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Theoretical modelling of Heavy Ion Double Charge Exchange reactions and calculations for the NUMEN project

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Heavy ion double charge exchange (HIDCE) nuclear reactions represent an alternative tool to gain information on the Nuclear Matrix Elements (NMEs) of double beta decay processes. This talk focuses on the formalism developed for describing HIDCE nuclear reactions in terms of sequential meson-exchange, i.e. as a sequence of two Single Charge Exchange transitions (DSCE). The DSCE cross section is calculated within the second order Distorted Wave Born Approximation (DWBA). The nuclear states populated in the intermediate channel are treated within the Closure Approximation. Reduction schemes for the DSCE transition form factors are also discussed in order to get a separate expression for projectile and target NMEs within the cross section expression. It has been proved that the latter can be related to the NMEs describing $2\nu\beta\beta$ decay. Calculations are compared to the data measured at LNS by the NUMEN Collaboration.

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