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Nuclear structure study for the neutron-rich cadmium nuclei beyond 132Sn

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Nuclear structure study for exotic nuclei far away the stability is one of major topics in today's nuclear physics research. In particular, the neutron-rich nuclei beyond 132Sn provide a pivot region to explore the exotic nuclear structure because 132Sn is doubly magic and locates far away the stability. In this region, two phenomena in nuclear structure have attracted much attention in recent years: the persistence of N=82 shell gap in the nuclei locating at the south of 132Sn and neutron dominance nature in the 2+ excitation in Te and Sn beyond N=82.

To address these two questions, neutron-rich cadmium isotopes are critical. For N=82 shell gap, mass measurement and spectroscopic studies show contradictory results for 130Cd (Z=48,N=82). While a reduced N=82 shell gap is deduced from the mass measurements on 130,131Cd, spectroscopic study suggests a good N=82 shell closure because the first 2+ state 130Cd is comparable to other N=82 isotones. For the neutron dominance nature, the first 2+ state in 132Cd (Z=48,N=84) is essential to investigate on the role of neutron in low-lying excitation in more neutron-rich system.

Aiming at investigating the exotic nuclear structure beyond 132Sn, we have measured reduced transition possibility B(E2) for the semi-magic nucleus 130Cd and 2+ state in 132Cd at the RI Beam Factory. Coulomb excitation at around 160MeV/u was applied to obtain the B(E2) value in 130Cd and the two-proton removal reaction was used to produce the 2+ state in 132Cd. Gamma rays emitted from the excited states were measured via the DALI2 spectrometer. In the presentation, the newly obtained BE2 value and 2+ state for 130Cd and 132Cd, respectively, will be discussed and experimental details will be given.

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