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Towards a cryogenic calibration of a dielectric haloscope for direct dark matter detection

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MADMAX, the MAgnitized Disc and Mirror Axion eXperiment, is a novel dielectric haloscope concept to detect the axion in the mass range 40-400 μeV through enhancement of the inverse Primakoff process. The discovery of the axion could solve both the strong CP problem, fundamental in particle physics, and the dark matter problem. Currently, MADMAX uses a prototype system called CB-100 to understand the different challenges of this novel concept at frequencies in the order of 20GHz at room temperature. One of the most urgent tasks is to operate the experiment at cryogenic temperatures, where the sensitivity to the QCD axion would be significantly higher. In this poster, I first justify why this effort could be interesting for other applications inside and outside astroparticle physics. Then, I explain the challenges and progress in accomplishing a cold calibration of CB-100. Finally, I show the projected sensitivity enhancement from this upgrade in the next MADMAX dark matter search campaign.

Submitted on behalf of a Collaboration?

Yes

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