

1. *Design specifications for a transmission etalon.* A Fabry-Perot etalon is to be used as a transmission filter inside an oscillating laser cavity, as mentioned in this section. A very high peak transmission ($\geq 99.0\%$) is required in order to avoid excessive losses inside the laser, and a finesse ≥ 30 is also needed. What specifications must be given for the etalon mirror reflectivities R_1 and R_2 , and for the internal round-trip power loss $\delta_0 \equiv 2\alpha_0 p$ in the etalon?

Hint: The mirror reflectivity's need to be closely matched, so you can assume in this case that $R_1 \approx R_2$.

2. In your lab, you have a Nd:YAG, solid state laser that has been injection-seeded in order to force the laser to operate on a single-longitudinal mode. The laser is in a standard Fabry-Perot configuration (linear cavity). In order to confirm that the laser is indeed operating on a single-longitudinal mode you decide to make use of a scanning Fabry-Perot interferometer. Discuss how this technique works and what design considerations for the scanning Fabry-Perot interferometer are important.