

Plunger lifetime measurements of intruder bands in $^{186,188}\text{Pb}$ and ^{194}Po *

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Neutron deficient nuclei with $Z \approx 82$ and $N \approx 104$ have recently been studied by using tagging techniques [1]. Triple shape coexistence at low excitation energies has been established by means of in-beam and decay spectroscopy, but so far, only one lifetime measurement in this region has been performed [2]. Lifetime measurements in this region are extremely important since they play a key role in verifying the deformation and in understanding the mixing of the three different shapes.

We have performed a series of lifetime measurements of exotic nuclear excited states at the Accelerator Laboratory of University of Jyväskylä. Lifetimes of low-lying yrast states in $^{186,188}\text{Pb}$ and ^{194}Po have been extracted using the Recoil Distance Doppler Shift (RDDS) method. A dedicated plunger device has been provided by the University of Köln and combined with the JUROGAM germanium detector array and RITU recoil separator [3]. For the first time, the Recoil Decay Tagging (RDT) method [4] has been employed in RDDS measurements to associate prompt γ rays from weakly populated states with the nucleus of interest.

In these pioneering experiments $B(E2)$ values of yrast transitions, deformation of the yrast band and mixing amplitudes of different shapes have been experimentally determined for $^{186,188}\text{Pb}$ and ^{194}Po nuclei. The results and their interpretation will be presented.

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[1] R. Julin *et al.*, Eur. Phys. J. **A 15** (2002) 189.

[2] A. Dewald *et al.*, Phys. Rev. **C 68** (2003) 034314.

[3] M. Leino *et al.*, Nucl. Instr. Meth. **B 99** (1995) 653.

[4] E. Paul *et al.*, Phys. Rev. **C 51** (1995) 78.