

Abstract Submitted  
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**Meta-Atom Interactions and Coherent Response in RF SQUID  
Metamaterials**<sup>1</sup> MELISSA TREPANIER, DAIMENG ZHANG, University of  
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versity of Maryland — We have designed, fabricated, and measured RF SQUID  
(radio frequency superconducting quantum interference devices) metamaterials and  
demonstrated their extreme tunability with temperature, DC magnetic field, and  
rf current [1]. The SQUID metamaterial can be modelled as an array of weakly  
coupled oscillators with tunable resonant frequencies. An array of identical SQUIDS  
under identical conditions will have a coherent collective response regardless of the  
strength of the interactions between them. In the presence of disorder (nonuniform  
magnetic flux for instance) the individual SQUIDS in the array may or may not tune  
coherently. Since we are interested in metamaterial applications, the coherent re-  
sponse is desirable. In this talk we examine the conditions required for the SQUIDS  
to tune coherently, and compare to experimental data on tuning and nonlinearity in  
a variety of RF SQUID metamaterials.

[1] M. Trepanier\*, Daimeng Zhang\*, Oleg Mukhanov, Steven M. Anlage, Phys. Rev.  
X (in press), arXiv:1308.1410v2

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