

B3

NUCLEAR SPECTROSCOPY IN  $^{27}\text{Si}$

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The  $^{24}\text{Mg}(\alpha, n\gamma)^{27}\text{Si}$  reaction at bombarding energies of  $E_\alpha = 15.50$  and  $16.35$  MeV was used to populate levels in  $^{27}\text{Si}$  up to an excitation energy of  $5.3$  MeV.

Gamma-rays were detected with two large-volume Ge(Li) counters at  $9$  cm from the target.

Outgoing neutrons were detected at  $0^\circ$  to the beam direction and at  $1.5$  m from the target in a  $18$  cm diam. x  $5$  cm long NE213 liquid scintillator in coincidence with  $\gamma$ -rays.

From angular correlation measurements spin values of  $11/2$  and  $9/2$  were determined for the  $4.44$  and  $2.91$  MeV levels, respectively.

The measurements further yield accurate excitation energies,  $\gamma$ -ray branching ratios and mixing ratios.

B4

SPIN AND PARITY ASSIGNMENTS OF BOUND STATES IN  $^{27}\text{Al}$

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Gamma-ray angular distribution measurements at eight low-lying resonances ( $E_p < 1$  MeV) in the  $^{26}\text{Mg}(p, \gamma)^{27}\text{Al}$  reaction have been used to obtain unambiguous  $J^\pi$  assignments for the levels in  $^{27}\text{Al}$  at  $E_x(\text{MeV}) = 3.96(3/2^+)$ ,  $4.05(1/2^-)$ ,  $5.15(3/2^-)$ ,  $5.25(5/2^+)$ ,  $5.44(5/2)$ ,  $6.16(3/2^-)$ ,  $6.99(3/2^-)$ ,  $7.23(9/2^-)$  and  $7.47(7/2)$ , in addition to  $J^\pi$  restrictions for nine other levels.

By using high proton beam currents ( $\approx 100$   $\mu\text{A}$ ) and big Ge(Li) detectors (up to  $120$  cm)  $\gamma$ -ray spectra were obtained with unusually good statistics which showed many new weak transitions in the decay of both resonances and bound states. The angular distributions of these transitions proved of decisive help for the  $J^\pi$  assignments.

The  $4.05$  and  $5.15$  MeV states were known to have  $1p$  hole character. The present work has shown that they have the expected order, with the  $1/2^-$  state lowest.