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(I) Direct and indirect measurements of charged-particle capture reactions

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Experimentally-derived rates of selected charged-particle induced capture reactions are key ingredients in our global understanding of stellar nucleosynthesis. In particular, selected resonant proton and alpha capture reactions on medium-mass stable and radioactive targets are important for nucleosynthesis in a variety of scenarios such as classical novae and the p and rp-processes, which form nuclei on the proton-rich side of stability. Select charged-particle reactions are also important for neutron capture processes, e.g. the s-process, where they can contribute to the neutron flux. In this talk, I will discuss my group's efforts to constrain important charged-particle capture reactions at both stable and rare-isotope beam facilities and using both direct and indirect measurement techniques. A particular emphasis will be placed on recent results related to the s-process neutron source $^{22}\mathrm{Ne}(\alpha, n)^{25}\mathrm{Mg}$, as well as ongoing technical developments and anticipated future work at TRIUMF and the Texas A&M Cyclotron Institute.

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