Contribution ID: **69** Type: **Oral Presentation**

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

Wednesday, May 29, 2019 3:45 PM (30 minutes)

In order to get quantitative information on neutrino absolute mass scale from the possible measurement of the 0νββ decay half-lives, the knowledge of the Nuclear Matrix Elements (NME) involved in such transitions is mandatory. In addition, NME are important also to compare limits on half-lives made with different isotopes, which is a crucial information to design present and future experiments for 0νββ decay. The use heavy-ion induced double charge exchange (DCE) reactions as a tool to extract information on the NME is one of the goals of the NUMEN [1] project in Italy. 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 [2].
The availability of the MAGNEX magnetic spectrometer [3] 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 0νββ decay.
Recent preliminary results from the (^{20}Ne,^{20}O) DCE reaction and competing channels, measured for the first time using a ^{20}Ne cyclotron beam at 15 MeV/u, on ^{116}Cd, ^{130}Te and ^{20}Ge targets will be presented at the Conference.

[1] F.Cappuzzello et al., Eur. Phys. J. A 54:72 (2018)
[2] F.Cappuzzello et al., Eur. Phys. J. A 51:145 (2015)
[3] F.Cappuzzello et al., Eur. Phys J. A 52:167 (2016)

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Session Classification: Session (Chair: F. Danevych)