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Study of Proton Resonances in ^{22}Mg by Resonant Elastic Scattering of $^{21}\text{Na}+p$ and Its Astrophysical Implication in $^{18}\text{Ne}(\alpha, p)^{21}\text{Na}$ Reaction Rate

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摘要 Proton resonant states in ^{22}Mg have been investigated by the resonant elastic scattering of $^{21}\text{Na}+p$. The ^{21}Na beam with a mean energy of 4.00 MeV/u was separated by the CNS radioactive ion beam separator(CRIB) and bombarded a thick(CH_2)n target. The energy spectra of recoiled protons were measured at scattering angles of $\theta_{\text{cm}} \approx 172^\circ$ and 146° , respectively. A new state at 7.06 MeV has been observed clearly and another new one at 7.28 MeV is tentatively identified due to its low statistics. The roton resonant parameters were deduced from an R-matrix analysis of the differential cross section data. The astrophysical resonant reaction rate for the $^{18}\text{Ne}(\alpha, p)^{21}\text{Na}$ reaction has been estimated, and it is about five times larger than that assumed before.

关键词 [nuclear astrophysics](#) [reaction rate](#) [nuclear structure and property](#)

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