Contribution ID: **105** Type: **1.Plenary**

Nucleon-nucleon correlations in two-proton radioactivity

Exotic decay beyond the nuclear dripline represents a frontier in understanding the nuclear landscape. Among these phenomena, two-proton (2p) radioactivity emerges as a distinctive three-body process involving the simultaneous emission of two protons from the ground state of even-Z, neutron-deficient nuclei. Recent advancements in measuring proton-proton correlations have rekindled interest in this area, shedding light on the interplay between structural and reactive dynamics of nuclear open quantum systems. Utilizing the Gamow coupled-channel method alongside a time-dependent approach, our study reveals how the structure of the initial wave function, influenced by both initial-state and final-state interactions, critically affects decay dynamics and imprints on asymptotic correlations. Moreover, analyzing the energy dependency of these correlations unveils unique insights into non-exponential decay mechanisms, enhancing our understanding of open quantum system properties.

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Session Classification: Plenary

Track Classification: Few-body aspects of nuclear physics and nuclear astrophysics