

Abstract Submitted
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Interactions between Josephson Junction Metamaterials and Evanescent Waves LAURA ADAMS, Center for Nanophysics and Advanced Materials, Physics Department, University of Maryland, College Park, MD 20742, STEVEN ANLAGE, Center for Nanophysics and Advanced Materials, Physics Department, University of Maryland, College Park, MD 20742 — Amplification of evanescent waves is an exciting, yet controversial application of negative index of refraction metamaterials in pursuit of creating a “perfect lens”. We will describe evanescent wave amplification experiments using lossless metamaterials, i.e. arrays of Josephson junctions (JJ). The effects of input power, temperature, and dc magnetic field on JJ arrays below the cutoff frequency of a waveguide have been investigated. At low temperatures a pronounced, tunable microwave resonance emerges in transmission. This resonance has been systematically studied in terms of its transmission and reflection coefficients. In the regime between -45 and -25 dBm, we observe a non-hysteretic emission of microwave photons that reverberate at the same frequency. Amplification of these photons (parametric amplification) will also be described. This work was supported by the Intelligence Community Postdoctoral Fellowship program.

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