

Pauli-principle driven correlations in four-neutron nuclear decays

Thursday, 18 April 2019 14:15 (15 minutes)

Mechanism of simultaneous non-sequential four-neutron ($4n$) emission (or true $4n$ -decay) has been considered in phenomenological five-body approach.

This approach is analogous to the model of the direct decay to the continuum often applied to $2n$ - and $2p$ -decays.

It is demonstrated that $4n$ -decay fragments should have specific energy and angular correlations reflecting strong spatial correlations of valence nucleons orbiting in their $4n$ -precursors. Due to the Pauli exclusion principle, the valence neutrons are pushed to the symmetry-allowed configurations in the $4n$ -precursor structure, which causes a “Pauli focusing” effect.

Prospects of the observation of the Pauli focusing have been considered for the $4n$ -precursor isotope ${}^7\text{H}$. Fingerprints of its nuclear structure or/and decay dynamics are predicted.

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Session Classification: Nuclear Physics

Track Classification: Nuclear Physics