



Contribution ID: 130

Type: Poster

MADMAX - Prototype Developments and Characterization Studies

MADMAX (the MAgnitized Disk And Mirror Axion eXperiment) is a novel approach to search for Axion Dark Matter in the mass range $40\text{-}400 \mu\text{eV}/c^2$. It utilizes the principle of the dielectric haloscope, a system composed of several parallel dielectric disks, a mirror, and a receiver. This so-called booster system is placed within a magnetic field and a cryogenic environment. We investigate the electromagnetic properties, systematic effects, and the thermal noise of several small prototype versions of the MADMAX experiment, including a proof of principle booster setup, and small (~ 10 cm) diameter tube designs. Measurement of electromagnetic signal reflection, dielectric disk placement precision, antenna designs, and thermal background signals are studied and the results are presented.

Mini-abstract

Characterization studies and results of several novel dielectric haloscope prototypes for MADMAX.

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Session Classification: Poster session 4