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## Free system of four correlated neutrons

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A fundamental aspect in low-energy nuclear physics is the interaction and correlation of neutrons at extreme conditions of very large neutron-to-proton asymmetry and low-density environment. Multi-neutron systems provide an exclusive way to address such correlations. Their high impact potential has led to many experimental searches for such isolated systems over the last decades.

In this talk I will present our recent result, where using an  $\alpha$ -knockout reaction from  $^8\text{He}$  isotope, we observed a low-energy peak in the four-neutron energy spectrum, with a resonance-like structure. A discussion on the interpretation of this observation is ongoing. The question is whether it is due to tetra-neutron correlation or other interaction between the neutrons, e.g. di-neutron correlations.

Next-generation experiments using different reaction mechanisms and possibly detecting all four neutrons in coincidence, which are essential to conclude about its nature will be discussed.

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