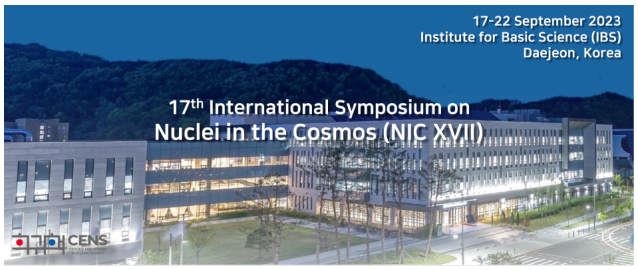

Contribution ID: **107** Type: **Poster**

High-dispersion spectroscopic observations of r-process elements including thorium in solar metallicity and mildly-metal-poor stars

Tuesday, September 19, 2023 5:45 PM (5 minutes)

The origin of the r-process is unknown for many years, but in 2017, neutron-star merger (NSM) was observed by gravitational waves [1], it was found that NSM is the origin of the r-process by following photometric and spectroscopic observation. However, NSM is unable to explain the origin of the r-process alone. Observations of stellar abundances have found stars which have high [Th/Eu] value (Actinide-Boost stars). The origin of Actinide-Boost stars is unclear, the existence of such stars suggests that the r-process has more than one origin (e.g. [2, 3]). It is important to determine Th abundance in many stars to clarify the origin of the r-process. At present, there has been few observations of Th in [Fe/H] > -1.5 [4]. Therefore, we obtained a number of r-process abundances including Th, over ten objects in [Fe/H] > -1.5. We observed with Nayuta/MALLS and obtained Subaru/HDS archive data. We found the following two results. First, the value of [Th/Eu] is constant and independent of the metallicity. Second, there are not Actinide-boost stars in [Fe/H] > -1.5. These results are important to clarify the origin of Actinide-boost stars. Identifying the origins of Actinide-boost stars is to investigate the origins of the r-process.
[1] Abbott et al., PhRvL, 119, 16 (2017)
[2] Holmbeck et al., ApJ, 859, 2 (2018)
[3] Yong et al., Nature, 595, 7866 (2021)
[4] Mishenina et al., MNRAS, 516, 3 (2022)

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Session Classification: Poster session (Core-collapse supernovae, mergers and the r-process)

Track Classification: Core-collapse supernovae, mergers and the r-process