other costs	Total cost
1	Salaries including social fees	1,047,888	1,047,888		1,047,888
2	Running costs	302,000	302,000		302,000
3	Subtotal	1,349,888	1,349,888	0	1,349,888
4	Indirect costs	372,000	372,000		372,000
5	Total project cost	1,721,888	1,721,888	0	1,721,888

Motivation of total budget*

The visiting professor salary: 80000 X 6 months with 53.2 percent social fees = 735360

The postdoctoral salary: 34000 X 6 months with 53.2 percent social fees = 312528

Travel to and from State College, USA for visiting professor and spouse =70000

Renting an apartment in Stockholm for 6 months for visiting professor and spouse = 168000. The conditions on the appartment are that it is close to KTH and that it has at least 2 rooms.

The office space at KTH mathematics department is rented and it costs 40000.

Guest speakers are planned one for each of the four Dynamics Day meetings, the speakers will be from Bristol, Warsaw, Paris and/or Copenhagen, and the expence per speaker is counted as: 2 nights in a hotel X 1000 + flight price of approximately 4000.

Indirect costs are calculated as 35.5 percent of the salary of the visiting professor and the postdoctoral researcher = 372000.

CV

CV - Danijela Damjanovic

Name: Danijela Damjanovic	**Doctorial degree:** 2004-08-20
Birthdate: 19731108	**Academic title:** Docent
Gender: Female	**Employer:** Kungliga Tekniska högskolan
Country: Sweden	

All cv sections are disabled for Damjanovic, Danijela on this application.

Publications

Publications - Danijela Damjanovic

Name: Danijela Damjanovic	**Doctorial degree:** 2004-08-20
Birthdate: 19731108	**Academic title:** Docent
Gender: Female	**Employer:** Kungliga Tekniska högskolan
Country: Sweden	

Publications are disabled for Damjanovic, Danijela on this application.

Register

Terms and conditions

Applications with an organisation as applicant is automatically signed when the application is registered.

The signature of the applicant confirms that:

- The information contained in the application is correct and in line with the instructions from the Swedish Research Council.
- Any side-line occupation and/or commercial ties have been reported to the administrating organisation, and that no conflict with the principles of good research practice has been established.The necessary permits and approvals are in place at the start of the project, e.g. concerning the ethical review.
- The organisation will accommodate the research and the equipment, and employ the applicant during the time period and to the extent presented in the application.
- The organisation approves the cost estimate presented in the application.
- The project will be conducted in accordance with Swedish law.