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

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We have found a candidate tetraneutron resonant state
via a double-charge exchange (DCX) reaction ^{4}He(^{8}He,^{8}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 ± 0.65(stat.)±1.25(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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