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A global approach in the 18O+48Ti reaction within the NUMEN project

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Nowadays, the search for neutrino-less double beta ($0\nu\beta\beta$) decay continues with undiminished interest since it is a prominent tool for probing the absolute neutrino mass scale. However, this task is hampered by our limited knowledge of the nuclear matrix elements (NMEs) for such an exotic process. In this respect, a seminal experimental campaign has been initiated at the Istituto Nazionale di Fisica Nucleare –Laboratori Nazionali del Sud (INFN-LNS) in Catania under the NUMEN and NURE projects [1,2], aiming to provide data-driven information on the NMEs for various $0\nu\beta\beta$ decay target candidates, through the study of heavy-ion induced double charge exchange (DCE) reactions. In this sense, the ^{48}Ti nucleus is of great interest since it is the daughter nucleus of ^{48}Ca in the $0\nu\beta\beta$ decay. However, in order to obtain meaningful information on the NMEs of $0\nu\beta\beta$ decay, the study of DCE reactions in conjunction with other competing nuclear reaction channels like one- and/or two-nucleon transfer is imperative. Understanding the degree of competition between successive nucleon transfer and DCE reactions is crucial for the description of the meson exchange mechanism. Furthermore, elastic scattering measurements are necessary for determining the nucleus-nucleus potential which is the starting point for the theoretical description of all the reaction channels mentioned above. Into this context, a global study for the ^{18}O+^{48}Ti collision was performed by measuring the complete net of the available reaction network. Angular distribution measurements for the reaction ejectiles were performed at the MAGNEX facility [4] of INFN-LNS in Catania. This contribution provides an overview of the analysis of elastic and inelastic scattering [5], one-nucleon [6] and two-nucleon transfer reactions, while preliminary results on the analysis of the DCE reaction will be also presented.

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