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Advancing reaction theory to enable predictions and indirect measurements of cross sections for neutron-induced reactions on short-lived nuclei

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Reliable nuclear data with quantified uncertainties are essential for basic and applied science. When measurements are not possible, evaluators rely on systematics, theory predictions, and indirect observables. This is particularly relevant for applications involving reactions with short-lived nuclei, such as simulations undertaken to understand stellar evolution and the synthesis of the elements. Integrated nuclear structure and reaction descriptions provide the basis for reliable reaction predictions, for achieving consistent evaluations across multiple isotopes, and for enabling indirect (surrogate) measurements of cross sections. This talk will focus on advances in incorporating state-of-the-art nuclear structure theory, newly-developed optical-model potentials, and improved approaches to uncertainty quantification into reaction calculations. I will discuss strategies for predicting neutron capture reactions and progress in extracting cross sections from indirect measurements with both stable and radioactive beams.

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