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The analysis strategy for the measurement of the electron flux with CALET on the International Space Station

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The CALorimetric Electron Telescope (CALET), operating aboard the International Space Station since October 2015, is an experiment dedicated to high-energy astroparticle physics. The primary scientific goal of the experiment is the measurement of the electron+positron flux up to the multi-TeV region. In this poster, we will present the analysis strategy employed for this measurement. At first, we will describe the careful selection of all variables used in the analysis in order that they are well reproduced by simulations. Then, we will discuss the analysis itself, which is divided in two main steps. The first step consists of a set of selections to obtain a sample of well reconstructed candidates, removing particles outside the detector acceptance and particles with a charge Z>1, while keeping a high selection efficiency for electrons. The second step consists of a final rejection to remove the residual proton background: this is the most crucial point of the analysis and is performed using different methodologies. We will demonstrate that, at low energies, it is enough to use a simple single cut that makes use of the reconstructed longitudinal and lateral profile, whereas, at high energies, it is necessary to use a more powerful cut that combines all detector information by the use of a multivariate analysis technique. Finally, we will show that this rejection algorithm leads to very stable performances at all energies, strongly reducing the impact of the associated uncertainty, which is the main source of systematic uncertainty in the high energy region.

Keywords

Electron+Positron; Electron/Proton Discrimination; Analysis methods; Detector Performance

Collaboration

CALET

other Collaboration

Subcategory

Experimental Methods & Instrumentation

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