GAS-JET TARGETS FOR REACTION STUDIES IN NUCLEAR ASTROPHYSICS

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Many nuclear processes of relevance to astrophysics involve proton- and alpha-induced reactions. While intense proton and alpha beams have provided and still provide a useful tool for low energy cross section studies, inverse kinematics experiments are becoming more and more the norm in the field. This approach enables the study of reactions with radioactive nuclei and also offers advantages for stable beam experiments. Inverse kinematics experiments can utilize gas targets, which offer major advantages over solid targets such as isotopic purity and stability, and which can be used in combination with recoil separators for increased sensitivity. This presentation will focus on the new generation of hydrogen and helium gas-jet targets used for direct and indirect reaction rate studies for nuclear astrophysics. The latest technical achievements and a couple of recent experiments with such devices will be highlighted, namely the $^{3}He(\alpha,\gamma)^{7}Be$ relevant to solar neutrino production and the $^{15}N(\alpha,\alpha)^{15}N$ elastic scattering relevant to the R-matrix description of the proton induced reactions on ^{18}O. Future plans with radioactive beams will also be discussed.