

Neutron deficient exotic nuclei and the Physics of the "proton rich side" of the nuclear chart



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Gamow-Teller Resonances in the beta decay and Charge-Exchange Reactions

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Gamow-Teller (GT) transitions are caused by the most common weak interaction of spin-isospin ($\sigma\tau$) type with $L = 0$. Since spin and isospin are unique quantum numbers in nuclei, GT transitions represent very important nuclear response. GT transitions are studied by the β decay and charge-exchange (CE) reactions. The β decay has a direct access to the absolute GT transition strengths $B(\text{GT})$ from a study of half-lives, Q -values and branching ratios, but it can only access states at excitation energies lower than the decay Q -value. In contrast, the CE reactions, e.g. $(^3\text{He}, t)$ reaction, at intermediate beam energies and 0° , can selectively excite GT states up to high excitation energies in the final nucleus.

Although the study of GT strength in the β decay is restricted by the decay Q -value, unstable nuclei can have the Q -value of 12 MeV or larger, which, in principle allows the study of the central part of the GTR where the GT strength is concentrated. Possibility of observing GTR structures in β -decay studies will be discussed on the basis of the GTR studies by $(^3\text{He}, t)$ reactions assuming a good isospin symmetry of nuclear structure and transitions.

Summary

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