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## Transfer reaction channels for the system 180 + 116Sn under NUMEN project

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The current work is a part of the NUMEN project [1] which aims to deduce the nuclear matrix elements (NME) by an innovative technique of measuring the cross section using heavy ions induced Double Charge Exchange (DCE) reactions. In particular DCE are processes characterized by the transfer of two units of the isospin component, leaving the mass number unchanged. Earlier such studies were not possible because of the lack of zero-degree data and the poor yields in the measured energy spectra and angular distributions and importantly due to the very low cross sections involved. The initiative experiment at INFN-LNS for the 40Ca(18O,18Ne)40Ar reaction [2] at 270 MeV proved lucrative in giving the quantitative information about NME. The pivotal facet of the project is the use of the MAGNEX large acceptance magnetic spectrometer [3], for the detection of the ejectiles, and of the LNS K800 Superconducting Cyclotron (CS), for the acceleration of the required high resolution and low emittance heavy-ion beams, already in operation at INFN Laboratory Nazionali del Sud in Catania (Italy). In the lieu of the [2] experiment which showed that DCE cross sections factorization reasonably holds for the crucial  $0+ \rightarrow 0+$  transition and searching the same NME under NUMEN mission, an experiment using 18O beam on medium-mass range target 116Sn at energy 15MeV/A were performed at very forward angles  $0^{\circ} < \theta lab < 10^{\circ}$ . Here in the current work we present the 1n-transfer 116Sn(18O,17O)117Sn, 2n-transfer 116Sn(18O,16O)118Sn and 1p-transfer 116Sn(18O,19F)115In processes at the above mentioned energy for forward angles  $4^{\circ} < \theta lab < 12^{\circ}$ . These correspond to the complete net of transfer reactions for the system 18O + 116Sn, that is important to measure in order to understand the importance of the two-step channels on the direct DCE mechanism.

The detailed aspects about the data analysis will be presented in the conference.

References:

[1] F. Cappuzzello et al., J. Phys.: Conf. Ser. 420, 012061 (2013)

[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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