The NUCLEON space experiment status: $10^{11} < E < 4 \times 10^{14}$ eV


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The NUCLEON apparatus includes the charge measurement system (1) consisting of the 4 pad silicon detectors layers (2048 channels), the KLEM energy measurement system of the carbon target (2) and the six layers of silicon microstrip detectors (6912 channels) divided by six thin tungsten layers (3), the trigger system (4) of the six scintillator layers (108 channels) and six layers (5) of the silicon-tungsten calorimeter (1536 channels). Total - 10604 channels, failure rate is 0.6%.

Active area – 0.5x0.50 m (for calorimeter – 0.25x0.25 m)
Total depth ~ 16 radiation lengths
E-resolution: P-60%, Fe-30-50%, e-8%
Ch-resolution: 0.2 ch.unit

The orbital NUCLEON experiment is designed to measure Cosmic Ray (CR) energy spectrum and charge composition at 100 GeV – 1000 TeV and Z = 1-30 respectively. The NUCLEON apparatus structure, methods of primary CR charge and energy measurements are described. The possible systematic uncertainty sources are discussed. Preliminary CR energy spectra and charge composition are presented from the first one and a half year of data taking from orbit.

The charge distribution obtained at the SPS CERN heavy ion beam test. Resolution ~0.2 ch. unit

NUCLEON detector was tested many times with electron, hadron and heavy ion beams at SPS of CERN
The set of data obtained by all detectors can be presented in the form of an event display.

Preliminary results for spectra of CR nuclei

Comparison of the trigger rates: simulation - X-axis, data – Y-axis

Simulation 100 GeV protons: asymmetry

Simulation 100 GeV muons: no asymmetry

Trigger system properties

Preliminary results for CR charge distribution of nuclei

More than $2 \times 10^7$ events was obtained since December 2014. Off-line analysis of the data is in progress.