Contribution ID: **208** Type: **Parallel session talk**

A Dark Photon Dark Matter Search with a Widely-Tunable SRF Cavity

Wednesday 8 October 2025 17:00 (15 minutes)

The SERAPH (SupERconducting Axion and Paraphoton Haloscope) experiment is a family of superconducting haloscopes being developed by the Superconducting Quantum Materials and Systems (SQMS) Center to search for wavelike dark matter. This presentation will focus on preliminary results from our dark photon dark matter search using a widely-tunable SRF cavity operating between 4-7 GHz, nicknamed the "plunger cavity."

I will present the cavity design and characterization, analyze the impact of microphonics on system performance and haloscope sensitivity, and describe our tuning methodology for this Q˜10ˆ8 cavity. The presentation will cover our haloscope analysis approach and discuss sensitivity limits achieved within this frequency range. Finally, I will outline lessons learned from this first search, implications for future axion searches, and proposed improvements for subsequent SERAPH experiments.

Author: CERVANTES, Raphael

Presenter: CERVANTES, Raphael

Session Classification: RDC 8 Quantum & Superconducting Sensors

Track Classification: RDC 8 Quantum & Superconducting Sensors