Compound-nuclear Reactions with Unstable Isotopes: Constrain-
ing Capture Cross Sections with Indirect Data and Theory\textsuperscript{1} JUTTA ES-
CHER, 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 re-
action. 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 pro-
cedure 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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