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Optomechanically Induced Transparency and Slow Microwaves in Circuit Nano-electromechanics XIAOQING ZHOU, École Polytechnique Fédérale de Lausanne, Switzerland/Max-Planck-Institut für Quantenoptik, Germany, FREDRIK HOCKE, Walther-Meißner-Institut, Germany, ALBERT SCHLIESSER, École Polytechnique Fédérale de Lausanne, Switzerland, ACHIM MARX, HANS HUEBL, Walther-Meißner-Institut, Germany, RUDOLF GROSS, Walther-Meißner-Institut, Germany/Technische Universität München, Germany, TOBIAS J. KIPPENBERG, École Polytechnique Fédérale de Lausanne, Switzerland/Max-Planck-Institut für Quantenoptik, Germany — Using a low-mass ($\sim$ 15 pg), high-Q ($>$ 100 000) nanomechanical oscillator coupled to a Nb superconducting quarter wave cavity, we realize a circuit nano-electromechanical system coupling microwaves to mechanical motion oscillating at 1.45 MHz. By exciting the system on the lower motional sideband with a strong drive tone, a transparency window for a probe field is created originating from the effect of optomechanically induced transparency (OMIT). This phenomenon, analogous to electromagnetically induced transparency in Atomic Physics, arises from the interference of different excitation pathways for an intracavity probe field. We utilize the transparency window to demonstrate slow microwave propagation. A tunable delay up to 4 ms is demonstrated experimentally for a microwave pulse on resonance with the cavity. Furthermore, we systematically investigate the temporal dynamics of this transparency window when the drive tone is modulated, and the effect of the oscillator's Duffing nonlinearity on the OMIT window.

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