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The Axion Dark Matter eXperiment (ADMX) - Status and Future Plans

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The axion is a well-motivated light elementary particle, and is also a compelling dark matter candidate. Although extremely feebly interacting, axions constituting our galactic dark matter halo could be detected by their resonant conversion to monochromatic photons in a microwave cavity permeated by a magnetic field. The cavity is kept at near-zero temperature to reduce blackbody photons, and the signal detected by an ultralow noise microwave amplifier. Resonant conversion occurs when the the cavity frequency equals the axion mass, thus the search requires tuning the cavity in small steps and integrating for sufficient time at each frequency to achieve the desired signal-to-noise. ADMX has been conducting such a search for several years, and has set strong limits on axionic dark matter in the micro-eV range. The experiment has recently been upgraded to use amplifiers based on SQUIDs (Superconducting QUantum Interference Device) whose noise is near-quantum limited. ADMX will now be upgraded with the addition of a dilution refrigerator to further reduce the system noise. Additionally, the construction of a second, smaller experiment ADMX-HF (High Frequency) has been proposed to search for axions in the 10 micro-eV range.

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