The NUCLEON satellite experiment is designed to investigate directly the energy spectra of galactic cosmic ray nuclei and its charge composition before the “knee”: in the energy interval from 100 GeV to 100 TeV and the charge range Z = 1–30 respectively. The “knee” energy range of \(10^{14} - 10^{16}\) eV is a crucial region for the understanding of the cosmic-ray acceleration and propagation in the interstellar medium. The NUCLEON detector has been data taken since December, 2014. The NUCLEON trigger system and cosmic ray (CR) events selection are described, including the beam tests at the SPS CERN, flight tests in orbit and the Monte-Carlo simulation. Measuring the energy spectrum, charge, mass of CR particles will provide the missing information about the sources of CR, about the mechanisms of their acceleration and propagation in the galaxy.

### THE NUCLEON DETECTOR

The detector consists of the following main systems:

1. the charge measurement system (CMS) of the primary particles
2. the graphite target
3. the tracker for the energy measurement system (CMS) by the KLEM method.
4. the fast scintillation trigger system (STS) to select useful and suppress background events;
5. the tungsten-silicon ionization calorimeter
6. the service electronics

### CALIBRATION AND BEAM TESTS OF STS AT SPS CERN

The NUCLEON scintillator and silicon detectors, readout and data taking electronics have been tested at SPS CERN. The beam spot is ~ 1.5 cm and intensity of \(10^3\)–\(10^4\) particles per second. The beam tests of the NUCLEON detector prototypes have been carried out with pions up to 350 GeV/c.

### THE SCINTILLATION TRIGGER SYSTEM

The detector consists of the following main systems:

1. the charge measurement system (CMS) of the primary particles
2. the graphite target
3. the tracker for the energy measurement system (EMS) by the KLEM method.
4. the fast scintillation trigger system (STS) to select useful and suppress background events;
5. the tungsten-silicon ionization calorimeter
6. the service electronics

### THE COMBINE FLIGHT TESTS OF STS

During the NUCLEON detector operation in orbit a number CR events were obtained and preliminary physical results are publishing.