

Contribution ID: 915

Type: Talk

Observations of Low-energy Cosmic-Ray Electron and Positron Spectra with the 2024 AESOP-Lite Mission

Tuesday 22 July 2025 16:35 (15 minutes)

As cosmic ray electrons and positrons propagate through the heliosphere, they interact with the outwardsflowing solar wind. The flux of low energy electrons is modulated by this solar wind, resulting in a flux spectrum with a turn-up around 100MeV. The source of this turn-up is unknown, but has been investigated by various cosmic ray detectors at 1AU during different periods of solar activity. One such experiment is the balloon-borne spectrometer AESOP-Lite (Anti-Electron Sub-Orbital Payload Low Energy), which launched from McMurdo Station, Antarctica on January 10, 2024. AESOP-Lite measures the rigidity and charge-sign of downwards-moving particles near the top of the atmosphere, targeting cosmic ray electrons and positrons between 20MeV-1GeV. The 2024 flight lasted around 46 hours, reaching a maximum altitude of 157,551 feet. This was the second flight of AESOP-Lite, the first being out of Kiruna, Sweden in May 2018 during a period of minimum solar activity. We present the low-energy electron and positron flux spectra as measured by AESOP-Lite during its most recent flight, which occurred during a period of high solar activity. Comparisons with the 2018 flight and similar measurements both at 1AU and in local interstellar space reveal the effects of solar modulation on the flux of cosmic ray electrons. We also present the positron fraction of cosmic rays measured during the 2024 campaign. Studying that fraction across our entire energy range allows us to infer about the source of these cosmic rays, and reveals information about the different components of solar modulation.

Collaboration(s)

Author: MARTIN, Scott (Bartol Research Institute, University of Delaware Department of Physics and Astronomy)

Co-authors: Dr CLEM, John (Bartol Research Institute, University of Delaware Department of Physics and Astronomy); Dr EVENSON, Paul (Bartol Research Institute, University of Delaware Department of Physics and Astronomy); Dr JOHNSON, Robert (Santa Cruz Institute for Particle Physics, University of California Santa Cruz); LUCAS, Brian (Bartol Research Institute, University of Delaware Department of Physics and Astronomy); Dr MANGEARD, Pierre-Simon (Bartol Research Institute, University of Delaware Department of Physics and Astronomy); ROTH, James (Bartol Research Institute, University of Delaware Department of Physics and Astronomy); ROTH,

Presenter: MARTIN, Scott (Bartol Research Institute, University of Delaware Department of Physics and Astronomy)

Session Classification: CRD

Track Classification: Cosmic-Ray Direct & Acceleration