

## Experimental Study of Resonant States in $^{26}\text{Si}$ and $^{27}\text{P}$ to Investigate the $^{25}\text{Al}(p,\gamma)^{26}\text{Si}$ and $^{26}\text{Si}(p,\gamma)^{27}\text{P}$ Reactions

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Proton resonant states in  $^{26}\text{Si}$  and  $^{27}\text{P}$  were studied by the resonant elastic scattering of  $^{25}\text{Al}+p$  and  $^{26}\text{Si}+p$  with  $^{25}\text{Al}$  and  $^{26}\text{Si}$  radioactive ion beams bombarding a thick  $\text{H}_2$  gas target with the inverse kinematics method at CRIB (CNS Radioactive Ion Beam separator) facility. CRIB is a low-energy RI beam separator at Center for Nuclear Study (CNS), the University of Tokyo, installed in the RIBF facility of RIKEN. CRIB can produce low-energy ( $<10$  MeV/u) RI beams in flight method, using primary heavy-ion beams from the AVF cyclotron ( $K=70$ ). Studies on proton and alpha resonant scatterings, and  $(a,p)$  reactions have been performed using RI beams at CRIB, motivated by interests on astrophysical reactions and exotic nuclear structure. The properties of  $^{26}\text{Si}$  and  $^{27}\text{P}$  resonance states are important to better constrain the production rates of the  $^{25}\text{Al}(p, g)^{26}\text{Si}$  and  $^{26}\text{Si}(p, g)^{27}\text{P}$  reactions. These are astrophysically important reactions needed to understand proton-rich nucleosynthesis such as the galactic production of  $^{26}\text{Al}$  and energy generation in explosive stellar environments. The details of these experiments and their results will be presented.

In addition, the progress and the recent several physics campaigns of the EURICA (Euroball-RIKEN Cluster Array) project for studying a wide range of exotic nuclei will be introduced.