

Tetraneutron states populated by $^4\text{He}(^8\text{He}, ^8\text{Be})$ reaction

Tuesday, 12 July 2016 09:40 (15 minutes)

We have found a candidate tetraneutron resonant state via a double-charge exchange (DCX) reaction $^4\text{He}(^8\text{He}, ^8\text{Be})$ at 190 A MeV by using the SHARAQ spectrometer at the RIBF facility in RIKEN^[1].

Production mechanism with kinematical consideration for the present exotic reaction is introduced and analysis for obtaining missing-mass spectrum is presented.

The observed missing-mass spectrum consists of a continuum consistent with a prediction assuming direct decay from a wave packet produced just after the DCX reaction and a peak just above the $4n$ threshold.

The energy of the peak is $0.83 \pm 0.65(\text{stat.}) \pm 1.25(\text{syst.})$ MeV with a significance level of 4.9σ , which is a candidate of a tetraneutron resonance.

Three-body forces relevant for formation of tetraneutron resonance are discussed for consistent understanding of few-body systems.

Further experimental approaches for the tetra-neutron system at the RIBF are also shown.

[1] K. Kisamori et al., Phys. Rev. Lett. **116**, 052501 (2016)

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Track Classification: Probing the nuclear force through direct reactions