Nuclear Moment Measurements of Neutron-rich Aluminum Isotopes Using Spin-polarized RI Beams: Determination of the Boundary of the "Island of Inversion"

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Nuclear moments (a magnetic moment and an electric quadrupole moment) directly reflect the nuclear wave function. The measurement, therefore, often plays a decisive role to reveal the nuclear structure such as spin. In particular, nuclear moment studies in the neutron-rich *sd*-shell region have played an important role to understand the shell structures of the strongly deformed nuclei observed in the region of Z=10-12 and N=20-22, so-called the "island of inversion" [4]. The nuclear moments of ^{30}Na and ^{31}Na [1,2] and the magnetic moment of ^{31}Mg [3] provide clear evidence that the intruder configurations in which some neutrons occupy the *pf* orbits via the neutron excitations across the N=20 shell gap dominate these ground states. It is interesting to investigate the mixing of the *pf*-intruder configuration in the ^{32}Al (Z=13, N=19) ground state, which is the neighbor of ^{31}Mg, because, according to recent shell model studies, the transition process between the normal *sd*-shell and the intruder structures *gradually* occurs as the neutron to proton ratio N/Z increases. In this talk, focusing on the electric quadrupole moments of ^{32}Al which has been measured to be $|Q(^{32}\mathrm{Al}_{\mathrm{g.s.}})|$=24(3) mb with the precise μ-moment, the possibility of the *pf* intrusion of the ^{32}Al nucleus will be discussed with interest in the location of the boundary of the island of inversion.

References
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