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

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The SQMS Physics and Sensing thrust is working toward the implementation of multiple axion search schemes to improve upon the current state-of-the-art sensitivity. The search schemes here under consideration all utilize either single or multiple ultra-high Q SRF cavities. Rather than applying an external magnetic field, these searches take advantage of the cavity resonant modes to enhance the production and/or detection of axions in the cavity volume. We are actively working on the design of two searches. We are also carrying out multi-mode and single mode non-linearity measurements 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.

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