

Search for fractionally charged particles in space with DAMPE

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The existence of fractionally charged particles (FCP) in present is some extensions to the Standard Model of particle physics, and their detection would be a significant breakthrough. Most of the previous cosmic-rays (CRs) studies are mainly focused on the secondary CRs from the extensive air shower, but there is rarely on-orbit study to search FCP from primary CRs. The DArk Matter Particle Explorer (DAMPE) was launched into space on the 17th December 2015, and it has been working well in space for more than five years with the purpose of measuring CRs and gamma-rays and as today a large amount of scientific data has been acquired. In this work the five years' on-orbit data of DAMPE have been analyzed for the search of $2/3$ fractionally charged particle (FCP). The FCP is assumed to have high penetration capability, and therefore in the selections the particle is required to penetrate the entire detector from top to bottom. Two sub-detectors, the Plastic Scintillator Detector (PSD) and the Silicon Tungsten tracKer (STK), are used for charge discrimination. The Geant4 simulations toolkit is used to investigate the signal region and selection efficiency of $2/3$ FCP in the detector. No FCP signal is found with DAMPE. The detailed selection methods and progress of DAMPE will be presented and discussed.

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Cosmic rays

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