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Modeling
Thermal Noise from Crystaline Coatings for Gravitational-Wave Detectors NICHOLAS DEMOS, GEOFFREY LOVELACE, California State University Fullerton, LSC COLLABORATION — The sensitivity of current and future ground-based gravitational-wave detectors are, in part, limited in sensitivity by Brownian and thermoelastic noise in each detectors mirror substrate and coating. Crystalline mirror coatings could potentially reduce thermal noise, but thermal noise is challenging to model analytically in the case of crystalline materials. Thermal noise can be modeled using the fluctuation-dissipation theorem, which relates thermal noise to an auxiliary elastic problem. In this poster, I will present results from a new code that numerically models thermal noise by numerically solving the auxiliary elastic problem for various types of crystalline mirror coatings. The code uses a finite element method with adaptive mesh refinement to model the auxiliary elastic problem which is then related to thermal noise. I will present preliminary results for a crystal coating on a fused silica substrate of varying sizes and elastic properties. This and future work will help develop the next generation of ground-based gravitational-wave detectors.

Nicholas Demos
California State University Fullerton

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