

Homework 4

Transmission of a pulse train by an “active” Fabry-Perot

due Monday, March 9

A mode-locked laser emits a frequency comb with exact equal spacing over the whole bandwidth covered by a single pulse of the train. We will consider here the frequency comb issued directly from a mode-locked laser with a ring cavity of 10 cm perimeter, which corresponds to a 3 GHz cavity. How could one multiply this mode spacing by 12?

The most obvious method is to use a Fabry-Perot cavity to multiplex the pulse train.

What should be the length of the Fabry-Perot?

What happens if the Fabry-Perot has a mode spacing of 4 GHz?

The shortcomings of this method are?

Can one use an *Active* (laser) cavity instead of a passive Fabry-Perot?

There are now two lasers, one “master laser” and one “slave laser”.

List the design problems to be solved.

How can the condition for creating a perfect comb be satisfied?

Make a numerical example for the parameters of the two lasers.