

High-Resolution Study of Gamow-Teller Transitions

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It is usually said that one order change in quantity will bring a change in quality. This was exactly what happened in the research field of Gamow-Teller (GT) Transitions using charge-exchange reactions at intermediate incident energies ($E_{\text{in}} > 100$ MeV/nucleon). High-resolution (${}^3\text{He}, t$) reactions at Osaka achieved an energy resolution of 30 keV. This resolution was about one-order better compared to the resolutions in (p, n) reactions that were well used for the study of the so-called GT giant resonances. The high resolution started to bring qualitative changes in what we can see.

GT transitions have been and will be studied for a wide variety of target nuclei. We discuss new observations such as the isospin symmetry and isospin asymmetry in nuclei, newly observed fine structures of GT strength in medium-heavy nuclei, width of states, selection rules related to isospin excitations, and GT transition strengths of astrophysical interest.