

Abstract Submitted
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The ORGAN Experiment: Phase 1a Status and Results¹ AARON QUISKAMP, MICHAEL TOBAR, BEN MCALLISTER, Univ of Western Australia — We present experimental details and initial results for Phase 1a of the Oscillating Resonant Group AxioN (ORGAN) Experiment, a microwave cavity axion haloscope interested in exploring the highly motivated $\sim 60 - 200 \mu\text{-eV}$ region of axion mass parameter space, corresponding to 15 - 50 GHz photons. Phase 1a employs a TM_{010} based tuning-rod resonator to place the strongest limits to date in the 15+ GHz mass region of the axion-photon coupling parameter space, and serves as a test of the ALP co-generation model. Prior to cavity fabrication, extensive finite-element modelling was completed to optimise resonator dependent parameters based on the C^2V^2G figure of merit (a product of the form factor, volume and geometry factor) in the targeted 15 - 16 GHz frequency range. This initial phase of ORGAN operates at 4K in a 12 T magnetic field, and uses readily available low noise HEMT-based amplifiers. Whilst this experiment is capable of placing sensitive limits on axion-photon coupling in its own right, it also serves as a path-finder for future ORGAN runs. Subsequent stages of ORGAN will utilise the Phase 1a infrastructure as a test bed for various technologies and techniques, such as GHz single photon counting, and novel cavity designs, to explore the full 15-50 GHz range.

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