Contribution ID: **29** Type: **Presentation**

Continuum and pairing effects for rotational excitations in neutron rich nuclei

Thursday, 3 April 2008 17:20 (20 minutes)

We discuss the unique role of pairing correlations for low-lying rotational excitations in neutron rich Be, Mg and Cr isotopes. Appearance of di-neutron correlation due to the neutron skin and continuum effects, and its influence on the moment of inertia are investigated. We also point out the necessity of the isospin density dependence in the pairing effective force; the usual isoscalar density dependence is inappropriate for describing the collective phenomena in neutron rich nuclei.

At first, we discuss the puzzle of the E2 properties in neutron rich Be isotopes; the energy of the first 2+ state in 14Be is lower than that in 12Be while its deformation length is shorter. We calculate the moments of inertia by the cranking formula based on the coordinate space Hartree-Fock-Bogoliubov formalism. The mixed type density dependent contact force is used for the pairing channel. By an appropriate choice of the deformation parameters of the Woods-Saxon potential in the p-h channel, both the deformation lengths and the 2+ excitation energies can be well reproduced. This is because the neutron pairing correlation is weakened by the large neutron deformed shell gap at N=10. As a result, the moment of inertia in 14Be becomes larger in spite of the smaller quadrupole deformation.

We extensively investigated the pairing effect for the first 2+ states in neutron rich Mg and Cr isotopes. We show that the di-neutron correlation appears if the pairing force has the strong density dependence such as the surface pairing. The nature of the neutron pairing strongly reflects the systematic trend of the 2+ energies. We also point out that the usual isoscalar density dependence in the pairing force is inappropriate for describing the collective phenomena in neutron rich nuclei. With the isospin density dependence for the surface pairing force, the 2+ energies shift upward at the neutron drip line while the di-neutron properties remain unchanged. Therefore we conclude that the systematic information of the rotational 2+ states can be utilized to explore the unique role played by the pairing correlation in neutron rich nuclei.

Primary author: Dr YAMAGAMI, Masayuki (RIKEN Nishina Center)

Co-author: Prof. SHIMIZU, Yoshifumi (Kyushu University)

Presenter: Dr YAMAGAMI, Masayuki (RIKEN Nishina Center)

Session Classification: Collectivities and Shell effects in neutron/proton-rich nuclei

Track Classification: Collectivities and shell effects in neutron/proton-rich nuclei