

Statistical nuclear reaction uncertainties important for the astrophysical rp and α processes

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Explosive astrophysical phenomena often involve complex networks of thousands of nuclear reactions which impact the energy release and nucleosynthesis of these scenarios. Many of these reactions are presently beyond the capabilities of direct measurement techniques, but are believed to be in the regime of validity for statistical nuclear reaction rate calculations. However, reaction rate predictions from statistical models can vary by an order of magnitude or more depending on adopted input parameters, leading to large changes in astrophysics model calculation results. Here I will focus on uncertainties in reaction rate calculations of (p, γ) reactions for the astrophysical rp -process and of (α, n) reactions for the astrophysical α -process. I will discuss the implications these uncertainties have for astrophysics model calculations of Type-I X-ray bursts and of core collapse supernova nucleosynthesis. I will also discuss near-future measurement plans to remedy some of the most pressing uncertainties and highlight where future measurements are needed.
