

# Halo Structure of $^{11}\text{Li}$ and Its Effect on the (p,t) Reaction

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The exotic nucleus  $^{11}\text{Li}$  with its two-neutron halo structure and so-called Borromean property is an object of considerable interest. The two valence neutrons are very weakly bound, and removal of one causes the remaining system to decay almost immediately, hence the Borromean designation, which refers to the well-known emblem of an ancient family. Clearly a two-neutron transfer reaction, such as  $^{11}\text{Li}(p,t)^9\text{Li}$ , promises to reveal interesting properties of the system. The short lifetime of  $^{11}\text{Li}$  required Tanihata *et al.* [1] to perform the experiment, which will be discussed as an example, in inverse kinematics at an incident energy of 3 MeV/nucleon. The experimental results of the  $^{11}\text{Li}(p,t)^9\text{Li}$  reaction and theoretical interpretations [1,2] will be discussed in detail. Some difficulties and uncertainties inherent to distorted-wave Born approximation analyses of two-nucleon transfer reactions will be reviewed. In addition, it will be shown that a simplistic theoretical calculation very surprisingly gives an excellent reproduction of the experimental cross section angular distribution to the ground state of the residual nucleus  $^9\text{Li}$ . This result will be used to investigate which of the properties of  $^{11}\text{Li}$  put a stamp on the features of the cross section angular distribution, on the one hand, and some other properties to which very little sensitivity is offered. Further future theoretical developments which need to be explored will be suggested.

## References

- [1] I. Tanihata *et al.*, *Phys. Rev. Lett.* **100** (2008) 192502.
- [2] G. Potel, F. Barranco, E. Vigezzi, and R. A. Broglia, *Phys. Rev. Lett.* **105** (2010) 172502.