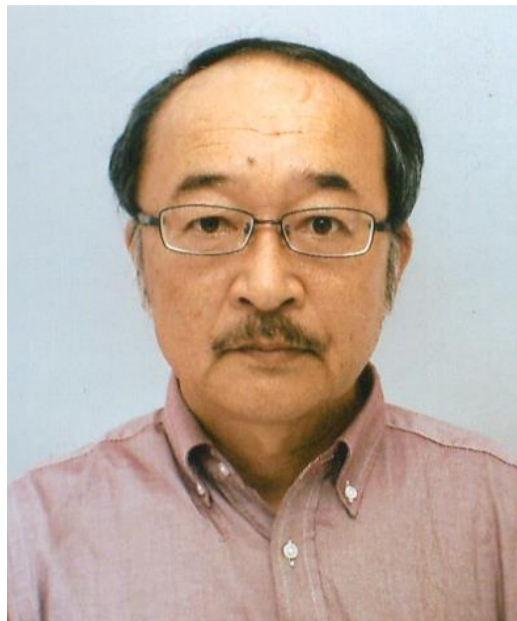


KMI Colloquium

Nuclear matter with hyperon in neutron star under nuclear physics with double strangeness



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Abstract:

Mixing of hyperons was strongly suggested in neutron stars to support their masses (typically $\sim 1.4 M_{\odot}$, where M_{\odot} is a solar mass). Although three body forces with nucleon(N) and hyperon are introduced to support the recent observed massive neutron star with $(1.97 \pm 0.04)M_{\odot}$, some other theorists claim that almost all model under hyperon or boson condensate can be ruled out. Appearance of hyperon around the core in neutron star is supposed to be naïve concept due to a chemical potential to be so larger than the mass of a Λ hyperon, but our knowledge about hyperon interactions is still poor to understand Equation of State.

For a quarter century, we investigated $\Lambda\Lambda$ and ΞN interaction with nuclear emulsion detector using K⁻ beam at KEK-PS. We have detected 8 events showing the decay topology of light double- Λ hypernucleus. Among them, the NAGARA event (${}_{\Lambda}^6\Lambda\text{He}$) was uniquely identified and presented weakly attractive $\Lambda\Lambda$ interaction with 0.67 ± 0.17 MeV. Very recently, we have succeeded to detect a deeply bound $\Xi^{-}{}^{-14}\text{N}$ system, which supports attractive $\Xi^{-}N$ interaction, under the development of “overall scanning” system.

In the seminar, we will discuss current condition of theoretical and experimental efforts.

