

Spectroscopy of the Transfermium Elements*

M. Leino

University of Jyväskylä, Department of Physics, P.O. Box 35, FIN-40351 Jyväskylä, Finland

For many years, the available experimental information on transfermium nuclei was limited mainly to basic properties of the nuclear ground state, i.e. the mass and the half-life. The situation is now changing rapidly. The first in-beam gamma spectroscopy measurements on ^{254}No at ANL, Argonne [1] and JYFL, Jyväskylä [2] and on ^{252}No at JYFL [3] provided information on the deformation of the nuclear ground state. Attempts at Jyväskylä and Argonne to extend these measurements to odd-mass systems gave meager results. To proceed towards this goal, and also to go on with the studies of the even-even nuclei, it is highly desirable to be able to measure conversion electron spectra. The first results from combining the JYFL gas-filled recoil separator RITU with the Liverpool-Jyväskylä silicon detector array SACRED [4] for recoil decay tagging experiments proved that the method works and provided complementary data on ^{254}No .

Significant progress has also been made in decay studies of the heaviest elements. New data from alpha decay fine structure studies have been determined for the elements Db, Rf, and Lr ($Z = 105-103$) using SHIP at GSI, Darmstadt [5]. For even heavier elements, alpha decay provides information on the location of nuclear shell/subshell closures [6]. Alpha decay studies can also reveal the existence of interesting isomeric states in even-even nuclei which have been observed e.g. in ^{254}No at JYFL and in $^{270}110$ at GSI [7]. Our capabilities for performing sensitive decay studies will be further improved by using devices such as the UK-funded GREAT [8] which is a new highly segmented focal plane spectrometer for alpha-, gamma-, electron- and X ray spectroscopy to be employed at RITU and possibly other recoil spectrometers in Europe.

[1] P. Reiter *et al.*, Phys. Rev. Lett **82**, 509 (1999).

[2] M. Leino *et al.*, Eur. Phys. J. A **6**, 63 (1999).

[3] R.-D. Herzberg *et al.*, to be published.

[4] P.A. Butler *et al.*, Nucl. Instrum. Meth. A **381**, 433 (1996).

[5] F.P. Heßberger *et al.*, submitted to Eur. Phys. J. A.

[6] S. Hofmann and G. Münzenberg, Rev. Mod. Phys. **72**, 733 (2000).

[7] S. Hofmann *et al.*, submitted to Eur. Phys. J. A.

[8] P.A. Butler *et al.*, XXXV Zakopane School of Physics, Zakopane, Poland, September 5-13, 2000 (submitted to Acta Phys. Polonica B).

*This work was supported by the Academy of Finland under the Finnish Centre of Excellence Programme 2000-2005 (Project No. 44875, Nuclear and Condensed Matter Physics Programme at JYFL).