

Triton decay channels from the $^{11}\text{Li}(p, n)^{11}\text{Be}$ reaction

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In the SAMURAI-30 experiment, we measured the $^{11}\text{Li}(p, n)^{11}\text{Be}$ reaction at 181 MeV/nucleon using the missing mass technique.¹⁻³⁾ Notably, whether a new phenomenon related to its dineutron property appears in its spin-isospin responses is of compelling interest.

The experimental setup included the PANDORA neutron detector array,⁴⁾ SAMURAI large-acceptance dipole magnet,⁵⁾ and a 45°-rotated 10-mm-thick liquid hydrogen target, as described in detail in another report.⁶⁾ Recoil neutrons were detected in the laboratory angular range of 47°–134° on both sides of the target. Setting the magnetic field of SAMURAI to 2.75 T, the trajectories, energy loss, and time-of-flight at the focal plane of the directed reaction residues to the 24-bar heavy-ion detector HODF were measured. In total, we identified 15 decay channels of ^{11}Be , including seven previously established modes observed in β -decay studies.⁷⁾

Figure 1 displays two of the observed decay channels: $^8\text{Li} + t$ and $^7\text{Li} + t + n$, with decay threshold energies of 15.7 MeV and 17.7 MeV, respectively. These channels were distinguished by selecting coincidences between ^8Li and t , and between ^7Li and t , using HODF. The analysis included background subtraction

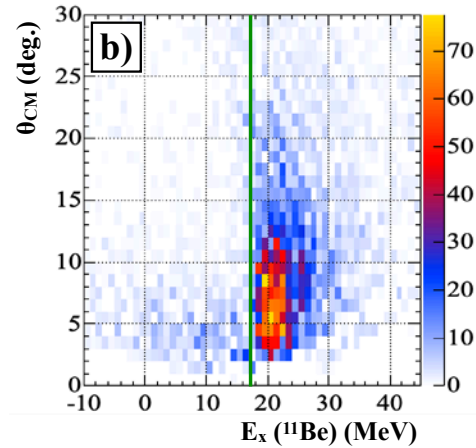
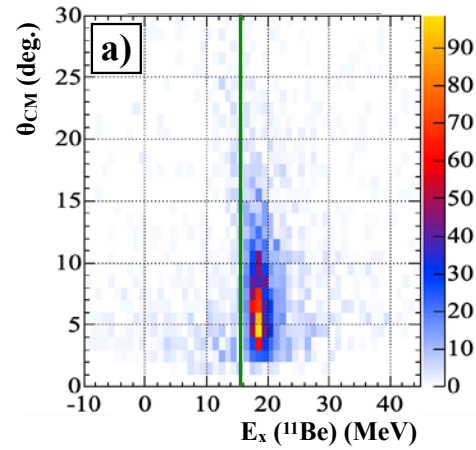


Fig. 1. Excitation energy as a function of center-of-mass angle for (a) $^8\text{Li} + t$ and (b) $^7\text{Li} + t + n$ decay channels. The vertical lines indicate threshold energies.

and corrections for the efficiency and geometrical acceptance of both the PANDORA and HODF detector systems.

In both cases, we observe a clear forward-peaking kinematic correlation between the scattering angle and excitation energy. This was confirmed through a completed multipole decomposition analysis, of the differential cross-section spectra, indicating that Gamow-Teller (GT) transitions occur in these two channels. The $B(\text{GT})$ strengths extracted from the double-

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differential cross-section data indicated that the ${}^7\text{Li} + t + n$ channel is approximately 1.5 times stronger than the ${}^8\text{Li} + t$ channel.

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