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MADMAX: A new way to search for QCD Axion Dark Matter with a Dielectric Haloscope

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Light Dark Matter candidates have increasingly come under the focus of scientific interest. In particular the QCD axion is also able to solve other fundamental problems such as CP-conservation in strong interactions. Galactic axions and axion-like particles can be converted to photons at boundaries between materials of different dielectric constants under a strong magnetic field. Combining many such surfaces, one can enhance this conversion significantly using constructive interference and resonances. The proposed MADMAX setup containing 80 high dielectric disks in a 10 T magnetic field could probe the well-motivated mass range of $40 - 400 \mu\text{eV}$, a range which is at present inaccessible by existing cavity searches. The experimental idea and the proposed design of MADMAX will be discussed. Among recent R&D results from 3D simulations and proof of principle prototype measurements, the prospects of reaching sensitivity to the QCD axion will be presented.

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