



Variable reflectivity mirrors

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Variable SR mirrors

- Needed if interferometers are to be tuned over wide range
 - » Due to effect of mirror loss and imperfect mode coupling optimisation of narrow-band / high-frequency responses requires change of SR reflectivity as well as tuning.
 - » A single mirror can cover a moderate range quite well (e.g. <300 Hz or 400 to 800 Hz) but not all useful responses.
- Methods available for 2005 time frame
 - » replacement
 - » temperature-tuned rigid etalon (under study for GEO)
- Control of a cavity formed from 2 separately requires much work to be developed for 2005



Thermal-tuned VRM

- Idea is simple
 - » use temperature tuning of a fused silica etalon
 - » 10cm thick device needs 0.6K to tune whole range
 - » temperature controlled *via* radiation from shield
- Problems
 - » achieving a wide range of reflectivity (few:1) requires that both surfaces contribute to the reflection
 - **the substrate must be of very good transmission quality**
 - **the surfaces must be very well centred**
 - » A design proposed for GEO (plane parallel) looks relatively straightforward to manufacture, but a LIGO II version may be hard to make