Fabry-Perot cavity

IFO parameters: Ideal cavity

ITM RoC: 1934m

ITM Trans: 0.014

ETM RoC: 2245

ETM Trans: 5e-6

Arm length: 3994.5m

Aperture: 0.326

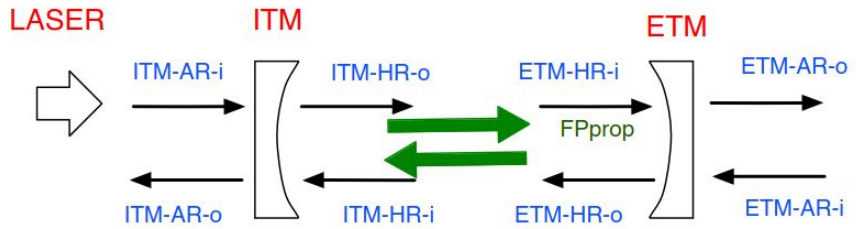
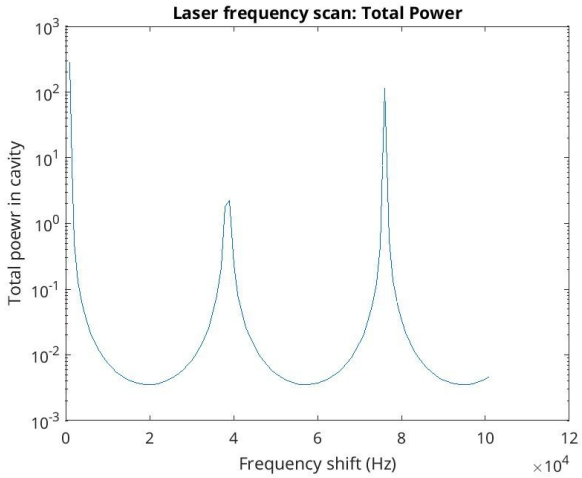


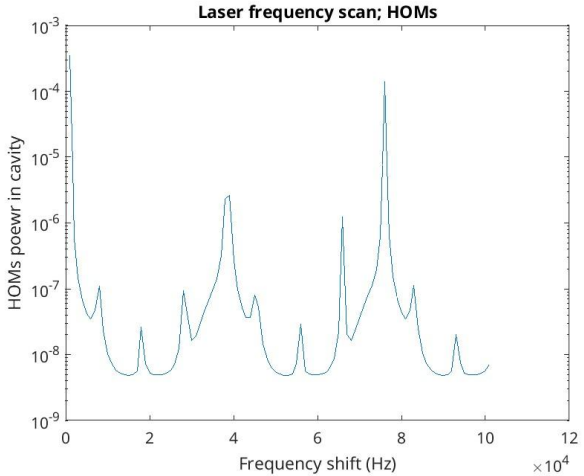
Figure 1: Schematic representation of a Fabry-Pérot cavity with input test mass and end test mass denoted by ITM and ETM, respectively. A representation of all the existing fields interacting with the high reflective (HR) and anti-reflective (AR) sides of the mirrors are indicated. The naming convention of fields is {mirror name}-{side of mirror}-{incoming/outgoing}, where the incoming (outcoming) fields are represented by -i (-o). E.g.: ETM-HR-i is the incoming field into the high reflective side of ETM.

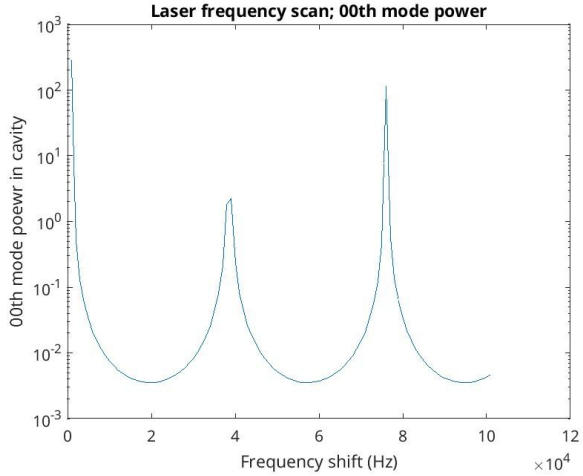
SIS20 documentation: T2000311

Cavity scan: frequency

- Definite the cavity
- Lock it
- Keep the cavity with the locked state parameters and sweep the laser frequency
- Measure physical properties of the fields







