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Study of the nuetron rich nuclei via heavy-ion double charge exchange reaction

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We are proposing a new powerful probe of heavy-ion double charge exchange (HIDCX) reaction, the (18O,18Ne) reaction, for the study of neutron rich nuclei. Ground states of 18O and 18Ne are among the same super-multiplet and the transition between them is just double spin-isospin flips keeping the spatial wavefunction unchanged. One can expect the transition is simple and its transition amplitude is large.

As a first step to establish the HIDCX reaction, 12Be and 9He nuclei were studied vai the 12C(18O,18Ne)12Be and 9Be(18O,18Ne)9He reactions at 80 MeV/nucleon. The nucleus 12Be is one of the symbolic nucleus evidencing disappearance of N=8 magicity. Spin-parities for low-lying states in 12Be are well understood. The nucleus 9He is, however, unbound and its spin-parities have not certainly been determined. Thus, by making use of shape of angular distribution of the differential cross section in 12Be, we may make a new assignment of spin-parities in 9He.

We performed the HIDCX experiment at the RCNP, Osaka University. The high resolution spectrometer Grand Raiden provide us to detect 18Ne particles which were well isolated from other isotopes. This is due to its unique A/Q value of 9/5. In the 12Be spectrum, three peaks were observed and show different angular distribution shapes, indicating different spin-parities. In the 9He spectrum, however, we did not observe any peaks. In the presentation, I will report the detail of the experiment and the result.

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