A Novel Spectrometer for Characterising Isomeric States*

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At the Heavy-Ion Accelerator Laboratory of the Australian National University, a new recoil spectrometer module, SOLENOGAM [1], is being developed for characterisation of isomeric states at the focal plane of a compact 6.5-Tesla superconducting solenoidal fusion product separator, SOLITAIRE, [2, 3] which was designed for reaction studies. In SOLENOGAM, the fusion-evaporation residues are implanted into a catcher tape which is viewed by arrays of six Si(Li) detectors to measure conversion electrons, and up to seven Ge/LEPS detectors for γ-ray detection, both systems in close geometry for high efficiency. Transitions of interest, de-exciting short or long isomers, are selected by time-correlation techniques, facilitated by the flexible beam pulsing available with the 14UD Tandem accelerator. The distance from the target to the focal plane is only 1.8 m, shorter than at the competing devices, such as RITU [4] or the FMA [5]. Thus, the system should give access to shorter-lived isomeric states, with recoil flight times of 150 (300) ns at a recoil velocity of $v/c \sim 4\%(2\%)$.

The performance of the separator in focussing the recoils into the detection area has been studied with computer simulations, as well as in measurements of the focal-plane recoil distributions with a position sensitive multiwire proportional counter. First test measurements with γ-ray and conversion electron detection have reproduced some of the results for the nucleus ^{190}Pb [6], confirming the design concept. The first production experiments will focus on this region of light lead isotopes, which exhibit a rich variety of competing shape coexisting structures, and where the experimental data is still incomplete despite substantial efforts (see *e.g.* [6, 7, 8]). Once in full operation, the system will be available for studies of isomeric states in other mass regions.

In this contribution, the system will be introduced, its performance will be reviewed and results from the most recent measurements will be presented.

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