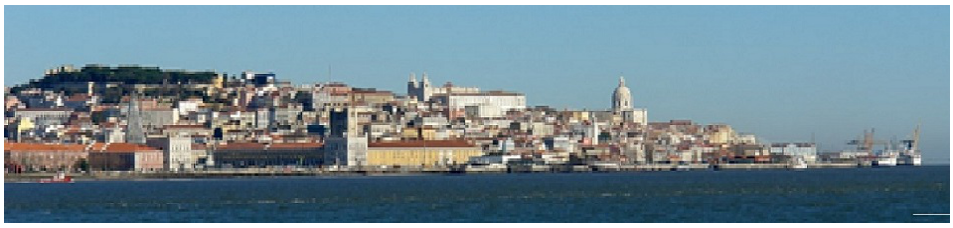

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Structure of heavy neutron-deficient nuclei near the proton drip line

The advent of highly selective radioactive correlation techniques using electromagnetic separators has extended spectroscopic investigations to heavy nuclei beyond the proton drip line. This has led to improvements in our understanding of a broad range of structural phenomena from proton radioactivity to the emergence of collective behaviour outside the N=Z=82 closed shell. However, spectroscopic studies of the most neutron-deficient nuclides remain challenging due to the rapid fall in decay half-lives and production cross sections. The observable limits for heavy nuclei that decay predominantly by ground-state proton emission may, in some cases, have already been reached using conventional techniques. Recent discoveries of high-lying isomers that have enhanced stability against proton radioactivity indicate that many open questions still remain concerning the ultimate limits to nuclear binding beyond the expected boundaries of the nuclear landscape.

Considerable progress has also been made in identifying excited states in the heavy neutron-deficient nuclei through in-beam gamma-ray spectroscopy experiments. This has allowed the variation of excited states to be extended over a broad range of nuclides and the provided some invaluable insights into the evolution of collective behaviour. Recent experiments employing fusion evaporation reactions with stable beams and targets have revealed some intriguing results that have yet to be explained such as measured ratios of reduced transition probabilities that appear to be inconsistent with collective model predictions.

This contribution provides a selective review of these themes, highlights the limitations of our current experiments and presents challenges and opportunities that might be addressed by the future EURISOL distributed facility.

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