From Vibration Insensitive Laser to the Cavity Length Change Enhanced Sensitivity

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Sensitivity of the lasing wavelength to the laser’s cavity length change is the foundation for many application: interferometry, temperature and strains sensors, gyroscopes and so on. On the other end of the spectrum is the need to have ultra stable lasing wavelength in order to have precision length standards, ranging, and optical clocks.

Our studies demonstrate lasing in a four-wave mixing setup with controllable response to the laser’s cavity change. In one regime our laser is immune to path changes of its resonator, \textit{i.e.} we obtain a vibration insensitive laser. With another set of parameters, we achieve enhanced (in comparison to a traditional laser) sensitivity of our laser to its cavity path change. We also show how to tune the system response from one regime to another.