Observation of new decay channels in ^{11}Li(p, n) reaction

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We focused on the study of exotic nuclei through giant resonances in the spin-isospin channel, exploring connections to shell structure, the origin of elements, basic symmetries, and pion condensation. We expanded previous studies[1,2] on exotic nuclei into an unexplored region along the neutron dripline, revealing highly exotic nuclei resembling the neutron-rich interior of a neutron star. Our recent experiment, SAMURAI30, investigated the ^{11}Li(p, n) reaction at 181 MeV/nucleon using the missing-mass technique. This study marked the first exploration of giant resonance in a drip-line nucleus, specifically focusing on the Gamow-Teller (GT) giant resonance.[3]

The experimental setup included the PANDORA neutron spectrometer[4] (with neutron-gamma discrimination capability), the SAMURAI spectrometer,[5] and a thick, 10 mm liquid hydrogen target, as reported in our previous reports.[6] This configuration enabled us to study the excitation energy range up to 40 MeV, resulting in the successful identification of several new decay channels. The B(GT) strengths distribution was successfully extracted, and comparisons with known results from beta-decay studies are currently being undertaken.

The large acceptance of the SAMURAI spectrometer enabled the coverage of all possible decay channels, resulting in the identification of seven for the first time. Figure 1 depicts the decay channels from ^{11}Be, along with their respective decay threshold energies.

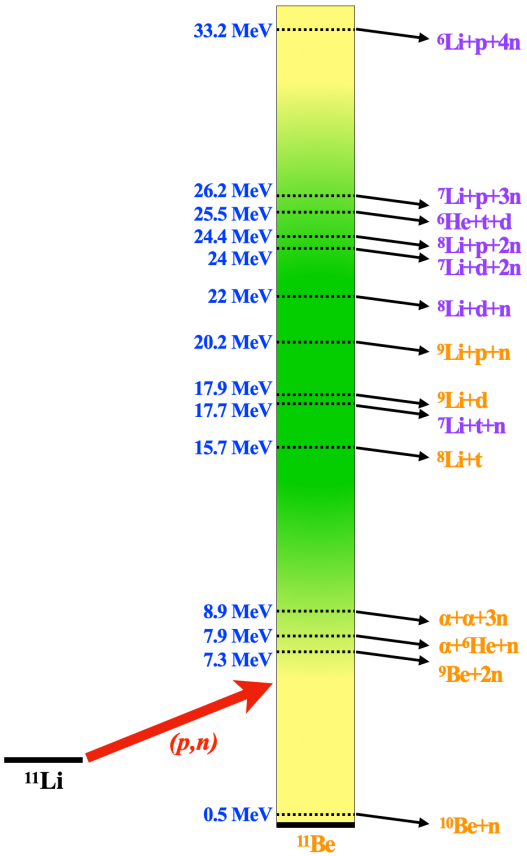

Fig. 1. Decay scheme of ^{11}Be with a list of all identified decay channels; newly identified decay channels are highlighted in magenta.

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