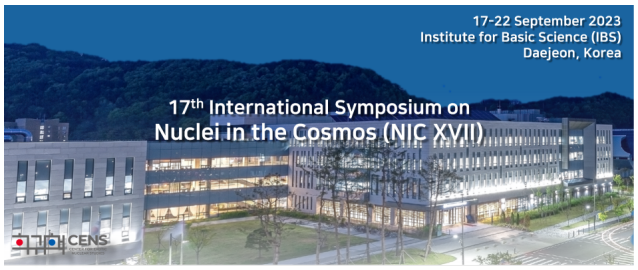

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Experimental study on astrophysically important ^{22}Mg nucleus via resonant scattering of ^{18}Ne+ α

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The ^{18}Ne(α,p)^{21}Na reaction is one candidate of the breakout reactions from hot-CNO cycle, and it plays an important role in understanding the X-ray bursts and the nucleosynthesis in the rp-process. We investigated energy levels of the ^{22}Mg by measuring the α resonant scattering on ^{18}Ne in inverse kinematics. The ^{18}Ne rare isotope beam was produced at the CNS Radio-Isotope Beam Separator (CRIB) of Center for Nuclear Study, the University of Tokyo, located at the RIBF of RIKEN Nishina Center. Recoiling α particles were measured by silicon detector telescopes. The excitation function of ^{22}Mg was obtained for the excitation energies of 10–16 MeV by adopting the thick-target method. To clarify the energy level properties of ^{22}Mg, the experimental excitation function was compared with theoretical R-matrix analysis using the SAMMY8 code. Since energy levels were not clearly observed at the astrophysically important energy range, upper limits on the ^{18}Ne (α,α)^{18}Ne cross section were set. The astrophysical impact was also investigated by estimating the ^{18}Ne(α,p)^{21}Na cross section.

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