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## Probing Nuclear Beta-Decay by Heavy Ion Charge Exchange Reactions

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In a new theoretical approach, it is shown that heavy ion charge exchange reactions are appropriate for probing nuclear response functions of the same type as encountered in single and double beta decay. In particular, a special class of nuclear double charge exchange (DCE) reactions proceeding as a one-step reaction through a two-body process are shown to involve nuclear matrix elements of the same diagrammatic structure as in  $0\nu 2\beta$  decay. These correlated DCE reactions must be distinguished from second order DCE reactions which are characterized the best as sequential double single charge exchange (dSCE) carrying a close resemblance to  $2\nu 2\beta$  decay. Our results suggest that ion-ion DCE reactions are the ideal testing grounds under well-defined dynamical conditions for investigations of double-beta decay nuclear matrix elements.

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