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ADMX Extended Frequency Range (EFR): Searching for 2-4GHz axions with 18 cavities

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ADMX-EFR (Axion Dark Matter eXperiment with Extended Frequency Range) will significantly scale up existing ADMX capabilities. To date, ADMX setups have probed the largest fraction of QCD dark matter axion parameter space at DFSZ sensitivity, using resonant conversion of dark matter axions to photons in a high-Q resonant cavity. ADMX-EFR will use a coherently power combined array of 18 cavities, leveraging a total cavity volume of about 200 liters. The detector is designed to cover the 2-4GHz range ($8-16\mu\text{eV}$ axion mass) with DFSZ benchmark sensitivity over the course of 3 years. It will be enabled by a high-field, large-bore 9.4T MRI magnet, located in the Fermilab Dark Wave Laboratory. In this talk we outline the conceptual design of ADMX-EFR based on experience from previous ADMX runs and present a detailed sensitivity estimate. We show progress of recent cavity and electronics R&D, including quantum-limited amplification and superconducting cavities.

Primary author: KNIRCK, Stefan (Fermi National Accelerator Laboratory)

Presenter: KNIRCK, Stefan (Fermi National Accelerator Laboratory)

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