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Consistent description of sequential and simultaneous contributions to the 11Li(p,t)9Li transfer reaction within a full three-body model

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A considerable amount of current lively research is devoted to the study of neutron Borromean nuclei, very intriguing exotic systems characterized by a diffuse two-neutron density distribution extending far beyond a compact core. Among them, the nucleus ^{11}Li deserves special attention, owing to the intensive theoretical and experimental work dedicated to this system in the last decades.

The marked three-body structure of ^{11}Li renders three-body models particularly suitable to study its ground state and continuum properties. These models have also been very useful for the interpretation of reactions involving ^{11}Li. One of these models has been recently proposed and successfully applied to the analysis of one-neutron transfer [J.˜Casal {\it et al.}, PLB767 (2017) 307] and quasi-free (p,pn) reactions [M.˜Gomez-Ramos {\it et al.}, PLB 772 (2017) 115]. A key issue of this model is the inclusion of the ^{9}Li spin, which leads to a splitting of the $J^\pi = 1^+, 2^+$ resonances and $J^\pi = 1^-, 2^-$ virtual states.

In this contribution, we employ this model to reanalyze the two-neutron transfer data for ^{11}Li(p,t)^{9}Li at 3 MeV/u [I. Tanihata {\it et al.}, PRL 100, 192502 (2008)]. We use the second order DWBA method, and include both sequential and simultaneous contributions. For the former, the required $\langle ^{11}\mathrm{Li}|^{10}\mathrm{Li}\rangle$ overlaps are consistently evaluated from the three-body wave function of ^{11}Li. Our results will be compared with those obtained with previous analyses ignoring the spin of ^{9}Li.

Topic

Theory

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