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The 116Cd(20Ne,20O) 116Sn reaction at 15 AMeV within the NUMEN project

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The knowledge of Nuclear Matrix Elements (NME), that enter in the expression of the half-life of the neutrinoless double beta decay (0νββ), is a key aspect for the evaluation of the average neutrino mass from these measurements. Relevant information on the NME can be obtained by measuring the cross sections of double charge exchange nuclear reactions (DCE), since the initial and final state wave functions in the two processes are the same and the transition operators are similar.
In order to deeply investigate the HI-DCE reactions involving nuclei of interest for 0νββ decay the NUMEN project [1] has started an experimental campaign at the INFN-Laboratori Nazionali del Sud in Catania using the MAGNEX large acceptance magnetic spectrometer [2]. The reactions of interest represent an important experimental challenge since they are characterized by very low cross-sections and require a high energy resolution to distinguish the transitions in the region of the ground state. Both constraints are guaranteed by the use of the MAGNEX spectrometer, a tool with high performance and flexibility.
In particular, the (20Ne,20O) DCE reaction was measured for the first time using a 20Ne10+ cyclotron beam at 15 AMeV on a 116 Cd target at forward angles. Energy spectra and absolute cross sections were measured with an energy resolution of about 800 keV, enough to identify the transitions of interest. Moreover, the concurrent measurements of the other reactions channels (two-proton transfer, two-neutron transfer and single charge exchange) were also performed.
The status of the data analysis and first experimental results will be presented at the Conference.

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