Contribution ID: **37** Type: **Presentation**

Structure of the heaviest Boron and Carbon isotopes 18,19B, 21,22C

Tuesday, 1 July 2014 11:00 (25 minutes)

The investigation of neutron-rich dripline nuclei, including in particular those exhibiting haloes, is a central theme of present day nuclear structure physics. These studies have, however, been limited for the most part to the He, Li and Be isotopes. With the advent of the RIKEN RIBF and intense energetic beams of 48Ca, the way is now open to explore the structure of heavier neutron dripline nuclei.
Here we describe investigations of the structure of the two heaviest candidate two-neutron halo systems, 19B and 22C, and the associated unbound sub-systems 18B and 21C, the level schemes of which are critical to the defining the 17B-n and 20C-n interactions for three-body models. In addition to being of direct importance to halo physics, 18,19B and 21,22C span the N=14 and 16 sub-shells closures below doubly magic 22,24O and are thus of considerable interest in terms of shell evolution far from stability.

The measurements that will be described were carried out as part of the first phase of experiments employing the SAMURAI spectrometer and the NEBULA neutron array. Following a brief introduction to the setup and the analysis techniques, results for the invariant mass spectroscopy of 18B and 21C will be presented. In particular, those obtained using single and two-proton knockout -C(19C/20N,17B+n) and C(22N/23O,20C+n) - will be compared and contrasted with those derived from neutron knockout from 19B and 22C. The first results for the 17B+n and 20C+n transverse momentum distributions following neutron knockout will also be presented and conclusions drawn regarding the orbital angular momentum of the removed neutron.

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Session Classification: Session 3

Track Classification: Prefer Presentation