ELECTRONS FROM A 0.3s ISOMER IN ^{254}No*

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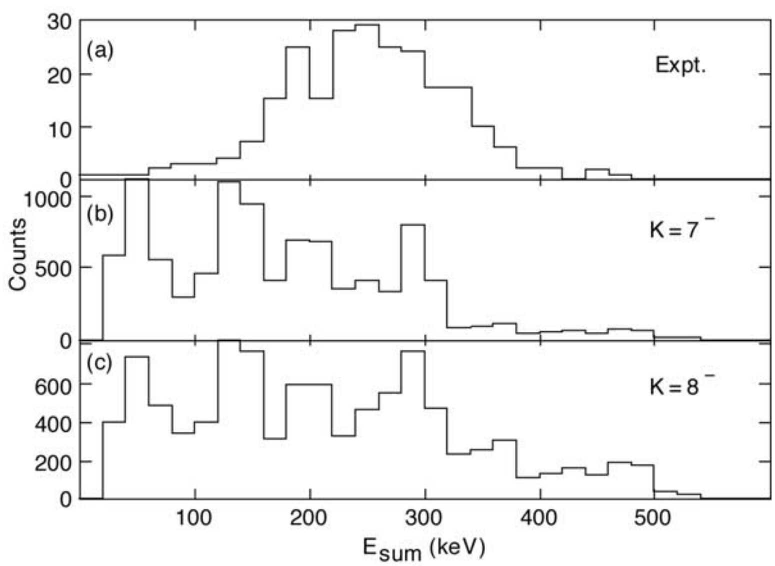
Data on pairing and single-particle energies are essential for reliable predictions of the stability of the superheavy elements. The single-particle energies constitute the basis of the shell-correction energy, which provides the essential binding energy, and pairing further lowers the ground-state energy. The energies and configurations of 2-quasiparticle high-K isomers in heavy shell-stabilized nuclei provide information on both single-particle energies and the pair gap.

High-K isomers are expected in shell-stabilized nuclei around ^{254}No because there are many high-Ω single-particle orbitals near the Fermi level. An isomer has been identified [1] in ^{254}No ($T_{1/2}$ = 0.28s), but no information on its decays exists. We have observed the electrons accompanying the decay of this isomer in an experiment where nobelium nuclides are produced with the ^{208}Pb(^{48}Ca,2*n*) reaction at ATLAS. The evaporation residues were transported and identified with the Fragment Mass Analyzer (FMA) and implanted in 1x1 mm^2 pixels of a Si double-sided strip detector. In the *same pixel* where a residue was implanted, electrons from the decay of an isomer were observed in a 1.4 s time interval, followed by α decays from the ground state of ^{254}No within a 120 s interval. (Similar results have been obtained [2] at Jyväskylä.) The source of the electrons was unambiguously characterized by: (i) identification of ^{254}No; (ii) time and spatial correlations of residue, electron and α; and (iii) the electron and α decay half-lives. Figure (a) shows the experimental electron spectrum, which represents the sum energy from transitions in the ground band following the isomer decay. (The depletion at low energy is due to electronic thresholds.) Figures (b, c) show the calculated spectra expected from isomers with either K = 7^- or 8^-, respectively, which decay to either the $6^+/8^+$ or 8^+ members of the ground band. Above 305 keV, which has a contribution from only the $8^+ \rightarrow 6^+$ transition, Fig. (b) better resembles the measured spectrum, so that the K=7^- assignment is favored, with a probable configuration $\pi\{7/2^-[514], 7/2^+[633]\}$. A search for the γ rays directly depopulating the isomer is planned.



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[1] A. Ghiorso *et al.*, Phys. Rev. C **7**, 2032 (1973).
[2] R. Herzberg *et al.*, priv. com.