Abstract Submitted
for the DNP08 Meeting of
The American Physical Society

Overview, Technical Description and Future of the Axion Dark Matter eXperiment[1] S. ASZTALOS, LLNL, R. BRADLEY, Natl. Radio Astronomical Observatory, G. CAROSI, LLNL, M. HOTZ, Univ. of Washington, J. HWANG, Univ. of Florida, D. KINION, LLNL, L. ROSENBERG, G. RYBKA, Univ. of Washington, P. SIKIVIE, D. TANNER, Univ. of Florida, K. VAN BIBBER, LLNL, ADMX COLLABORATION — The Axion Dark Matter eXperiment (ADMX) at LLNL searches for dark-matter axions through their Primakoff conversion to microwave photons, resonantly enhanced in a high-Q cavity permeated by a strong magnetic field. The original operations of the experiment employed conventional microwave amplifiers, using heterojunction field-effect transistor amplifiers (HFET) amplifiers; these devices had a system noise temperature around 3 K, determined by the sum of the 1.5 K physical temperature and the 1.5 K amplifier equivalent noise temperature. ADMX is the world's quietest spectral receiver in the GHz regime, capable of detecting a single RF photon per minute above the cavity blackbody and amplifier noise. ADMX has covered a frequency range of 460 to 812 MHz (1.9 - 3.4 micro-eV); over that octave of mass range axions were excluded as the Milky Way halo dark matter for well-motivated models of the coupling of the axion to two photons. An upgrade of ADMX has recently been completed, which replaced the previous HFET amplifiers with SQUID amplifiers. This talk will describe the experiment, both hardware and data analysis, the SQUID amplifier technology and recent operating experience, and discuss plans for a second-phase upgrade to further reduce the systems noise temperature to ∼100 mK.

[1]

Stephen Asztalos
Lawrence Livermore National Laboratory

Date submitted: 30 Jun 2008 Electronic form version 1.4