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**Simulating a Parametric Oscillator-Based Dynamical Casimir Effect** ENRIQUE GUERRERO, Humboldt State University, ALESSANDRO CASTELLI, LUIS A. MARTINEZ, RAYMOND CHIAO, JAY E. SHARPING, University of California, Merced — We present simulations of a cavity for use in demonstrating the dynamical Casimir effect (DCE). The successful demonstration of the DCE gives rise to interesting opportunities to study questions in Quantum Mechanics and General Relativity. Crucial to this experiment is attaining resonant cavities with a high  $Q$ , a measurement of how purely our system resonates. Necessary  $Q$  values can and have been achieved using superconducting cavities, and the low losses in these cavities allows above threshold amplification of vacuum fluctuations. Simulations of the system are crucial to optimize cavity design parameters. Using COMSOL Multiphysics, we simulate a set of three resonant cavities to create and amplify radio frequency (11 GHz) electromagnetic wave. Coupling between different cavities is achieved via a membrane which is driven into motion by electromagnetic radiation pressure. The simulation is being conducted concurrently with preliminary cavity experiments.

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