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Does the Seniority Scheme Hold in the $N = 126$ Isotone ^{214}Ra?

I. Anastasov[1], **G. Rainovski**[1], **G. Georgiev**[3], **H. Mayr**[2], **V. Terziev**[1], **D. L. Balabanski**[4], **A. Blazhev**[5], **F. Browne**[6], **M. Droste**[5], **L. Gaffney**[7], **K. Gladnishki**[1], **H. Hess**[5], **D. Hristova**[1], **K. E. Ide**[2], **H. Kleis**[5], **D. Kocheva**[1], **L. Kodinov**[1], **Th. Kröll**[2], **A. Kuşoğlu**[4], **S. Meyer**[1], **C. M. Nickel**[2], **N. Pietralla**[2], **Zs. Podolyák**[8], **C. Porzio**[9], **P. Rahkila**[10,11], **P. Reiter**[5], **M. Scheck**[12], **T. Stetz**[2], **A. E. Stuchbery**[13], **S. Thiel**[5], **C. Unsworth**[14], **E. Uusikylä**[10,11], **N. Warr**[5,7], **V. Werner**[2], **J. Wilson**[15], **Z. Yue**[15], and **R. Zidarova**[2]

[1]Faculty of Physics, Sofia University St. Kliment Ohridski, 1164 Sofia, Bulgaria
[2]Institute for Nuclear Physics, Technische Universität Darmstadt, 64289 Darmstadt, Germany
[3]IJCLab, IN2P3/CNRS and Université Paris-Saclay, 91405 Orsay, France
[4]ELI-NP, Măgurele 077125, Romania
[5]Institute for Nuclear Physics, Universität zu Köln, 50937 Köln, Germany
[6]School of Physics and Astronomy, The University of Manchester, Manchester M13 9PL, UK
[7]Department of Physics, Oliver Lodge Laboratory, University of Liverpool, Liverpool L69 7ZE, UK
[8]University of Surrey, Guildford, Surrey GU2 7XH, UK
[9]CERN, 1211 Geneva 23, Switzerland
[10]University of Jyväskylä, Department of Physics, FI-40014 Jyväskylä, Finland
[11]Helsinki Institute of Physics, University of Helsinki, P.O. Box 64, FI-00014 Helsinki, Finland
[12]School of Engineering and Computing, University of the West of Scotland, Paisley PA1 2BE, UK
[13]Department of Nuclear Physics, The Australian National University, Canberra ACT 2600, Australia
[14]STFC Daresbury Laboratory, Daresbury, Warrington WA4 4AD, UK
[15]School of Physics, Engineering and Technology, University of York, Heslington, York YO10 5DD, UK

Abstract

The nuclear shell model, combined with pairing correlations, offers a straightforward explanation of the low-energy spectra of semi-magic nuclei. In a single high-j orbital with more than two particles, low-lying $J > 0$ states arise from the recoupling of unpaired nucleons and form multiplets labelled by the seniority ν, the number of unpaired particles. The generalized seniority scheme is essentially a truncated shell-model description [1]. To test how well this picture holds near the $N = 126$ shell closure, a safe Coulomb-excitation experiment with ^{214}Ra was performed. A post-accelerated ^{214}Ra beam impinged on a ^{120}Sn

target at HIE-ISOLDE, and the resulting γ rays were measured with the Miniball detector [2]. The main goal is to extract the $B(E2; 2_1^+ \rightarrow 0_1^+)$ transition strength and compare it with shell-model predictions and the systematics of neighbouring $N = 126$ isotones. With the data taking complete and the analysis in progress, the current status and preliminary $B(E2)$ values will be presented. The final result will test whether the low-lying states of ^{214}Ra are dominated by a simple $\pi(1h_{9/2})^2$ configuration and will provide constraints on shell-model interactions in this region.

References

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