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Energy Scale Calibration of Calorimeters in Space using Moon Shadow

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Calorimetric experiments in space of the current and of the next generation measure cosmic rays directly above 10 TeV on satellites in Low Earth Orbit. A common issue of these detectors is the determination of the absolute energy scale for hadronic showers at the highest energies since there are no available facilities for detector testing with particles with energies exceeding several hundreds of GeV. In this work, we propose the use of the Moon-Earth spectrometer technique, a technique used since the 1980s by ground experiments to derive limits on anti-proton flux, for the calibration of calorimeters in space. Essentially, the presence of the Moon creates a detectable lack of particles in the detected cosmic ray arrival directions. The position of this depletion has an offset with respect to the moon center due to the effect of the geomagnetic field on the cosmic rays. The developed simulation will explore if, with enough statistics, angular and energy resolutions, this effect can be used for the energy scale calibration of calorimeters on satellites in the proximity of the Earth.

Eligibility for "Best presentation for young researcher" prize

No

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