

The investigation of quasi-free scattering reactions with the two-proton-halo nucleus ^{17}Ne

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Reactions of the Borromean two-proton-halo nucleus ^{17}Ne have been measured in complete kinematics at the R3B/LAND setup at GSI in Darmstadt. The experimental method is based on exclusive measurements of one-proton-removal reactions. Polyethylene (CH_2) and carbon (C) were used as targets. Thus it is possible to reconstruct the pure hydrogen (H) contribution of the CH_2 data by subtracting the carbon background. The resulting events are clean quasi-free-scattering (p,2p) reactions showing the typical angular correlations known from p-p scattering. Thereby quasi-free (p,2p) and carbon-induced one-proton removal reactions have been studied separately and are compared with each other showing the quasi-free-scattering reactions to be a clean tool for nuclear-structure studies.

The s^2 - and d^2 -configuration in the ground state wave function of ^{17}Ne is determined with two independent analysis methods for both targets, the C-target and the reconstructed H-target. The first analysis method is based on the invariant mass technique, while the second one is based on the analysis of the transverse momentum distributions. The results obtained using quasi-free scattering reactions are compared to the results from carbon induced reactions.

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