Contribution ID: **15** Type: **not specified**

Data related to muon nuclear capture

Tuesday 12 November 2024 09:30 (40 minutes)

Cosmic-ray muons are constantly bombarding us on the ground. When a negative muon comes to rest in matter, it is captured into an atomic orbit and, with a certain probability, is subsequently absorbed by the atomic nucleus via the weak interaction. This process is known as muon nuclear capture (μNC). In this process, most of the muon's rest energy is carried away by a muon neutrino and the remaining energy excites the residual nucleus. μNC can be regarded as one of the most naturally occurring nuclear reactions.

Since μNC occurs ubiquitously on Earth, it holds significant relevance for various applications. A notable application is evaluating the soft error rate in semiconductor devices induced by cosmic-ray muons. Charged particles emitted following μNC can generate electron-hole pairs in semiconductors, potentially altering stored data and causing single event upsets (SEUs). This risk is growing as semiconductor devices become smaller and operate at lower voltages, making them more susceptible to such soft errors. Other applications include geochronology using cosmogenic nuclides generated by cosmic-ray muons and, of course, evaluating activation levels in muon facilities, where μNC plays an important role.

Despite the increasing need for muon nuclear data, a dedicated database has yet to be developed. While some muon nuclear reaction data are included in conventional databases such as ENSDF, the way of inclusion is not standardized. To address this, we launched the Muon Nuclear Data (μND) Project, which aims to develop a comprehensive database for muon nuclear reactions. This database will include not only experimental data on muon nuclear reactions but also evaluated and theoretical data.

In this presentation, we will discuss the μNC process, the potential applications of μND, and also recent progress related to the μND project.

Primary author: KAWASE, Shoichiro (Kyushu University)

Co-author: Dr NIIKURA, Megumi (RIKEN)

Presenters: Dr NIIKURA, Megumi (RIKEN); KAWASE, Shoichiro (Kyushu University)

Session Classification: Users' Feedbacks and New Demands