NUCLEAR ELECTROMAGNETIC MOMENTS AND RADII NEAR N = 126 NEUTRON SHELL

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Charge radii of Tl, Pb and Bi isotopic chains and magnetic moments of the ground state $J^{\Pi} = 1/2 +$ (Tl^g) and $11/2-$ (Tl^m) isomeric states are calculated. The self-consistent Theory of Finite Fermi Systems (TFFS) based on the modified Energy Density Functional DF3-a by Fayans et al. is used. The calculated ground-state charge radii of Tl, Pb and Bi isotopic chains reveal distinctive kink at the N = 126 shell closure which has a similar magnitude, as in the neighboring mercury, lead and bismuth isotopic chains. For Tl isotopic chain, the experimental kink indicators $\xi = \delta < r2 > 128/126/\delta < r2 > 126/124$ [1] are described by the present calculation. Taking into account the meson exchange in the external field operator and in the effective spin dependent NN -interaction, as well as the regular effects of np-nh configurations and non-regular phonon-coupling (PC) corrections enables an improved description of the ground state magnetic moments in the long isotopic chain of thallium isotopes. Calculated magnetic moments agree fairly well with the isotopic trend and qualitatively reproduce the "asymmetric" jump at N = 126 revealed by the experiment [2]. For N = 82-126, "parabolic" N- dependence of the 11/2 - Tl m isomeric state magnetic moments and its value [1] is well reproduced without phonon-coupling (PC) corrections.

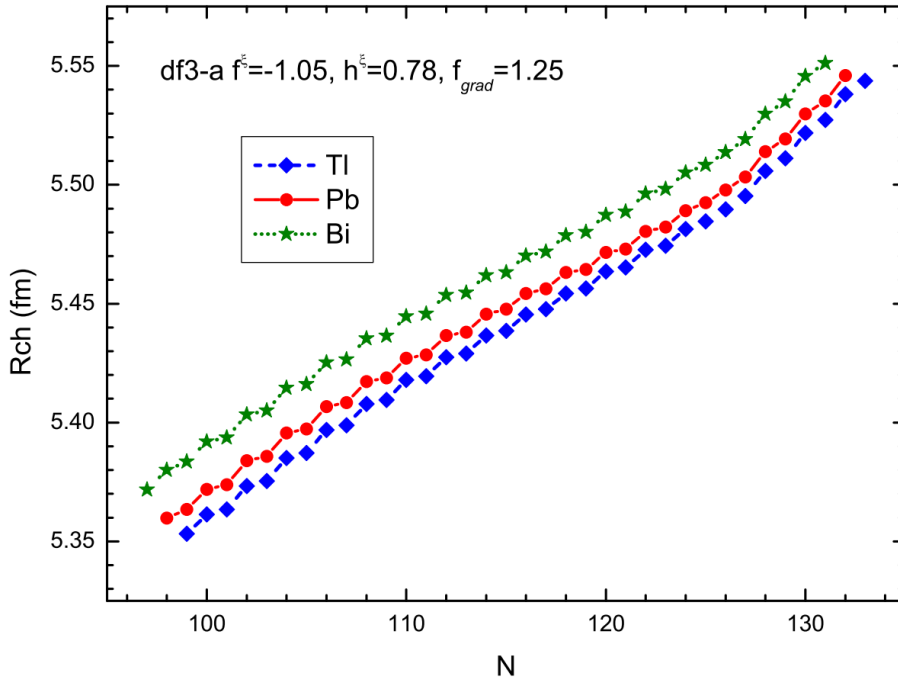Fig. The ground-state charge radii Rch of Tl, Pb and Bi isotopic chains calculated within DF3-a functional.

1. A. E. Barzakh, D. V. Fedorov, V. S. Ivanov, et.al. Phys.Rev. C 97, 014322 (2018).

2. Z. Yue, A. N. Andreyev, A. E. Barzakh , I. N. Borzov , J. G. Cubiss et.al. Physics Letters B 849, 138452 (2024).