Abstract Submitted
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Investigation of Coating Thermal Noise at Cryogenic Temperatures for Third-Generation Interferometric Gravitational-Wave Detectors[1] JOHANNES EICHHOLZ, MICHAEL HARTMAN, PAUL FULDA, GIACOMO CIANI, DAVID TANNER, GUIDO MUELLER, University of Florida — Second-generation interferometric gravitational-wave detectors will be limited between 50 and 500 Hz by coating thermal noise (CTN). CTN originates in the motion of the mirror surfaces on the order of 10^{-20} m due to thermal excitation and mechanical loss in their coatings. The magnitude of this effect scales with the square root of the available thermal energy, but also depends strongly on coating material parameters. These in turn may also be temperature dependent, making cryogenic mirrors an option to consider for third-generation detectors. The Cryogenic THermal noise Optical Resonator (CryoTHOR) experiment at the University of Florida aims at measuring the CTN of cryogenic mirrors by over-amplifying it using high-finesse cm-scale test cavities; this will make it an invaluable tool to assess the prospect of cryogenic test masses and explore candidate coating materials and techniques in the cryogenic regime. This presentation reports on the development of CryoTHOR.

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