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Spectrum of PeV Cosmic-Ray Protons and Helium Nuclei with IceCube

The IceCube Observatory comprises a cubic-kilometer particle detector deep in the Antarctic ice and the cosmic-ray air-shower array IceTop at the surface above. Previous analyses of the cosmic-ray composition have used coincident events with IceTop detecting the electromagnetic shower footprint, including GeV muons, while the sensors submerged in the ice measure the TeV muons from the same events. The energy range of previous composition analyses, however, has been limited to 3 PeV primary energy and above whereas the IceTop all-particle energy spectrum has been extended down to 250 TeV. This contribution presents a method to reconstruct the combined spectrum of cosmic-ray protons and helium nuclei, starting at 200 TeV primary energy. This would close the gap in the H+He spectrum between IceCube and experiments measuring in the TeV energy range, such as DAMPE and HAWC.

Collaboration(s)

IceCube

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