Investigating high-energy proton-induced reactions: Implications for level densities and the preequilibrium exciton model

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Multihundred MeV proton accelerators are promising sites for the large-scale production of medical radionuclides due to the high production rates enabled by their high-intensity beam capabilities and the long range of high-energy protons. However, the ability to reliably conduct isotope production at these accelerators and model relevant (p,x) reactions in the 100-200 MeV range is hampered by a lack of measured data. The current suite of predictive reaction-modeling codes is only accurate to within approximately 20% for (p,x) and (n,x) reaction channels where a large body of experimental measurements currently exists. In cases where few data exist, these codes often exhibit discrepancies anywhere within a factor of 2-50. In order to address this deficiency, experiments and a detailed assessment of the TALYS code were performed. Particular attention was paid to the formulation of the two-component exciton model in the transition between the compound and preequilibrium regions, with a linked investigation of level density models for nuclei off of stability and their impact on modeling predictive power. Experimental results and model calculations will be presented.

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Lindley Hall room 321