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Multi Cavity Array for Axion Dark Matter Experiment

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The current version of ADMX (Axion Dark Matter Experiment) utilizes a single 1 meter long by 0.5 meter diameter RF cavity to search for axion to photon decay with resonance frequencies ranging from ~580 to 890 MHz. We investigate the use of the current ADMX experimental space for the detection of axion decay in the range of 1.0 to 2.0 GHz. In order to maximize the detector volume available we propose an array of 4 or 8 mode-locked RF cavities with 15cm diameters to replace the current single cavity detector. In our design we propose a single rotor tuning rod array which minimizes gaps as well as differences in rod motion within the cavities. Utilizing cavities of different lengths we are able to reduce the effects of critical mode crossings.

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