Abstract Submitted
for the FWS16 Meeting of
The American Physical Society

Interaction of Gravitational Waves with Superconductors NADER INAN, JOHNATHON THOMPSON, RAYMOND CHIAO, University of California, Merced — Applying the Helmholtz Decomposition theorem to linearized General Relativity leads to a gauge-invariant formulation where the transverse-traceless part of the metric perturbation describes gravitational waves in matter. Gravitational waves incident on a superconductor can be described by a linear London-like constituent equation characterized by a "gravitational shear modulus" and a corresponding plasma frequency and penetration depth. It is shown that in the DC limit, the gravitational wave field is expelled from the superconductor in a gravitational Meissner-like effect.

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Date submitted: 07 Oct 2016 Electronic form version 1.4