Contribution ID: **18** Type: **Invited Presentation**

Spectroscopy of Very Heavy Elements

Saturday, 5 April 2008 09:00 (30 minutes)

A stringent test for predictive power of current nuclear structure theories is provided by the study of deformed nuclei in the region of 254No. These nuclei are the heaviest for which detailed in-beam and decay spectroscopy can be performed.

Initial in-beam measurements in the region focussed on gamma-ray spectroscopy of even-even nuclei (e.g. 252,254No, 250Fm), studying the ground-state yrast bands and allowing extraction of parameters such as the moments of inertia, and proving the deformed nature of these nuclei
[1-4]. More recently, attention has switched to odd-mass nuclei such as 253No, 251Md and 255Lr, the latter being the heaviest nucleus so far studied in-beam [5-7]. Rotational bands have been observed in all these nuclei. The success of such in-beam gamma-ray spectroscopic studies is strongly dependent on the gK value of the odd particle, as the M1/E2 branching ratio is determined
by (gK-gR/Q0). If the configuration is such that M1 transitions dominate, strong internal conversion precludes the observation of gamma-rays.

Non-yrast and K-isomeric states have recently been observed in 252,254No and 250Fm through the use of both in-beam and focal plane decay spectroscopy [8-11]. The studies employed a calorimetric technique suggested by Jones, whereby the summed energy from a cascade of conversion electrons is detected in a DSSSD detector and used as a "tag"for gamma-rays detected in the various germanium detectors [12]. These experiments have yielded data which can be used to determine the excitation energies and configurations of two-quasiparticle states in the region, and compared to the predictions of various theories.

Many challenges for in-beam spectroscopy of these heavy nuclei still lie ahead and developments of new spectrometers and associated electronics are emerging from development. Current results and future perspectives of these devices will be discussed.

An overview of the most recent results and the experimental techniques used will be presented.

Primary author: Dr JONES, Pete (University of Jyväskylä)

Presenter: Dr JONES, Pete (University of Jyväskylä)

Session Classification: Stability of Very Heavy Nuclei

Track Classification: Shell structure and stability of very heavy nuclei