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Progress towards a Hybrid Superconducting Microwave Cavity for ADMX[1] GIANPAOLO CAROSI, Lawrence Livermore National Laboratory, ADMX COLLABORATION, ADMX-HF COLLABORATION — Axions are a well motivated dark matter candidate and can be detected by their resonant conversion into photons using a microwave resonant cavity in an axial magnetic field. This is the basis of both the ADMX and ADMX-HF experiments. The axion-photon conversion power is directly related to the quality factor (Q = resonant frequency over bandwidth) of the microwave cavity used. To date copper cavities have been used with Q $\sim 10^5$ at frequencies of 1 GHz. As one scales to higher frequencies this Q degrades substantially. Superconducting cavities can regularly be made with Q $> 10^9$ but would be driven normal in the high magnetic field of ADMX. Here we describe progress of R&D efforts to make hybrid cavities with regular copper end-caps and a thin-film superconducting barrel that can maintain its superconducting properties in the presence of a strong axial magnetic field. This hybrid cavity system has a potential Q great than copper by an order of magnitude (or more) thus greatly increasing the sensitivity of the system to axions.

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