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Exploring the shell structure in very neutron rich pfg-shell nuclei through the γ-ray spectroscopy technique

NORI AOI, RIKEN

Rearrangement of the shell structure is one of the prominent features of neutron rich nuclei clarified in the light mass region, such as disappearance of magicity at N=8 and 20, or appearance of a new magic number of N=16. A similar phenomenon is anticipated in the heavier mass pfg-shell region. For example, a new magic number of N=34 is predicted in the neutron rich region [1], while a new region of large deformation is suggested around neutron rich chromium isotopes with $N \sim$40 [2]. The behavior of the magicity at Z=28 and N=50 in the nuclei around the doubly magic nucleus ^{78}Ni is of extreme importance from the point of view of both nuclear structure and nuclear astrophysics, but is far from clear yet. Aiming to investigate these intriguing subjects, experimental and theoretical effort has been made by several groups in the past few years, and some clues begin to be obtained. In the present paper, recent results on the structure study of neutron rich pfg-shell nuclei will be presented with the emphasis on the experiments using gamma-ray spectroscopy technique. The perspective on the experiments to be performed in the upcoming next generation RI beam facilities will also be discussed.

Reference:

1. M. Honma et al., Phys. Rev. C65, 061301(R)(2002).
2. O. Sorlin et al., Eur. Phys. J. A 16, 55-61 (2003).