X axis is not up to scale

Cavity scan: Frequency

- Definite the cavity
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- Keep the cavity with the locked state parameters and sweep the laser frequency
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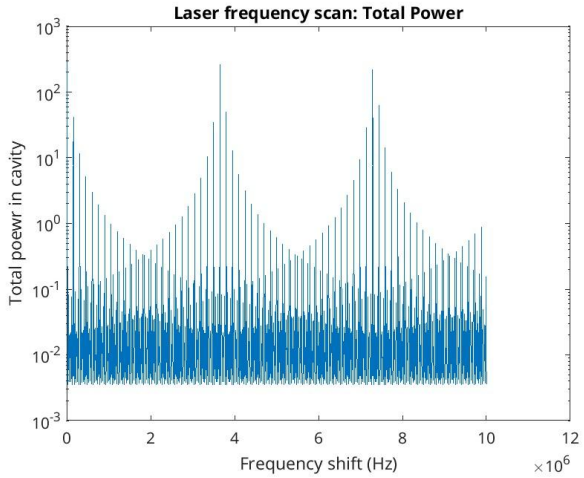
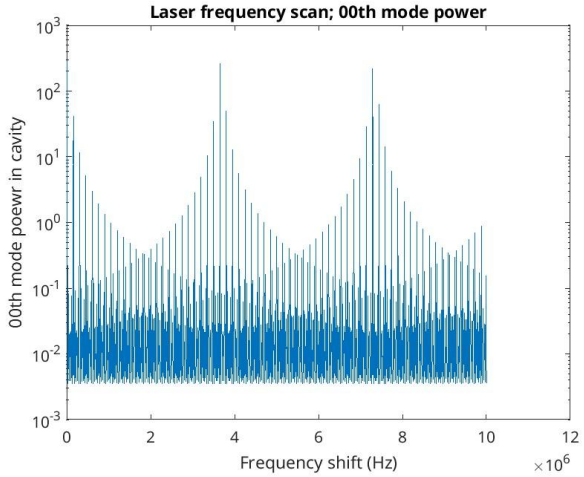
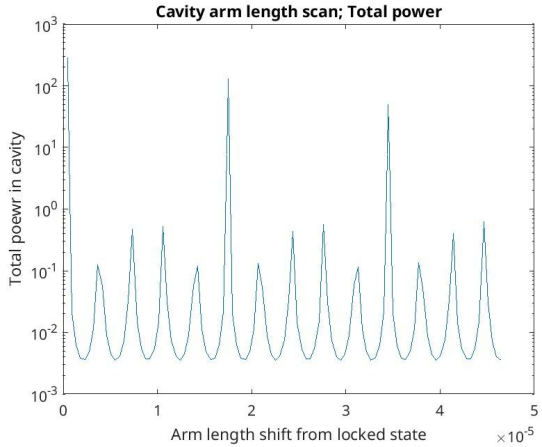


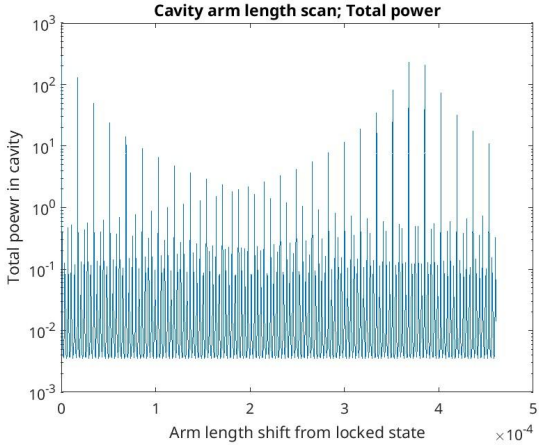


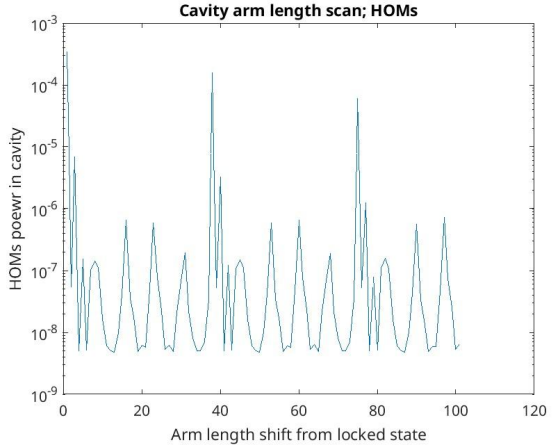
X axis is not up to scale

Cavity scan: Arm length

- Definite the cavity
- Lock it
- Keep the cavity with the locked state parameters and sweep the laser frequency
- Measure physical properties of the fields



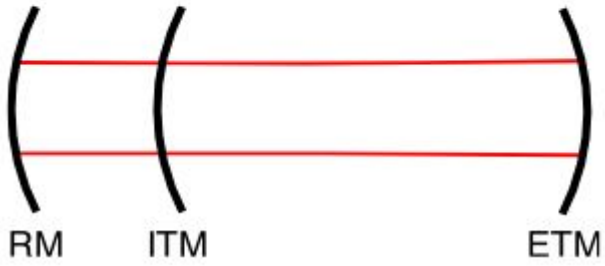


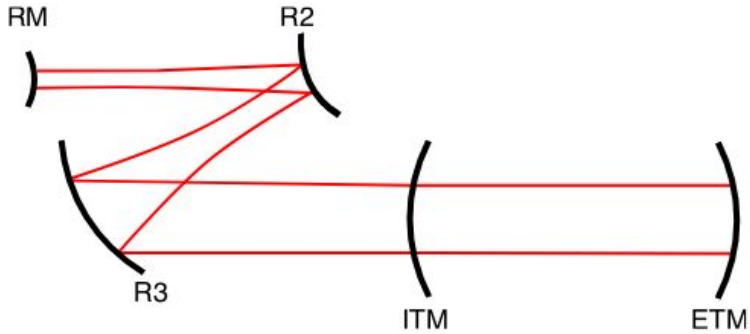


X axis is not up to scale

TODO

- Coupled cavity
- Surface profile map of O5 + FROSTI thermal models
- Other parameters: Cavity gain, round trip loss, ...





Bond et al., “Interferometer Techniques for Gravitational-Wave Detection.”