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Study of Gamow Teller strength from ^{132}Sn via the inverse kinematics (p,n) reaction

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The Gamow-Teller (GT) transition is one of the basic excitation modes in nuclei. In medium or heavier mass region, the collectivity in this mode exhibits the GT giant resonance (GTGR), which gives information critically important for understanding the isovector part of effective nucleon-nucleon interaction[1]. Experimentally, charge-exchange (CE) reactions at intermediate energies have been used to extract the GT transition strength. Recently, the GT transitions from unstable nuclei can be studied by the development of a new experimental technique of CE (p,n) measurements in inverse kinematics[2].
We performed the measurement of the ^{132}Sn(p,n) reaction at 220 MeV/u in inverse kinematics at RIBF in order to extract GT transitions strength from the key doubly-magic nuclei ^{132}Sn. This is an essential step for establishing comprehensive theoretical models for nuclei situated in between ^{78}Ni and ^{208}Pb.
The experiment was carried out by using the Wide-angle Inverse-kinematics Neutron Detectors for SHARAQ (WINDS)[3] and the large acceptance SAMURAI spectrometer[4]. A secondary beam of ^{132}Sn was transported onto a 10-mm thick liquid hydrogen target, which was surrounded by WINDS to detect recoil neutrons. From the measured neutron time-of-flight and recoil angle, the excitation energy and center-of-mass scattering angle were determined. SAMURAI was used for tagging (p,n) reaction events with the particle identification of the outgoing heavy residues. Owing to the large momentum acceptance of SAMURAI, we can measure all the heavy fragments with different rigidities in one setting. It allows us to reconstruct the excitation energy spectrum up to high excitation energy including the GTGR. The details of experimental setup and experimental results will be presented in this talk. We also discuss the GT strength distribution on ^{132}Sn.

Reference
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