

SEARCH FOR DOUBLE GAMOW-TELLER GIANT RESONANCE VIA HEAVY-ION DOUBLE CHARGE EXCHANGE REACTION

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Double Gamow-Teller (DGT) transitions are driven by a double spin-isospin operator, $\sigma\sigma\tau$. In spite of several experimental efforts, the data on the DGT transition is very scarce. At present, only $2\nu\beta\beta$ decays are the experimentally confirmed DGT transition. However, the $2\nu\beta\beta$ decays account a quite small portion of a total DGT strengths. In 1980s, it was proposed the existence of the collective mode, a double Gamow-Teller giant resonance (DGTGR), which exhausts a major part of the DGT strengths at higher excitation energies in granddaughter nuclei. The DGTGR have been kept yet-to-be-discovered. Observations of the missing DGT strengths will lead us to a mature understanding of double spin-isospin responses in nuclei.

We have started an experimental program to search for the DGTGR with a new probe. The probe is the heavy-ion double charge exchange ($^{12}\text{C}, ^{12}\text{Be}(0^+_2)$) reaction. The reaction has remarkable points that populate DGTGRs efficiently and enable a clear event identification. We performed the first ($^{12}\text{C}, ^{12}\text{Be}(0^+_2)$) reaction experiment by using a 100 MeV/nucleon ^{12}C beam at Research Center for Nuclear Physics, Osaka University. We used a ^{48}Ca enriched target and obtained an excitation energy spectrum in ^{48}Ti . A peak that is a candidate of the DGTGR was found in the experiment.

We will report results from our first experiments and discuss the candidate of the DGTGR found in the excitation energy spectrum in ^{48}Ti .