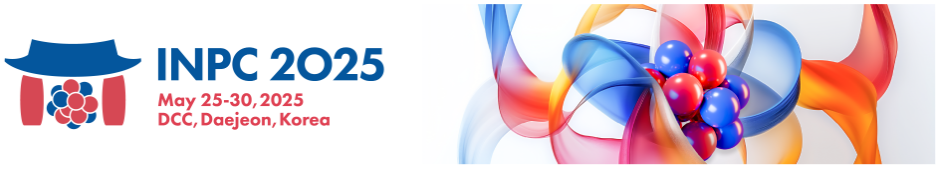

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Constraining i-process nucleosynthesis with quasi-continuum nuclear data

Monday, 26 May 2025 14:40 (15 minutes)

The gamma-ray decay of nuclear states in the quasi-continuum provides significant constraints on nucleosynthesis processes. In particular, measurements of Nuclear Level Densities (NLDs) and Photon Strength Functions (PSFs) have and will continue to play a central role as these are inputs for the statistical Hauser-Feshbach model. This facilitates the extraction of neutron-capture cross-section data even for nuclei where direct measurements are not feasible. Now, PSF and NLD measurements in previously inaccessible regions of the nuclear chart have become possible due to many facilities worldwide offering enhanced or new state-of-the-art research infrastructure. These range from significant increases in efficiencies for particle and gamma-ray detectors to new or upgraded radioactive ion beam facilities. In parallel, several new experimental and analytical techniques have been developed, enabling more reliable PSF and NLD studies. This collective progress leads to unprecedented insight not only into the structure of nuclei but also to provide experimental constraints relevant to nucleosynthesis processes.
In this presentation, I will provide an overview of the most significant advances made and how these have laid the foundation for novel and ambitious measurements of PSFs and NLDs at radioactive ion beam facilities. Furthermore, I will discuss how our understanding of observed isotopic abundances can be enhanced through the measurement of PSFs and NLDs, using the i-process nucleus 67Ni as an example.

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Primary author: WIEDEKING, Mathis (Lawrence Berkeley National Laboratory)

Presenter: WIEDEKING, Mathis (Lawrence Berkeley National Laboratory)

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