

Measuring thermal noise in gram-scale Si flexures at 123 K

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Future terrestrial gravitational wave detectors are limited by fundamental noise sources, one of which is the thermal noise arising in the test masses and suspensions in the frequency band where ground-based detectors are sensitive. To mitigate this noise, future detectors are envisioned to operate at cryogenic temperatures using silicon optics as test masses and silicon ribbons to suspend the test masses. Silicon ribbons resemble cantilever topology, and therefore studying the thermal noise in the flexing of a gram-scale silicon cantilever is analogous to the suspension thermal noise encountered in these ribbon suspensions. At the Australian National University, I have built an operational cryogenic infrastructure to measure the broadband thermal noise of silicon flexures at 123 K. In this talk, I will present initial results of our cool-down tests, thermal noise measurements from the experiment and future plans.

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