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SQMS axion searches based on $Q_0 \approx 10^{10}$ multimode superconducting cavities

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The Physics and Sensing thrust of the Superconducting Quantum Materials and Systems (SQMS) center is developing searches for dark photons, axions and ALPs with the goal of improving upon the current state-of-the-art sensitivity. We are actively working on multiple experiments, including axion haloscopes, DM dark photon searches and light-shining-through-the-wall experiments. All these efforts leverage on Fermilab expertise on ultra-high Q superconducting RF cavities combined with the center research on QIS and quantum technology. This poster focuses on two axion searches that utilize ultra-high Q SRF cavities and their resonant modes to enhance the production and/or detection of axions in the cavity volume. In addition, multi-mode and single mode non-linearity measurements are being carried out as part of an experimental feasibility study to gain insight on the behavior of the ultra-high Q resonators and the RF system in the regime relevant for axion searches.

In-person or Virtual?

In-person

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