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CALET on the International Space Station: new direct measurements of cosmic-ray iron and nickel

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The Calorimetric Electron Telescope (CALET), in operation on the International Space Station since 2015, collected a large sample of cosmic-ray over a wide energy interval. The instrument identifes the charge of individual elements up to nickel and beyond and, thanks to a homogeneous lead-tungstate calorimeter, it measures the energy of cosmic-ray nuclei providing a direct measurement of their spectra. A favourable opportunity for a low background measurement spectra is provided by iron and nickel, thanks to the negligible contamination from spallation of higher mass elements and to their abundance among the heavy elements. Also, they play a key role in understanding the acceleration and propagation mechanisms of charge particles in our Galaxy.
In this contribution a direct measurement of iron and nickel spectra, based on more than five years of data, are presented in the energy range from 10 GeV/n to 2 TeV/n and from 8.8 GeV/n to 240 GeV/n, respectively. The spectra are compatible within the errors with a single power law in the energy region from 50 GeV/n to 2 TeV/n and from 20 GeV/n to 240 GeV/n, respectively. Also, systematic uncertainties are detailed and the nickel to iron flux ratio is presented.
This unprecedented measurement confirms that both elements have very similar fluxes in shape and energy dependence, suggesting that their origin, acceleration, and propagation might be explained invoking an identical mechanism in the energy range explored so far.

In-person participation

Yes

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