Abstract ID : **29**

Probing two-body charge-exchange transition densities with heavy ion reactions

Content

Second-order processes provide a crucial touchstone to test our understanding of the underlying physics mechanisms and of our hierarchically-conceived conceptual modelling of phenomena related to nuclear structure and transitions. In this contribution, collisional heavy ion double charge exchange (DCE) reactions, induced by second order nucleon-nucleon interactions, are shown to provide access to the two-body transition densities (2BTD) of the complementary DCE transitions in the interacting nuclei. Corresponding two-body operators are introduced, treating the second order distorted wave reaction amplitude in the s-channel interaction form. The theoretical results are applied to the reaction ^{18}O + ^{76}Se $\longrightarrow$ ^{18}Ne + ^{76}Ge at T_{lab} = 270 MeV, being ^{76}Ge a candidate for neutrino–less double beta decay. The 2BTDs of the interacting nuclei are evaluated adopting the HF+BCS+QRPA scheme, employing different Skyrme interactions. These investigations open the way for possible future comparisons between the predictions of different structure models for 2BTDs and to probe their impact on the DCE reaction cross section.

References:
1) J.I.Bellone, M.Colonna, D.Gambacurta and H.Lenske, Modeling Double Charge Exchange processes occurring in Heavy Ion Reactions, EPJ Web of Conferences 292, 05002 (2024).
2) H.Lenske, J.I.Bellone, M.Colonna, D.Gambacurta, Nuclear Matrix Elements for Heavy Ion Sequential Double Charge Exchange Reactions, Universe 2021, 7(4), 98.

Primary authors: BELLONE, Jessica Ilaria (Università di Catania); COLONNA, Maria (Istituto Nazionale di Fisica Nucleare); GAMBACURTA, Danilo (Istituto Nazionale di Fisica Nucleare); LENSKE, Horst

Presenter: COLONNA, Maria (Istituto Nazionale di Fisica Nucleare)

Status: SUBMITTED

Submitted by **COLONNA, Maria** on **Wednesday, 12 March 2025**