

Measurement of the Electron and Positron Fluxes with AMS - 02

lunes, 21 de octubre de 2019 15:20 (20)

Abstract

The Alpha Magnetic Spectrometer (AMS) is an experiment located onboard the International Space Station. AMS is designed to carry out precise measurements of cosmic rays, in particular, the flux of positrons and electrons. To this end, it is comprised of different subdetectors to measure the properties of the particles. The trajectory, the rigidity and the charge with its sign of the cosmic ray particle can be measured with a precision silicon tracker. Protons can be separated from electrons and positrons using estimators based on the emitted transition radiation on TRD and the shower on the electromagnetic calorimeter ECAL. The signals from positrons can be separated efficiently from the background using a template fitting technique. The dominant source of background in the analysis is due to charge confusion electrons, which are distinguished by means of a charge confusion estimator.

AMS collaboration has published the latest measurement of the positron flux up to 1 TeV, based on a data sample of 1.9 million positrons collected from 2011 May to 2017 November. The results show a flux excess starting from 25.2 ± 1.8 GeV and a sharp drop-off above 284+91-64 GeV, and are consistent with a finite energy cutoff of the source at $E_s = 810$ GeV with a significance of more than 4σ . One of the possible models of this result is based on dark matter particle annihilation, thus, the measurement of antimatter cosmic rays particles allows indirect searches for dark matter.

By the end of the mission in 2024, the increased statistics will allow extending the energy range of the positron measurement to 2 TeV and determine at 5σ whether the flux drops-off or presents a continuous spectrum.

Primary author(s) : Dr. CASAUS, Jorge (CIEMAT); Dr. VELASCO, Miguel Ángel (CIEMAT); GÁMEZ, Carmen (CIEMAT)

Presenter(s) : GÁMEZ, Carmen (CIEMAT)

Clasificación de la sesión : RENATA (Red Nacional Temática de Astropartículas)

Clasificación de temáticas : Red Temática de Astropartículas (RENATA)