Resonant scattering of ^{22}Na+p via a thick–target inverse kinematic method

Y.B. Wang,[1] S.J. Jin,[1] J. Su,[1] S.Q. Yan,[1] Y.J. Li,[1] B. Guo,[1] Z.H. Li,[1] W.P. Liu,[1] H. Yamaguchi,[2] J. Hu,[2] D. Kahl,[2] S. Kubono,[2] H.S. Jung,[3] J.Y. Moon,[3] T. Terenishi,[4] H.W. Wang,[5] H. Ishiyama,[6] H. Iwasa,[7] and H. Komatsubara[8]

[1]*Department of Nuclear Physics, China Institute of Atomic Energy, Beijing 102413, China*
[2]*Center for Nuclear Study, University of Tokyo, Saitama 351-0918, Japan*
[3]*Department of Physics, Chung-Ang University, Seoul 156-756, Republic of Korea*
[4]*Department of Physics, Kyushu University, Fukuoka 812-8581, Japan*
[5]*Shanghai Institute of Applied Physics, Chinese Academy of Sciences, Shanghai 201800, China*
[6]*High Energy Accelerator Research Organization(KEK), Ibaraki 319-1195, Japan*
[7]*Department of Physics, Tohoku University, Miyagi 980-8578, Japan*
[8]*Department of Physics, University of Tsukuba, Tsukuba 305-8571, Japan*

^{22}Na is one of the most important yet debatable cosmic γ–ray emitters. Triggered by the so–called Ne–E puzzle discovered in 1972 in Orgueuil meteorites with much excessive ^{22}Ne/^{20}Ne ratio [1], ^{22}Na ($T_{1/2} = 2.6$ y) is long regarded as a promising sensitive probe for nova and supernova outbursts. However, the recent observations from the orbiting γ–ray telescope show that only an upper limit of 3.7×10^{-8} $M_\odot$ for the ^{22}Na mass ejected by any nova in the Galactic disk [2].

^{22}Na(p,γ)^{23}Mg is one of the key reactions that control the ^{22}Na abundance in nova ejecta [3]. To investigate the complicated level structure of odd–mass ^{23}Mg close to the proton threshold, the resonant scattering of ^{22}Na+p was studied with a ^{22}Na radioactive ion beam bombarding a hydrogen gas target at the CRIB facility, University of Tokyo. The excitation function of the ^{22}Na+p elastic resonant scattering was obtained in the energy interval of 0.8−1.6 MeV in the center–of–mass frame. The experimental excitation function was analyzed with a multi–channel multilevel *R*–matrix code, three resonance states in the compound nucleus ^{23}Mg were revealed. Results on the deduced resonance parameters and the impact to the ^{22}Na(p,γ)^{23}Mg reaction rates will be presented and discussed.

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