Contribution ID: **50** Type: **Contributed talk**

Single particle structures of 19C and 23O

Thursday, 11 June 2015 15:40 (20 minutes)

Nuclear structure in the vicinity of neutron drip line offers a unique opportunity to study underlining residual nuclear interactions by isolating specific, rarely investigated parts of them, such as the three-nucleon forces and the neutron pairing interaction for shallow binding orbits. In this work single particle structures of near drip-line 19C and 23O nuclei, as probed via one-neutron knockout on 20C [1] and 24O [2], respectively, are discussed. Experiments were performed at the RIKEN RIBF laboratory by using the setups for invariant mass spectroscopy (SAMURAI for 19C and RIPS for 23O) involving detection of neutrons, decay in flight. Very sharp neuron resonances were observed at E_x=~0.6 and 2.78(11) MeV for 19C and 23O, respectively, which exhibit a clear d-wave character in their longitudinal momentum distributions of the cross section. These states were formerly reported in studies of multi-nucleon knockout reactions [3,4]. Since the ground state Jπ of these nuclei is 1/2+, the energies characterize the respective ν1s1/2-ν0d5/2 shell gaps. The presentation will focus on the following observations: (i) the decreasing trend of the gap from Oxygen to Carbon at N=13 approximately follows that of N=11 and 9, (ii) the ordering of the 1/2+ and 5/2+ states in 19C is not correctly predicted by the presently available ab initio shell-model calculation, which takes into account the three-body forces from the chiral effective-field theory [5], (iii) there is a strong correlation between the shell-gap and the one-neutron separation energy in these nuclei.

[1] J.W.Hwang et al., ARIS2014 proceedings, and in preparation.
[2] K.Tshoo et al., Phys. Lett. B739 (2014) 19.
[3] M.Thoennessen et al., Nucl. Phys. A912 (2013) 1.
[4] A.Schiller et al., Phys. Rev. Lett. 99 (2007) 112501.
[5] G.R.Jansen et al., Phys. Rev. Lett. 113 (2014) 142502.

Primary author: Dr SATOU, Yoshiteru (Seoul National University)

Co-authors: SAMURAI DAYONE, DayOne collaboration (LPC-Caen, Tokyo Tech, RIKEN, Tohoku Univ., Rikkyo Univ., Kyoto Univ., TU-Darmstadt, GANIL, GSI, University of York, IPN-Orsay); Mr HWANG, Jongwon (Seoul National University); Ms KIM, Sunji (Seoul National University)

Presenter: Dr SATOU, Yoshiteru (Seoul National University)

Session Classification: Nuclear structure far from stability 4

Track Classification: Nuclear structure far from stability