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**Compound-nuclear Reactions with Unstable Isotopes: Constraining Capture Cross Sections with Indirect Data and Theory**<sup>1</sup> JUTTA ESCHER, Lawrence Livermore National Laboratory — Cross sections for compound-nuclear reactions involving unstable targets are important for many applications, but can often not be measured directly. Several indirect methods have recently been proposed to determine neutron capture cross sections for unstable isotopes. These methods aim at constraining statistical calculations of capture cross sections with data obtained from the decay of the compound nucleus relevant to the desired reaction. Each method produces this compound nucleus in a different manner (via a light-ion reaction, a photon-induced reaction, or  $\beta$  decay) and requires additional ingredients to yield the sought-after cross section. This contribution focuses on the process of determining capture cross sections from inelastic scattering and transfer experiments. Specifically, theoretical descriptions of the (p,d) transfer reaction have been developed to complement recent measurements in the Zr-Y region. The procedure for obtaining constraints for unknown capture cross sections is illustrated. The main advantages and challenges of this approach are compared to those of the proposed alternatives.

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