Contribution ID: **66** Type: **Contributed Oral/Poster**

γ-spectroscopy of neutron-rich ^{79}Cu through proton knock-out

Monday, 11 July 2016 16:10 (15 minutes)

Nuclear shell structure is evolving when going into more and more exotic regions. As a consequence, the classical magic numbers, derived from the shell-model in agreement with the experimental knowledge, can be different far from stability. We here discuss about neutron-rich copper isotopes beyond ^{78}Ni. Different experiments have been performed in the region of ^{78}Ni at RIKEN, in Japan. During the EURICA campaign where many half-lives have been measured, suggesting ^{78}Ni to be indeed doubly magic [1]. However, in copper isotopes above $N = 40$, a monopole drift has been seen in the past [2,3], leading to the question whether the $Z = 28$ shell gap weakens or not when adding neutrons beyond $N = 40$. It has been recently observed that this gap is not reduced in ^{71}Cu ($N = 42$) [4]. Further experiments have been performed recently and are analysed at the moment in order to complete the chain of copper isotopes.

We shall present the latest results from an experiment leading to selective population of hole states in ^{79}Cu ($N = 50$), through the ^{80}Zn(p,2p)^{79}Cu knock-out reaction, carried out at RIKEN by the SEASTAR collaboration. A ^{238}U beam, with an energy of 345 MeV/nucleon and an intensity of 15 pnA, was sent on a ^{9}Be target, creating a cocktail of radioactive isotopes. These isotopes went through the BigRIPS spectrometer, for identification and selection, and reached the liquid-hydrogen target MINOS, where the knock-out reactions took place. The isotopes produced went through the ZeroDegree spectrometer for identification. The DALI2 scintillator array was surrounding MINOS for γ-ray detection. γ-γ coincidences permitted to build the first level scheme of ^{79}Cu, with levels up to 4 MeV. Interpretation of this scheme is ongoing, and shell-model calculations are currently being performed by the nuclear theory group of the University of Tokyo.

[1] Z. Y. Xu et al., PRL 113, 032505 (2014)

[2] S. Franchoo et al., PRL 81, 3100 (1998)

[3] K. Flanagan et al., PRL 103, 142501 (2009)

[4] P. Morfouace et al., Physics Letters B 751 (2015) 306-310

Primary authors: Dr OBERTELLI, Alexandre (CEA Saclay); OLIVIER, Louis (IPN Orsay); Dr NIIKURA, Megumi (University of Tokyo); Dr DOORNENBAL, Pieter (RIKEN); Dr FRANCHOO, Serge (IPN Orsay)

Presenter: OLIVIER, Louis (IPN Orsay)

Track Classification: Shell evolution through direct reactions - Spectroscopy of nuclear levels and nuclear shapes through direct reactions