

Development of particle detector for the observation of trans-iron isotopes in galactic cosmic rays

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Abstract

The study of isotopic compositions of rare nuclei in the ultra-heavy cosmic rays (UH-CRs) is the next important step after the ACE/CRIS measurements of light isotopes below iron-groups. We have no data at all of isotopic abundances in the UH-CR regions and still lack decisive data of elemental abundances in the region. The observation of UH-CR compositions provides the isotopic study of neutron capture nucleosynthesis, which is an essential issue in understanding the origin of CRs. Isotopic abundance is less subject to fractionation than elements in fractionation processes, which leads us to bring a preferred probe to study the cosmic ray origin.

Definitive measurements are now close to the availability of spacecraft or long duration balloon over Antarctica capable of carrying very large scientific payloads for a long extended period of years. In this study, the large particle detectors with high mass resolution made of solid-state track detectors are developed, and they will make the first measurements of the elemental and isotopic compositions of CRs in the range of $30 \leq Z \leq 56$ with the energy range from 100 MeV/n to 600 MeV/n.