

Abstract Submitted  
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**Optimizing Finite Mirrors for Advanced Gravitational Wave Detectors** DAVID TSANG, Cornell University, Ithaca, NY, ANDREW LUNDGREN, Syracuse University, Syracuse, NY, RUXANDRA BONDARESCU, Pennsylvania State University, University Park, PA, SIMON FONG, University of Waterloo, Canada, MIHAI BONDARESCU, University of Mississippi, Oxford, MS — We discuss mirror design for advanced interferometric gravitational wave detectors including finite mirror effects. We perform a search for the lowest value of thermal noise that can be achieved in LIGO by changing the shape of mirrors, while fixing the mirror radius and maintaining a low diffraction loss. We use a genetic algorithm to attempt to find a global minimum of thermal noise within the given constraints. Lowering the thermal noise can significantly increase the strain sensitivity of the detector in the most sensitive frequency band. This frequency region includes gravitational radiation expected from one known young pulsar as well as binary coalescences of neutron stars and black holes.

David Tsang  
Cornell University, Ithaca, NY

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