

Solar Modulation of the Local Interstellar Spectrum with Voyager 1, AMS-02, PAMELA and BESS

In recent years, the increasing precision of direct cosmic rays measurements opened the door to high-sensitivity indirect searches of dark matter and to more accurate predictions for radiation doses received by astronauts and electronics in space. The key ingredients in the study of these phenomena are the knowledge of the local interstellar spectrum (LIS) of galactic cosmic rays and the understanding of how the solar modulation affects the LIS inside the heliosphere.

Voyager 1, AMS-02, PAMELA and BESS measurements of proton and helium fluxes provide valuable information, allowing us to shed light on the shape of the LIS and the details of the solar modulation during solar cycles 22-24.

A new parametrization of the LIS is presented, based on the latest data from Voyager 1 and AMS-02. Using the framework of the force-field approximation, the solar modulation parameter is extracted from the time-dependent fluxes measured by PAMELA and BESS. A modified version of the force-field approximation with a rigidity-dependent modulation parameter is introduced, yielding better fits than the force-field approximation. The results are compared with the modulation parameter inferred by neutron monitors.

Primary author: CORTI, Claudio (University of Hawai'i at Manoa (US))

Co-authors: BINDI, Veronica (University of Hawai'i at Manoa (US)); CONSOLANDI, Cristina (University of Hawai'i at Manoa (US)); LIGHT, Christopher (University of Hawaii at Manoa); Dr PALERMO, Matteo (University of Hawaii at Manoa); Dr POPKOW, Alexis (University of Hawaii at Manoa); WHITMAN, Kathryn (University of Hawai'i at Manoa (US))

Presenter: CORTI, Claudio (University of Hawai'i at Manoa (US))