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Exploring New Axion Parameter Space with The ORGAN Experiment: ORGAN-Q, ORGAN-LF, & Work Towards Phase 2

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We present recent developments from The Oscillating Resonant Group AxioN (ORGAN) Collaboration, focusing primarily on two experimental platforms beyond the main experiment - ORGAN-Q and ORGAN-Low Frequency (ORGAN-LF) - designed to expand axion parameter space coverage and test technologies for future searches.

ORGAN-Q is a pathfinding and testbed experiment targeting the range around $\sim 25 \mu\text{eV}$, which recently completed a science run with near-quantum limited sensitivity, and high frequency resolution. We report on its results and the future plans for ORGAN-Q, including upgrades and the performance of candidate technologies for Phase 2 of the main-line ORGAN Experiment.

ORGAN-LF, targeting the $\sim 1 \mu\text{eV}$ range, is a new low-mass axion haloscope under development at Swinburne. Designed to operate within a large-bore MRI magnet, it utilises re-entrant cavity designs, and tests technology for future low mass searches. We outline the experimental plans, current build status, and projected sensitivity reach.

Finally, we provide an update on ORGAN Phase 2 R&D, with emphasis on high-frequency cavity innovations and readout. Together, these developments aim to extend the sensitivity of ORGAN across key regions of parameter space.

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