Research Center for Nuclear Physics, Osaka University

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Title Study of Superdeformed Bands and High-Spin Level Structures in A~40 Nuclei by Using Stable and Unstable Nuclear Beams

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Place Lecture room, 4th floor, RCNP, Osaka University

Abstract

Nuclear superdeformation is a unique testing ground for the shell structure at extreme deformation. Since the observation of the superdeformed (SD) rotational band in 152Dy, SD bands have been investigated at high-spin states in various mass regions by in-beam gamma-ray spectroscopy using Ge detector arrays such as Gammasphere and Euroball, and they were found in A=60, 80, 130, 150, and 190 region. Observed SD bands in specific mass regions indicate the presences of SD shell structures. In the light mass region, SD states were investigated along the N=Z line and a new 'island' of SD nuclei was found around A \sim 40 nuclei (i.e. 36Ar, 40Ca, and 44Ti). Presences of these SD bands indicate the SD shell gaps at N=Z=18, 20, and 22. To clarify the SD shell structures in neutron-rich side, high-spin states in 40Ar were investigated, where SD bands associated with asymmetric combination of SD magic numbers, Z=18 and N=22 are expected. To extend the high-spin studies to more neutron-rich nuclei, fusion-evaporation reactions of RI beam were employed and high-spin level structures of neutron-rich Ti isotopes were investigated.

In the talk, recent experimental results of the SD band in 40Ar and high-spin level structures in $A \sim 40$ by using stable and unstable nuclear beams will be presented.