Contribution ID: **241** Type: **Oral contribution**

New developments for the modeling of double charge-exchange reactions

Monday 27 June 2022 17:10 (20 minutes)

Charge-exchange reactions offer the possibility to explore the features of the isospin and spin-isospin channels of the nuclear interaction and associated nuclear structure properties. For instance, they have been recently exploited to measure, in inverse kinematics, the spin-isospin response of neutron drip-line nuclei, such as in the case of the 6He(p,n)6Li reaction, and to scrutinize, via the double charge exchange reaction 4He(8He,alpha alpha)4n, the nature of the tetraneutron system. Owing to the analogies between the vertices of the strong and weak interactions in the isospin and spin-isospin channels, charge-exchange reactions are often investigated also to deduce information on nuclear transition matrix elements (NME) relevant for beta decay. In particular, double charge exchange reactions could allow one to probe NME similar to the ones involved in neutrino-less double beta decay.
In this contribution we discuss new developments related to the theoretical description of double charge exchange (DCE) reactions. The latter are modeled by a sequential meson-exchange, corresponding to a double single charge exchange (DSCE) reaction mechanism [1]. The crucial role of the ion-ion elastic interactions, in the entrance and exit channels, is discussed. This allows one to single out reaction and structure components from the DCE reaction cross section, with the possibility to extract projectile and target DCE NMEs [2].
As a first application, calculations are performed for the reaction 40Ca(18O,18Ne)40Ar and results are compared to the data measured at LNS-Catania and published by the NUMEN Collaboration (see Refs. in [1]). The possible role of short range n-n correlations, which could correlate the two single charge changing processes yielding the DCE, is also discussed [3].
References:
[1] J.I.Bellone et al., Phys. Lett. 807, 135528 (2020).
[2] H.Lenske, J.I.Bellone, M. Colonna, D.Gambacurta, Universe 7, 98 (2021).
[3] H.Lenske, M.Cavallaro, F.Cappuzzello, M.Colonna, Progr. in Part. and Nucl. Phys. 109, 103716 (2019).

Topic

Theory

Authors: Dr COLONNA, Maria; BELLONE, Jessica; GAMBACURTA, Danilo; LENSKE, Horst (Justus-Liebig-Universitaet Giessen)

Presenter: Dr COLONNA, Maria

Session Classification: MON4