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Recent results on heavy-ion induced reactions of interest for neutrinoless double beta decay at INFN-LNS

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Researches on neutrinoless double beta decay have crucial implications on particle physics, cosmology and fundamental physics. It is likely the most promising process to access the absolute neutrino mass scale. To determine quantitative information from the possible measurement of the $0\nu\beta\beta$ decay half-lives, the knowledge of the Nuclear Matrix Elements (NME) involved in such transitions is mandatory. The use heavy-ion induced double charge exchange (DCE) reactions as tools towards the determination of information on the NME is one of the goals of the NUMEN and the NURE projects. The basic point is that there are a number of similarities between the two processes, mainly that the initial and final state wave functions are the same and the transition operators are similar, including in both cases a superposition of Fermi, Gamow-Teller and rank-two tensor components.

The availability of the MAGNEX magnetic spectrometer for high resolution measurements of the very suppressed DCE reaction channels is essential to obtain high resolution energy spectra and accurate cross sections at very forward angles including zero degree. The measurement of the competing multi-nucleon transfer processes allows to study their contribution and constrain the theoretical calculations.

An experimental campaign is ongoing at INFN-Laboratori Nazionali del Sud (Italy) to explore medium-heavy ion induced reactions on target of interest for $0\nu\beta\beta$ decay.

Recent results obtained by the $(^{20}\text{Ne},^{20}\text{O})$ DCE reaction and competing channels, measured for the first time using a $^{20}\text{Ne}^{10+}$ cyclotron beam at 15 AMeV will be presented at the conference.

Primary author: CAVALLARO, Manuela (INFN -LNS)

Presenter: CAVALLARO, Manuela (INFN -LNS)

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