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Resonant breakup of 19-C on a proton target

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The reaction theory is a key tool to interpret experimental measurements and extract nuclear structure information. Traditional direct scattering formalisms developed to the stability line are inadequate to describe the scattering of stable from halo nuclei. With the delivery of high precision data at the future FAIR facility it is timely to have tight control of the theoretical reaction theory.

When describing the scattering of halo nuclei from a stable target it is crucial to handle its few-body character. In addition, it is necessary to treat in equal footing all opening channels (elastic, inelastic, transfer and breakup) in equal footing. Recently a great deal of theoretical effort has being made in developing few-body multiple scattering reaction frameworks.

As a working problem example, we consider the resonant breakup scattering of ^{19}C on a proton target at 70 MeV/u that was measured and analyzed using microscopic DWBA [1]. This analysis was found to be compatible with a transition from a ground $2s_{\frac{1}{2}}$ to an excited E_x=1.46 MeV (E_{rel}=0.9 MeV) $1d_{\frac{5}{2}}$ although a detailed reproduction of the data was not achieved. In this work we reanalyze this reaction making use of the microscopic few-body Faddeev/AGS [2,3], CDCC [4] and macroscopic DWBA collective formalisms.

We aim to pin down the relevant physics that need to be incorporated in the reaction mechanism in order to extract meaningful and accurate information from the data.

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Primary author: Prof. CRESPO, Raquel (Instituto Superior Tecnico)

Co-authors: Prof. FONSECA, Antonio (Centro de F\'{\i}sica Nuclear, Universidade de Lisboa, Av.\ Prof.\ Gama Pinto 2, 1649-003 Lisboa, Portugal); Dr MORO, Antonio (Departamento de FAMN, Universidad de Sevilla, Aptdo 1065, E-41080 Sevilla, Spain); Dr DELTUVA, Arnouldas (Centro de F\'{\i}sica Nuclear, Universidade de Lisboa, Av.\

Prof.\ Gama Pinto 2, 1649-003 Lisboa, Portugal); Prof. CRAVO, Edgar (Centro de F\'{\i}sica Nuclear, Universidade de Lisboa, Av.\ Prof.\ Gama Pinto 2, 1649-003 Lisboa, Portugal); Dr RODRIGUEZ-GALLARDO, Manuela (Departamento de FAMN, Universidad de Sevilla, Aptdo 1065, E-41080 Sevilla, Spain)

Presenter: Prof. CRESPO, Raquel (Instituto Superior Tecnico)

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