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A realistic method for observing the dynamical Casimir effect in a mechanical oscillator system moving at non-relativistic speeds JOHNATHON THOMPSON, JACOB PATE, RAYMOND CHIAO, JAY SHARPING, UC Merced — While the dynamical Casimir effect (DCE) has been shown in electronic circuits, it has yet to be realized in a system with a mechanical oscillator as the driving mechanism for the boundary conditions. Researchers assume that one must move a mirror at velocities near the speed of light in order to observe the DCE. We find that the threshold for oscillation implies that non-relativistic velocities of the membrane mirrors on the order of c/Q are sufficient in order to achieve the DCE. Using our scheme, one can thus construct a system where the large (microwave) frequency of motion combined with the high Q of the cavity leads to efficient microwave photon generation associated with the DCE. Here we propose a system for demonstrating the DCE using a macroscopic mechanical oscillator attached to a high Q microwave SRF cavity.

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