

Abstract Submitted
for the FWS14 Meeting of
The American Physical Society

A Cryogenic Piezoelectric Rotary Drive System for the Axion Dark Matter Experiment¹ KELLY BACKES, BELLA URDINARAN, UC Berkeley, ADMX / ADMX-HF COLLABORATION — The nature of Dark Matter is a central mystery in physics and one candidate particle is the axion. Axions can be detected by their conversion to microwave photons in a cryogenically cooled resonant cavity immersed in a magnetic field. The microwave cavity's resonant frequency must be tuned to match the axion's mass, which is currently an unknown parameter. This frequency can be changed by rotating tuning rods inside of the cavity. Currently a system of stepper motors and gear boxes is used to tune these rods, but the gear boxes add too much heat. The experiment needs to run as cold as possible to minimize the background noise from blackbody radiation. A rotary drive system based on piezoelectric's should generate much less heat. Commercial piezo systems are expensive and have low torque so we are using more inexpensive design that should give higher torque. The behavior of this piezoelectric system will be discussed.

¹Supported by DOE Grants DE-FG02-97ER41029, DE-FG02-96ER40956, DE-AC52-07NA27344, DE-AC03-76SF00098, NSF grants PHY-1067242 and PHY-1306729, and the Livermore LDRD program.

Kelly Backes
UC Berkeley

Date submitted: 09 Oct 2014

Electronic form version 1.4