The POLIS interferometer for ponderomotive squeezed light generation

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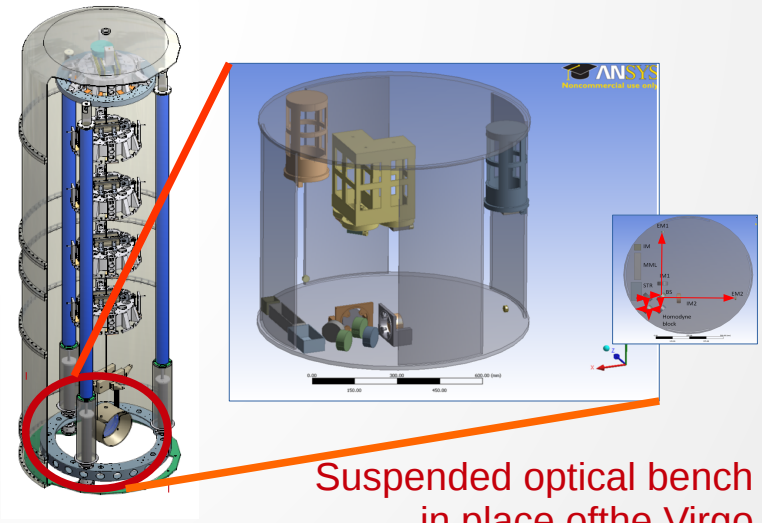
Project to realize a completely suspended low frequency independent ponderomotive squeezer in the low frequency range

moving from the pioneers' work made in the LIGO laboratory at the MIT

[*Corbitt et al.* Phys. Rev. A 73 (2 Feb. 2006), p. 023801]

and

taking the advantage of the available Virgo Super Attenuator Facility at EGO, SAFE to control the main noises source in the low frequencies range



Suspended optical bench in place ofthe Virgo suspended mirror

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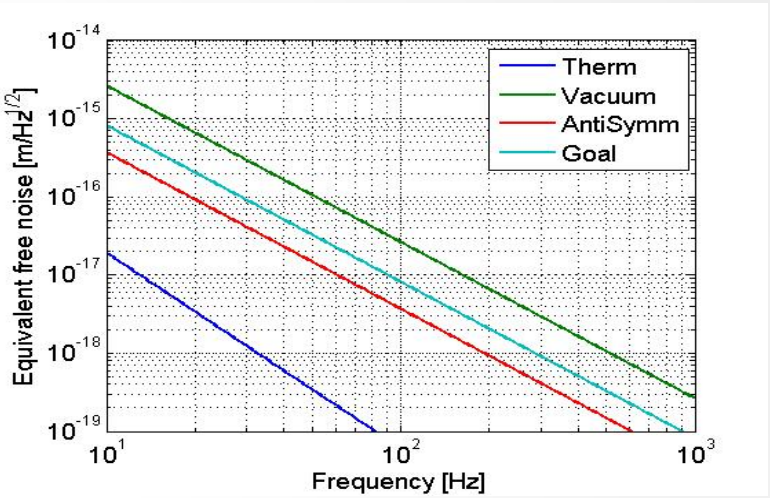
Ponderomotive Squeezing:

large squeezing values *without use* high laser power and/or very high cavity finesse
requires
very small suspended mirrors mass

very critical point is the mass suspension, suspension and coating thermal noise

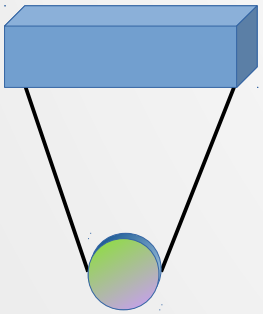
higher chance of success:

A relative large mass allows us to use the available well consolidate technologies of Virgo to control the low frequency noise



Maximum equivalent interferometer noise on the differential mode in order at least to reach the non-squeezed noise level.

In case of **7 db of squeezing** (taken as *realistic value* due to losses) the **interferometer sensitivity limit** is **10^{-15} m/sqrt(Hz) @ 10 Hz** and **10^{-17} m/sqrt(Hz)@100 Hz**.
These requirements can be fulfilled by careful design of the interferometer.

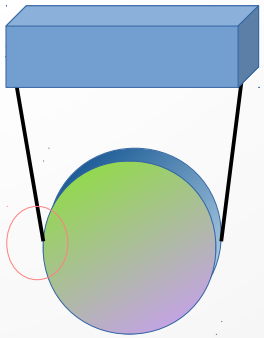


Low value of mass

- Large optical Spring resonance (*frequency independent squeezing Band)*

High value of mass

- ease of construction;
- ease to sense and actuate motion;
- use commercial size



Thermal noise reduction