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First observation of rotational bands in the nucleus ^{231}U

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D.G. Roux

Rhodes University, Department of Physics and Electronics, Grahamstown 6140, South Africa.

S.S. Ntshangase

University of Zululand, Department of Physics, Private Bag X1001, KwaDlangezwa 3886, South Africa.

R.A. Bark, E.A. Gueorguieva-Lawrie, T.S. Dinoko, P. Jones, J.J. Lawrie, L.P. Masiteng, and O. Shirinda
iThemba LABS, National Research Foundation, P. O. Box 722, Somerset West 7129, South Africa.

J.L. Easton, B.V. Kheswa, N.A. Khumalo, S.P. Noncela, and J.F. Sharpey-Schafer

University of the Western Cape, Department of Physics, Private Bag X17, Bellville 7535, South Africa.

S.N.T. Majola

Department of Physics, University of Johannesburg,

P. O. Box 524, Auckland Park 2006, South Africa. and

iThemba LABS, National Research Foundation, P. O. Box 722, Somerset West 7129, South Africa.

D. Negi

iThemba LABS, National Research Foundation, P. O. Box 722, Somerset West 7129, South Africa. and
UM-DAE Centre for Excellence in Basic Sciences, Kalina, Mumbai 400098, India.

P.C. Uwitonze

Rhodes University, Department of Physics and Electronics, Grahamstown 6140, South Africa. and

University of Rwanda, Department of Mathematics,

Sciences and Physical Education, 50 Rwamagana, Rwanda.

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The

-ray spectroscopy of uranium nuclei far from stability is compromised by large fission cross sections and competition from electron conversion. However, by using a recoil detector to discriminate against the fission background, together with the afrodite

-ray spectrometer array, we have

observed the first rotational bands in ^{231}U , to date the lightest odd uranium nucleus shown to exhibit collective structure. Excited states were populated in the $^{232}\text{Th}(,5n)$ reaction at a beam energy

of 52 MeV. The data analysis revealed three rotational bands, interpreted as the ground-state band

$[633]5=2^+$, yrast band $[752]5=2^+$, and an excited band $[631]3=2^+$. These configuration assign-

ments are supported by Cranked Shell Model calculations and the electromagnetic properties of the

bands. The excitation energy of the $[752]5=2^+$ band head is suggested to be 113.0 keV.

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Notes

Primary author: ROUX, David G. (Rhodes University)

Presenter: ROUX, David G. (Rhodes University)