

Silicon suspensions: thermal noise and mechanical properties

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The design of cryogenic suspensions for mass tests for future generation GW detectors is based on the balancing of several factors: mechanical properties, thermal conductivity, resonance frequencies, thermo-mechanical stress and generally any parameter that aims to reduce thermal noise of test masses. The talk will present the state of the art of studying the mechanical and thermal properties of silicon as a function of the orientation of the axes and how these can influence the design of a monolithic suspension. Furthermore, the measurements of the limit load on fibers produced at the maximum of the current technique will be described and compared with the expected limit load, trying to understand the limiting factors. Finally, we will describe the tests done so far to measure the mechanical dissipations of the mono-crystalline silicon fibers and the limits found.

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