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Microwave resonator R&D in support of the ADMX-HF/Extreme Axion Experiment

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The ADMX-HF/Extreme Axion Experiment platform was created to identify and resolve challenges for the microwave cavity experiment in the 2.5–25 GHz range (~ 10–100 µeV), develop new cavity and amplifier technologies, and serve as a data pathfinder in the high mass axion range. The University of California Berkeley is responsible for development of microwave resonators for the experiment; this poster will highlight three topics: 1. high-fidelity field mapping with the bead perturbation technique, coupled with simulations and metrology; 2. avenues to high-Q cavities, in particular R&D on superconducting thin-film cavities and Distributed Bragg Reflectors; and 3. Photonic Band Gap resonators to eliminate unwanted TE modes and accelerate the scan rate of the experiment. ADMX-HF/X3 is a collaboration of Yale University, UC Berkeley, Colorado University, and LLNL; the Berkeley effort is supported by the National Science Foundation, grant NSF PHY-1306729, and the Heising-Simons Foundation, grant 2014-182. S.M. Lewis acknowledges receipt of a Chancellor's Fellowship by the University of California Berkeley.

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