Contribution ID: **57** Type: **not specified**

(Halo) Scoping out the Parameter Space of Wave-Like Dark Matter

Friday, 18 June 2021 13:00 (25 minutes)

The scope of the dark matter problem is profound, with 85% of all matter existing in some unknown form. In the case of the axion, the challenge is compounded by the fact that the parameter space is largely unexplored. The Axion Dark Matter eXperiment (ADMX) and other resonant searches are tackling this problem by searching for axions using a microwave cavity in a magnetic field. We report on recent headway made by ADMX into the parameter space for the QCD axion, and lay out plans to move upwards in frequency (mass) space using multi-cavity arrays. Recent technological advancements in quantum technology and elsewhere have enabled improvements in the scan speed and sensitivity of resonant cavity haloscopes. We cover the implications of such technology in these experiments, as well as novel analysis techniques. A variety of ideas will be presented on the topic of joint efforts from cavity haloscope groups to improve both the sensitivity as well as the mass coverage of these experiments, especially as we move towards higher frequencies.

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Session Classification: Session 17