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Evolution of nuclear shape in the light radon isotopes

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One of the remarkable properties of the nucleus is its ability to minimise its energy by adopting different deformed nuclear shapes. In some cases, this can lead to competing minima very close together. This phenomena has been widely tracked through the neutron-deficient lead, mercury and platinum isotopes, where the shape coexistence has been discussed in terms of intruder states based on proton particle-hole excitations across the Z=82 shell gap [1].

Particle-hole intruder states similar to those found in the light lead nuclei are expected to be present in nuclei above the Z=82 closure, for example 4p2h and 6p2h configurations in the polonium and radon isotopes. Such phenomena have been most extensively investigated in the light polonium nuclei, where low-lying excited 0+ states have been observed following the alpha decay of 200,202Rn [2] and the beta decay of 200,202At [3]. Energy systematics and branching ratios have been used to interpret such states as intruders, which appear to mix with the spherical ground-state configurations in isotopes lighter than 200Po [4]. Candidates have been found in 202,204Rn for deformed intruder states [5], which coexist with the spherical ground-state shape however this assignment can be no more than speculation given the absence of any detailed experimental information such as electromagnetic matrix elements.

Coulomb excitation (Coulex) with radioactive beams has shown to be a highly successful method for establishing the evolution of nuclear shape. Notable examples of this class of measurement include the Coulex of 74,76Kr at SPIRAL [7] and 70Se at REX-ISOLDE [7]. Recently a number of experiments have been performed at REX-ISOLDE studying shape coexistence in the light mercury isotopes with Coulex. These highly successful measurements have recently been extended to study shape coexistence in even heavier nuclei.

Preliminary results from our recent Coulex experiment studying shape coexistence in the light radon isotopes, 202Rn and 204Rn, will be presented.

[1] J.L. Wood et al., Phys. Rep. 215, 101 (1992)
[2] J. Wauters et al., Z. Phys. A 344, 29 (1992); Phys. Rev. Lett. 72, 1329 (1994)
[3] N. Bijnens et al., Phys. Rev. Lett, 75, 4571 (1995); Phys. Rev. C 58, 754 (1998)
[4] R. Julin, J. Phys. G 27, R109 (2001)
[5] D.J. Dobson et al., Phys. Rev. C 66, 064321 (2002)
[6] E. Clement et al., Phys.Rev. C 75, 054313 (2007)
[7] A.M. Hurst et al., Phys. Rev. Lett. 98, 072501 (2007)

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