

## Stepped-up development of AMS for the detection of $^{60}\text{Fe}$ with the HI-13 tandem accelerator

Monday, 9 September 2024 16:57 (1 minute)

The Moon provides a unique environment for investigations of nearby astrophysical events such as supernovae. Lunar samples retain valuable information provided by these nearby astrophysical events, via detectable long-lived "fingerprint" radionuclides such as  $^{60}\text{Fe}$ .

In this work, we stepped up the development of an accelerator mass spectrometry (AMS) method for detecting  $^{60}\text{Fe}$  using the HI-13 tandem accelerator at the China Institute of Atomic Energy. Since interferences could not be sufficiently removed with the existing magnetic systems of the tandem accelerator and the following Q3D magnetic spectrograph, a Wien filter with a maximum voltage of 60 kV and a maximum magnetic field of 0.3 T was installed after the accelerator magnetic systems to lower the detection background for the low abundance nuclide  $^{60}\text{Fe}$ . A 1  $\mu\text{m}$  thick  $\text{Si}_3\text{N}_4$  foil was installed in front of the Q3D as an energy degrader. For particle detection, a multi-anode gas ionization chamber was mounted at the center of the focal plane of the spectrograph. Finally, an  $^{60}\text{Fe}$  sample with an abundance of  $1.125 \times 10^{-10}$  was used to test the new AMS system. The results indicate that  $^{60}\text{Fe}$  was clearly distinguished from the isobar  $^{60}\text{Ni}$ . The sensitivity was evaluated to be better than  $4.3 \times 10^{-14}$  based on the 5.8 hours blank sample measurements, and the sensitivity could in principle be expected to be about  $2.5 \times 10^{-15}$  when the data are accumulated for 100 hours which is feasible for future lunar sample measurements because the main contaminants were sufficiently separated.

**Primary author:** YANG, zhang (China Institute of Atomic Energy)

**Presenter:** YANG, zhang (China Institute of Atomic Energy)

**Session Classification:** Poster presentation