

The Axion Dark Matter eXperiment (ADMX): Overview of Current Operations and Future R&D

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The Axion Dark Matter eXperiment (ADMX) is a direct-detection axion dark matter search operating as one of the Department of Energy (DOE) “Generation 2” dark matter projects. ADMX searches for dark matter axions in the micro-eV mass range using a large ($V \sim 100\text{L}$) high-Q ($Q \sim 40,000$) electromagnetic cavity threaded by a moderate intensity magnetic field ($B \sim 8\text{T}$) to resonantly convert local halo axions into microwave photons via an inverse-Primakov channel of the candidate. The cavity haloscope technique aided by a low-noise amplifier chain has enabled ADMX to approach standard quantum limit (SQL) noise and reach sensitivities surpassing both the Kim-Shifman-Vainshtein-Zakharov (KSVZ) and Dine-Fischler-Srednicki-Zhitnitsky (DFSZ) benchmark models. This talk will provide an overview of ADMX’s current Run 1 operations (0.64-1.3 GHz, 2.65-5.4 μeV) and upcoming Run 2 (1.25-2.25 GHz, 5.2-9.3 μeV) and Extended Frequency Range searches (2-4 GHz, 8.3-16.6 μeV) for which the single cavity will be replaced by four and eighteen cavities respectively, as well as R&D efforts to further the frequency range beyond 4 GHz, improve operational efficiency, and improve sensitivity beyond the SQL.

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