Studies for $\alpha$-induced astrophysical reactions at CRIB

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CRIB (CNS Radio-Isotope Beam separator) is a low-energy RI beam separator of Center for Nuclear Study (CNS), University of Tokyo. Studies on nuclear astrophysics and other topics have been performed using RI beams at CRIB, forming international collaborations. Recent improvements on the beam production at CRIB and experimental studies are discussed, including latest results and plans for studies on alpha-induced astrophysical reactions.

A main study currently going on is measurements of $\alpha$ resonance scattering using $^7$Li and $^7$Be beams. This study is related to astrophysical $^7$Li/$^7$Be($\alpha,\gamma$) reactions, important at hot p-p chain and $\nu$-process in supernovae. It is also interesting to study exotic cluster structure of $^{11}$B/$^{11}$C nuclei, similar to the one seen at Hoyle state in $^{12}$C.

Another interest is on ($\alpha,p$) reactions, which may play important roles in hot p-p chains, $\gamma$-ray bursts, novae, and other astrophysical phenomena. In particular, we are interested in $^{11}$C($\alpha,p$), $^{14}$O($\alpha,p$), $^{21}$Na($\alpha,p$), $^{18}$Ne($\alpha,p$), and $^{30}$S($\alpha,p$) reactions.