

Isomeric states in neutron-rich $A \sim 110$, $Z \sim 40$ nuclei studied using RISING at GSI

Alison Bruce

University of Brighton

The calculation of prolate/oblate shape coexistence [1,2] and multi-quasiparticle states [2] in the $A \sim 110$ neutron-rich nuclei suggests the possibility of isomerism which would make the nuclei accessible as part of the RISING [3] stopped beam campaign at GSI. This region of nuclei is of additional interest given the proposal of a neutron shell closure at $N=70$ (^{110}Zr) and the suggestion that this region satisfies the criteria expected for X(5) symmetry [4]. Therefore an experiment to study ^{106}Zr and neighbouring nuclei was carried out at GSI following the projectile-fission fragmentation of a beam of ^{238}U at an energy of 750 MeV/u impinging on a ^9Be target. The recoiling nuclei were separated and identified in the Fragment Separator (FRS) and stopped in a passive stopper at the second FRS focal point. Delayed γ rays were detected in the RISING [3] array consisting of 105 HpGe crystals mounted in 15 cluster detectors. The nuclei of interest were identified by means of charge (Q) and mass-to-charge ratio (A/Q).

During this experiment the region of neutron-rich nuclei between As ($Z=33$) and Ag ($Z=47$) was mapped. The on-line analysis confirms all known isomeric states in the region. It also gives some evidence for new meta-stable states and details of these and the associated level schemes will be presented.

[1] J. Skalski *et al.*, Nucl. Phys. **A617** 282 (1997).

[2] F.R. Xu *et al.*, Phys. Rev. **C65** 021303(R) (2002).

[3] S. Pietri *et al.*, Nucl. Instr. Methods **B** (2007) in press.

[4] E.A. McCutchan *et al.*, Phys. Rev. **C69** 021303(R) (2004).