

AdEPT, the Advanced Energetic Pair Telescope for Medium-Energy Gamma-Ray Polarimetry

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Abstract content

We present the Advanced Energetic Pair Telescope (AdEPT) which is being developed as a future NASA/GSFC MIDEEX mission to perform high-sensitivity medium-energy (5–200 MeV) astronomy and revolutionary gamma-ray polarization measurements. The enabling technology for AdEPT is a large volume gaseous time projection chamber with high spatial resolution 2-dimensional readout. The accurate 3-dimensional track resolution of the time projection chamber eliminates the need for an anti-coincidence system and calorimeter which simplifies the instrument and significantly reduces the total mass of this mission. AdEPT will achieve high angular resolution (~ 0.5 deg at 67.5 MeV) and, for the first time, exceptional gamma-ray polarization sensitivity. These capabilities enable a wide range of scientific discovery potential for AdEPT. The key science goals of the AdEPT mission include: 1) Explore fundamental processes of particle acceleration in active astrophysical objects, 2) Reveal the magnetic field configuration of the most energetic accelerators in the Universe, 3) Explore the origins and acceleration of cosmic rays and the Galactic MeV diffuse emission, 4) Search for dark matter in the Galactic center, and 5) Test relativity with polarization measurements. We report on the science goals to be expected from AdEPT and current status of the mission.

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