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Operating high sensitivity measurement apparata out of equilibrium

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In this work we present an approach aimed at operating high sensitivity measurement apparata out of equilibrium with the purpose to enhance their sensitivity. We show, with an experiment, that selective cooling of thermally activated single modes of a mechanical structure, is capable of positively impacting the measurement sensitivity improving significantly the signal-to-noise ratio in the frequency range where the cooling has been applied. In general, our results suggest that, at difference with the standard way to operate high sensitivity measurement apparata, i.e. under equilibrium conditions, the cyclical drive-and-relax to equilibrium operation might provide increased sensitivity in selected frequency ranges.

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