Contribution ID: **47** Type: **Contributed Oral/Poster**

Single-particle structure of ^{17}C

Thursday, 14 July 2016 11:30 (15 minutes)

Xesús Pereira-Lopez1,2, Beatriz Fernández-Domínguez1, Franck Delaunay2, Nigel A. Orr2, N. Lynda Achouri2, F. Miguel Marqués2, Julien Gibelin2, Wilton Catford3, Adrien Matta3, Diego Ramos1, Manuel Caamaño1, Valèrie Lapoux4, Anna Corsi4, Matthieu Sénoville4, Marlène Assie5, Benjamin Le Crom5, Nicolas de Séréville5, Fairouz Hammache5, Yorick Blummenfeld5, Iulian Stefan5, Daisuke Suzuki5, Maria Fisichella6, Geoff Grynier7, Mihai Stanoiu8, Florin Rotaru8, Marine Vandebrouck7, Thomas Roger7, Carme Rodriguez-Tajes7,1, Sylvain Leblond2, Andrew Knapton3, Alain Gillibert4, Emanuel Pollacco4, Pierre Morfouace5, Julien Pancin7, Emmanuel Clément7, Gilles de France7, Olivier Sorlin7, Jean-Charles Thomas7, Lucia Caceres7, Omar Kamalon7, Luc Perrot5, Beyhan Bastin7, Neil Curtis9, Carl Wheldon9, Tzany Wheldon9, Robin Smith9, Joe Walshe9, Sam Bailey9.

1 Universidade de Santiago de Compostela, 15754 Santiago de Compostela, Spain.
2 LPC Caen, ENSICAEN, Université de Caen, CNRS/IN2P3, 14050 Caen, France.
3 Department of Physics, Faculty of Electronics and Physical Sciences, University of Surrey, Guildford GU2 7XH, United Kingdom.
4 IRFU, CEA-Saclay, 91191 Gif-sur-Yvette, France.
5 Institut de Physique Nucléaire, Université Paris-Sud-11-CNRS/IN2P3, 91406 Orsay, France.
6 Laboratori Nazionali del Sud, via S.Sofia 62, 95123 Catania, Italy.
7 GANIL, BP 55027, 14706 Caen Cedex 5, France.
8 IFIN-HH, P. O. Box MG-6, 76900 Bucharest-Magurele, Romania.
9 School of Physics and Astronomy, University of Birmingham, Birmingham B15 2TT, United Kingdom.

The shell structure of stable and near-stable nuclei and the associated magic numbers are key elements in nuclear structure. It has been demonstrated, however, over recent years that the traditional magic numbers evolve when nuclei far from stability are explored. For example, recent experiments [1-3], including transfer studies by the TIARA collaboration at GANIL [4-6], have provided evidence to support the existence of a shell closure at N=16 in neutron-rich neon and oxygen isotopes associated with the vanishing of the N=20 shell gap. This has been understood as arising from the effects of the monopole part of the nucleon-nucleon interaction [7,8]. However, in the neutron-rich carbon isotopes, the extent to which the gap persist at N=16 is unclear. In an effort to answer this question we have attempted to probe the low-lying level structure of ^{17}C using the ^{16}C(d,p)^{17}C transfer reaction in inverse kinematics to locate the neutron single-particle orbitals involved in the formation of the N=16 shell gap. Of particular interest is the neutron 0d3/2 orbital, the spectroscopic strength of which is expected to be carried by unbound states.

The experiment was carried out at the GANIL facility. A pure secondary beam of ^{16}C at 17.2 AmeV produced by fragmentation in the LISE3 spectrometer was used to bombard a CD2 target. The light ejectiles were detected using with the TIARA and MUST2 silicon (Si) strip arrays while a Si-Si-CsI telescope was placed at zero degrees to identify beamlike residues. In addition, four HPGe-EXOGAM clover detectors were used to measure the gamma-rays arising from ^{17}C bound excited states.

The detailed goals of the experiment, the setup, the results of the analysis and a first interpretation will be discussed in this presentation.

[1] J. R. Terry et al., Phys. Lett. B, 640, 86 (2006).
[2] Z. Elekes et al., Phys. Rev. Lett., 98, 102502 (2007).
[3] C. R. Hoffman et al., Phys. Rev. Lett., 100, 152502 (2008).
[4] W. N. Catford et al., Phys. Rev. Lett. 104, 192501 (2010).
[5] B. Fernandez-Dominguez et al, Phys. Rev. C 84, 011301 (2011).
[6] S. M. Brown et al., Phys. Rev. C 85, 011302 (2012).
[7] T. Otsuka et al., Phys. Rev. Lett. 105, 032501 (2010).
[8] T. Otsuka et al., Phys. Rev. Lett. 104, 012501 (2010).

Primary author: Mr PEREIRA-LOPEZ, Jesus (LPCCaen (France) / Universidade de Santiago de Compostela (Spain))

Co-authors: Dr FERNANDEZ-DOMINGUEZ, Beatriz (Universidade de Santiago de Compostela); Dr DELAUNEY, Franck (LPC Caen (France))

Presenter: Mr PEREIRA-LOPEZ, Jesus (LPCCaen (France) / Universidade de Santiago de Compostela (Spain))

Track Classification: Shell evolution through direct reactions