TOWARDS THE FIRST OBSERVATION OF ISOSCALR GIANT MONOPOLE RESONANCES IN UNSTABLE TIN ISOTOPES WITH CNS ACTIVE TARGET

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Isoscalar Giant Monopole Resonance (ISGMR) is of particular interest since it provides the information on the equation of state (EOS) of nuclear matter, which plays an important role in understanding the collective motion of nucleus, supernova explosion, neutron skin thickness and the sizes of the neutron stars. The measurements of ISGMRs in isotopic chain provide the asymmetry term $K\tau$ in incompressibility of finite nuclei (K_A), which is strongly correlated with the asymmetry term of the EOS of infinite nuclear matter. The $K\tau$ of -550±100 MeV is recently given by T. Li et al. [1,2] and D. Patel et al. [3] via the measurement of the ISGMRs in stable even-mass tin isotopes and cadmium isotopes. A relatively large uncertainty still remains in the extracted value, mainly originating from the error associated with quadratic fitting. In the present study, we are aiming at determining ISGMR strength distribution in doubly-magic ^{132}Sn and to obtain K_A for the most neutron-rich system measured so far. To achieve this goal, we have developed an active target system, called CNS Active Tartget (CAT).
The CAT consists of time projection chamber (TPC) and Si detector array and measures the trajectories of both beam and target-like recoil particles at the same time. This TPC is operated with 0.4-atm deuterium gas to have a sensitivity to recoil particles having 300-keV total kinetic energy, which corresponds to the scattering at around two degrees in the center-of-mass region for the excitation energy of 15 MeV. High-intensity heavy-ion beam injection up to 500-kHz has been achieved by using dual-gain thick gas electron multiplier, in which the gains for beam and recoil regions can be optimized, respectively [4]. Pilot experiment of deuteron inelastic scattering off ^{14}O was performed at HIMAC synchrotron accelerator facility in Chiba. A ^{14}O beam bombarded the CAT at the intensity of around 30 particles per pulse (ppp). The trajectory of recoil was measured successfully with the one of beam at the same time. The measurement of ISGMR in ^{132}Xe was performed at the same facility. A 115-MeV/u ^{132}Xe beam bombarded the CAT at the intensity of 1Mppp. Although a number of delta rays have been detected together with the recoil particle, those tracks can be discriminated from the track of recoil using charge information and the trajectory of recoil particle can be reconstructed.
In the present paper, we would like to introduce the CAT, which is a key device for the measurement of ISGMR in unstable nuclei, present the preliminary results for ^{14}O and ^{132}Xe, and talk about the experimental plan for the measurement of ISGMR in ^{132}Sn.

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