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New results on ^{13}C structure from α+^{9}Be low energy reactions

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Accurate studies on ^{13}C spectroscopy have great impact in the present understanding of the role played by extra-neutrons in stabilizing α-cluster structures formed in light nuclei. ^{13}C excited states are in fact the simplest systems that can be formed by adding a neutron to a triple-α molecular-like structure, and their spectroscopic properties are therefore a unique benchmark for theoretical cluster models aiming at describing light nuclei.
To investigate such aspects, we performed a comprehensive R-matrix fit of α+^{9}Be elastic and inelastic scattering data in the energy range E$\simeq$ 3.5 −10 MeV at several angles. To carefully determine the partial decay widths of states above the α decay threshold we included in the fit procedure also ^{9}Be$(\alpha, n_0)^{12}$C$_{gs}$ and ^{9}Be$(\alpha, n_1)^{12}$C$_{4.44}$ cross section data taken from the literature. This analysis allows to improve the (poorly known) spectroscopy of excited states in ^{13}C in the E$_x$ $\simeq$12-17 MeV region, and tentatively suggests the presence of a large-deformation negative-parity molecular band.

Selected session

Nuclear structure and dynamics

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