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## Reaction Approach to Nuclear Matrix Elements of Lepton Number Violating Processes

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The search for lepton number violating (LNV) processes are of central interest as signatures for physics beyond the standard model. Nuclear neutrinoless double beta decay (DBD) is a prominent case of active current research as the expected low-energy limit of more general, yet to be identified and explored phenomena. Heavy ion Majorana double charge exchange (MDCE) reactions, proceeding by virtual  $(\pi^+, \pi^-)/(\pi^-, \pi^+)$  processes are well suited to study independently DBD-type nuclear matrix elements. The NUMEN project at LNS Catania is dedicated to systematic measurements of MDCE transitions, thus narrowing a persistent source of uncertainties on the determination of the desired Majorana mass of neutrinos, once confirmed DBD data will be available.

Direct access to LNV beyond the static limit of nuclear DBD could be obtained by lepton-induced double charge exchange (LDCC) reactions on nuclei. LDCC reactions are second order charged current processes. An in principle feasible case is  $A(Z)(e^-, e^+)B(Z-2)$  reactions. The reaction relies on the transformation of the intermediate electron-neutrino into an anti-neutrino, either by the Majorana mechanism or due to higher dimensional LNV operators. Theoretical aspects of these hitherto never considered reactions and first estimates of cross sections are discussed.

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