

PRISMA+ Colloquium

Nov. 15, 2023 at 1 p.m.
Lorentz-Raum, 05-127, Staudingerweg 7

Prof. Dr. Gianpaolo Carosi
Lawrence Livermore National Lab, USA

Tuning into Axion Dark Matter with the ADMX Experiment

The axion is a hypothetical particle that may solve two problems in particle physics & cosmology, the Strong-CP problem (or why the neutron doesn't have a measurable electric dipole moment) and the nature of dark matter. The Axion Dark Matter Experiment (ADMX), which started at Lawrence Livermore National Laboratory in the mid-1990s and has gone through a series of upgrades through the years, is the DOE Flagship search for these particles. The experiment uses tunable resonant cavities in a large static magnetic field to enhance the conversion of dark matter axions to detectable microwaves. Quantum-limited amplifiers based on superconducting Josephson Junction circuits are critical to allow the search to be sensitive enough to rapidly scan the frequencies where the axion may exist. Here I will describe the detection strategy of ADMX, the progress made so far, and outline the next phase of the experiment dubbed ADMX-Extended Frequency Range (ADMX-EFR), which aims to cover 2-4 GHz at below DFSZ sensitivity. Opportunities for physics searches beyond axions, such as potentially high frequency gravity waves, will also be discussed.