Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Field and temperature dependent cavity coupling for highly sensitive on-chip spin detection.[1] GIOVANNI FRANCO-RIVERA, IRINEL CHIORESCU, MATHEW MARTENS, AIDAN ZABALO, Department of Physics and NHMFL, Florida State University, Tallahassee, Florida 32306, USA, LEI CHEN, SIMIT, Chinese Academy of Sciences, Shanghai, China 200050, NARESH DALAL, Department of Chemistry and Biochemistry, Florida State University, FL 32306
— Probing spin-photon interaction in single molecule magnets using Electron Spin Resonance is of great interest due to possible application as a molecular quantum memory[2]. Here we will present a method to tune the coupling of a Nb superconducting cavity[3] operating at ∼20GHz using losses induced by temperature and field. The effects are studied on a cavity empty first empty, then loaded with the molecular magnet V_{15}. This system has shown Rabi oscillations as well as spin-orbit dependence of the coherence time[4]. From the zero-field temperature dependence of the resonance frequency of the empty cavity we have observed that thermally induced losses have the effect of decreasing the resonance frequency, while reaching critical coupling at a well-defined temperature. Loading the cavity shifts the critical coupling parameters which are tunable by a magnetic field in plane and/or perpendicular to the cavity. V_{15} spectroscopy at critical coupling will be presented.

[1]Supported by the NSF Cooperative Agreement DMR-1157490, the State of Florida and NSF DMR- 1206267
[2]M. Blencowe,**Nature** 468, 2010
[3]N. Groll et al, **PRB** 81, 2010
[4]M. Martens et al, arxiv:1505.03177

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Date submitted: 11 Nov 2016 Electronic form version 1.4