Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Nonlinear Superconducting Metamaterials in Free-Space at mm-wave Frequencies[1] STEVEN ANLAGE, DAIMENG ZHANG, MELISSA TREPANIER, University of Maryland, OLEG MUKHANOV, Hypres, Inc., K. DELFANAZARI, V. SAVINOV, N. ZHELUDEV, ORC, University of Southampton — Superconducting metamaterials show the promise of low loss, compact size and extreme tunability and nonlinearity, allowing for new applications. Most demonstrations of these metamaterials have been conducted in waveguide geometries, either in co-planar form or three-dimensional single-conductor structures. Here we demonstrate for the first time a widely tunable superconducting metamaterial operating under the free-space illumination of a quasi-optical beam in the 100 GHz regime. The meta-atoms are Radio Frequency Superconducting QUantum Interference Devices (RF SQUIDs) that form compact self-resonant objects endowed with the nonlinearity of the Josephson effect. The metamaterial is tuned with dc magnetic flux, temperature and mm-wave power, and holds promise for a new generation of mm-wave agile devices.

[1]This work is supported by the NSF-GOALI and OISE programs through grant # ECCS-1158644, and CNAM.

Steven Anlage
University of Maryland

Date submitted: 15 Nov 2013 Electronic form version 1.4