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K-isomeric states in heavy, well-deformed nuclei within a microscopic framework with selfconsistent blocking and consistent pairing

L. Bonneau[1], **P. Quentin**[2,3,1], **N. Minkov**[4], **D. Ivanova**[5], **J. Bartel, H. Molique**[6], **Meng Hock Koh**[7,8]

[1]CENBG, UMR 5797, Université de Bordeaux, CNRS-IN2P3, Gradignan, France
[2]Division of Nuclear Physics, Advanced Institute of Materials Science, Ton Duc Thang University, Ho Chi Minh City, Vietnam
[3]Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam
[4]INRNE, BAS, Tzarigradsko Chaussee 72, 1784 Sofia, Bulgaria
[5]Military Medical Academy; UMHAT “Saint Ekaterina”, Sofia, Bulgaria
[6]IPHC, UMR 7178, Université de Strasbourg, CNRS-IN2P3, Strasbourg, France
[7]Department of Physics, Faculty of Sciences, UTM, Johor Bahru, Malaysia
[8]UTM Center for Industrial and Applied Mathematics, UTM, Johor Bahru, Malaysia

Abstract

K-isomeric states of well-deformed heavy nuclei are known to yield important information about nuclear dynamics involving at the same time collective and single-particle degrees of freedom. Studying them offers an opportunity to assess properties of nuclear mean field and residual interaction. From the point of view of collective degrees-of-freedom K isomers can provide information about the nuclear shapes that can favor appearance of such isomeric states and that determine binding energy and electromagnetic decays from these states.

In this presentation I will report on recent microscopic calculations of K-isomeric states of multiquasiparticle character in well-deformed rare-earth nuclei and actinide nuclei. In these calculations we employ a Skyrme energy-density functional together with a seniority residual interaction in the Hartree-Fock-BCS approximation with selfconsistent blocking (see Refs. [1, 2]). The strength of the seniority force is calibrated in a consistent way: as shown in [3] for rare-earth nuclei, the same strength can be obtained in a fit on moments of inertia of even-even nuclei and in a fit on odd-even mass staggering. The former fitting protocol is used for the actinide nuclei studied here. Once the seniority force is adjusted we have calculated properties of various K-isomeric states without additional parameters. Overall we have obtained a reasonable agreement with available data around ^{154}Nd and in the ^{234}U-^{236}Pu region. In the latter case the effect of intrinsic parity breaking is currently under study.

References

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