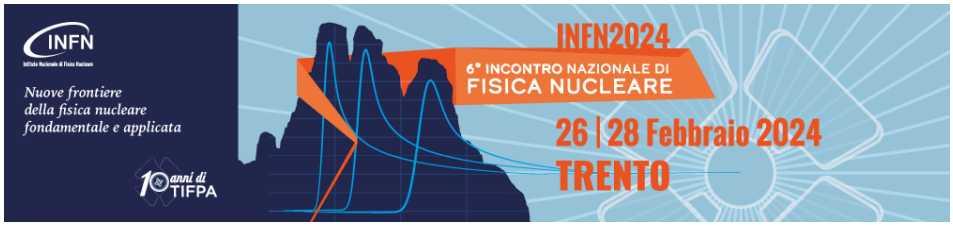

ID contributo: **77** Tipo: **Oral**

Multi-channel analysis of the $^{18}O + ^{48}Ti$ reaction at 275 MeV within the NUMEN project

martedì 27 febbraio 2024 11:50 (20 minuti)

In the last years, double charge exchange (DCE) nuclear reactions have gained an increasing interest due to their close analogies to neutrinoless double beta ($0\nu\beta\beta$) decay [1]. On this ground, the NUMEN project [2] proposed an innovative method to deduce data-driven information on the nuclear transition matrix elements for the candidate isotopes to $0\nu\beta\beta$ decay by measuring DCE cross sections. In this context, the $^{18}O + ^{48}Ti$ collision at 275 MeV incident energy was studied for the first time, with ^{48}Ti being the daughter nucleus of ^{48}Ca in the $0\nu\beta\beta$ process [3]. The measurements were performed at the INFN - Laboratori Nazionali del Sud in Catania, using the MAGNEX magnetic spectrometer [4]. A full understanding of DCE reactions is a complex task since different reaction mechanisms contribute to the measured DCE cross section. For this reason, a multi-channel approach is adopted, where DCE reactions are investigated not as stand-alone processes, but as a part of a network of nuclear transitions which includes elastic and inelastic scattering, one- and two-nucleon transfer reactions, and single charge exchange reactions [1,5]. The study of elastic and inelastic scattering gives access to the optical potential and nuclear deformations, respectively, which are key ingredients for the theoretical description of all the reaction channels [6]. The analysis of one-nucleon transfer reactions is fundamental to understand the degree of competition between the DCE process and successive nucleon transfer reactions, as well as to probe single-particle configurations in the nuclear many-body wave functions [7,8]. In this contribution, the status of the multi-channel study of the $^{18}O + ^{48}Ti$ system will be presented.

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Classifica Sessioni: Nuclear Structure and Reactions I