Abstract Submitted
for the APR16 Meeting of
The American Physical Society

Microwave Cavity R&D for ADMX-HF[1] MARIA SIMANOVSKAIA, KELLY BACKES, University of California, Berkeley, GIANPAOLO CAROSI, Lawrence Livermore National Laboratory, SAAD KENANY, SAMANTHA LEWIS, JABEN ROOT, KARL VAN BIBBER, University of California, Berkeley, ADMX-HF COLLABORATION — Dark matter axions may be detected by their resonant conversion to photons in a tunable microwave cavity permeated by a strong magnetic field. The Axion Dark Matter eXperiment - High Frequency is both a test-bed for innovative cavity and amplifier concepts and a data pathfinder for the 5-25 GHz range. We are focusing on two major issues in the microwave cavity axion search. The first is increasing the cavity quality factor, Q, which enters linearly into the signal power and thus mass scan rate. Toward this end, we are developing a RF plasma deposition technique for making and characterizing superconducting NbTiN thin films. Multilayers of these thin films deposited on cylindrical surfaces of the microwave cavity may improve the Q by an order of magnitude. The second is applying Photonic Band Gap structures to make resonators of higher frequency and isolate the desired TM_{010} mode. The density of mode crossings between the axion-coupling TM_{010} mode and axion-noncoupling TE and TEM modes is the greatest limitation to the experiment's mass scan rate through loss of continuous frequency coverage.

[1]This work was supported by the NSF under grant PHY-1306729, the US DOE under Contract DE AC52-07NA27344, and an award from the Heising-Simons Foundation.

Maria Simanovskaia
University of California, Berkeley

Date submitted: 08 Jan 2016 Electronic form version 1.4