The structure of ^{8}B through measurement of ^{7}Be+p scattering

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We have measured ^{7}Be+p elastic and inelastic scattering cross sections at the Holifield Radioactive Ion Beam Facility (HRIBF) at ORNL. Beams of isotopically pure ^{7}Be bombarded thin (100 μg/cm^2) polypropylene targets; scattered protons were detected in an array of silicon strip detectors. Cross sections were measured at 17 bombarding energies ranging from E_{cm}=0.5 to 3.4 MeV. The data at each energy were normalized using ^{7}Be+Au elastic scattering from a combined target of polypropylene and gold.

The ^{1}H(^{7}Be,p')^{7}Be* reaction populating the 429-keV ($1/2^-$) first-excited state in ^{7}Be was distinguished from elastic scattering by kinematics and was clearly observed for $E_{cm} > 1$ MeV. This is the first measurement of ^{7}Be+p inelastic scattering and the measured excitation function shows clear evidence for a new positive parity state in ^{8}B. A multi-level R-matrix analysis of the combined elastic and inelastic scattering cross sections was performed and properties of levels in ^{8}B were determined. Results will be presented and compared to previous results from elastic scattering [1, 2] and theoretical expectations from both the shell model [3] and microscopic cluster models [4]. Differential cross sections for ^{7}Be+^{12}C elastic scattering were also determined and will be presented in comparison to optical model calculations.

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