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Study of the neutron-rich nucleus $^{6}\mathrm{H}$ in electron scattering experiment at MAMI-A1

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The neutron-rich isotopes of hydrogen, such as ^{6}H and ^{7}H, are good platforms for the study of NN interactions in neutron-rich environments because they have the largest neutron-to-proton ratios known so far. However, the experimental and theoretical studies of them are still limited. For ^{6}H, the energy of its ground state is still controversial. It is about 2.7 MeV (above the ^{3}H+3n threshold) in some experiments but about 6.6 MeV in others. The actual location of the ^{6}H ground state remains an open problem in theoretical work as well.

To solve this puzzle, ^{6}H is studied for the first time in an electron scattering experiment with the reaction $^{7}\mathrm{Li}(\mathrm{e},\mathrm{e}'\mathrm{p}\pi^{+})^{6}\mathrm{H}$ at MAMI-A1. The 855 MeV electron beam of the Mainzer Microtron (MAMI) is used to hit a ^{7}Li target. The scattered electron, the produced proton, and π^{+} are measured with high resolution and accuracy by the three-spectrometer setup in the A1 hall. With the triple timing coincidence and momentum measurements of three spectrometers, the missing mass spectrum of ^{6}H can be obtained. In this talk, we will present the principle experiment, the experimental setup, and data analysis, including corrections and calibrations of the data. Our measurement of the ^{6}H ground state energy will be shown and compared with previous measurements and theoretical expectations.

session

I. Nuclear Structure and Reactions

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