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A four-neutron system probed through sudden removal of alpha particle from ^8He

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The search for chargeless nuclei consisting only of neutrons has been a long-lasting challenge in nuclear physics, dating about 50 years back. The tetraneutron, in particular, has attracted a lot of experimental and theoretical attention. Theoretical models agree that nuclear forces do not bind four neutrons together, but struggle to handle the resonance case. On the other hand, no solid experimental information on the tetraneutron ground-state resonance is available as experiments suffer from low statistics and/or large background. The possibility of the tetraneutron forming a resonance state is still an open and fascinating question, which can now be probed theoretically with state-of-the-art ab initio calculations and studied experimentally by employing new techniques in the upgraded, high-intensity, radioactive-ion beam facilities. In this talk I will present results from a novel experiment performed at the SAMURAI setup in RIKEN, Japan, which probed the correlation energy between the four remaining neutrons after the quasi-elastic removal of alpha cluster from ^8He projectiles.

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