Contribution ID: **138** Type: **Oral Presentation**

Test for traditional vibrational wisdom in 110,112Cd by two proton stripping

Tuesday, 30 June 2015 10:00 (20 minutes)

Abstract content
   (Max 300 words)
Formatting &
Special chars

The cadmium nuclei have been traditionally been regarded as best examples of spherical vibrational nuclei. However, advances in nuclear spectroscopy have begun to detail the properties of these nuclei at the two and three vibrational phonon levels, casting doubts on the vibrational assumptions. In particular the properties of the excited 0+ levels are key to vibrational models.

Historically, the Cd isotopes, especially 110,112Cd [J. Kern et al., Nucl. Phys. A593, 21(1995)] have been favoured examples of near-harmonic quadrupole vibrational behaviour, with a two-phonon triplet of levels having I(pi) = 0+, 2+, 4+ at approximately twice the energy of the one-phonon(2+) state. A further quintuplet of three-phonon levels with I(pi) = 0+, 2+, 3+, 4+, 6+ is then expected close to three times the energy of the one-phonon state. This simple picture is complicated in cadmium isotopes by the presence of low-lying intruder states (caused by elevation of two protons across the z = 50 shell gap). Extensive investigations of 110,112,114Cd [P. E. Garrett et al., Phys. Rev. C 75, 054310(2007) & P. E. Garrett et al., Phys. Rev. C 78, 044307(2008)] have revealed that these nuclei, far from being “textbook” cases of near-harmonic spherical vibrators, exhibit serious disagreement with expected multi-phonon patterns of low energy excitation.

Details of the decay, candidate intruders, and branching ratios for the two- and three-phonon levels are being investigated using 108,110Pd(3He, n)110,112Cd, the two proton stripping reaction. The experimental technique involves operating AFRODITE in-coincidence with a wall containing 12 large plastic scintillators to detect the fast neutrons from direct reaction.

Apply to be
 considered for a student
   award (Yes / No)?

yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

PhD

Main supervisor (name and email)
and his / her institution

Dr Pete Jones; pete@tlabs.ac.za

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

No

Please indicate whether
this abstract may be
published online
(Yes / No)

yes

Primary author: Mr MAQABUKA, Bongani (University of the Western Cape)

Presenter: Mr MAQABUKA, Bongani (University of the Western Cape)

Session Classification: NPRP

Track Classification: Track B - Nuclear, Particle and Radiation Physics