Abstract Submitted
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Relativistic Effects on Subshell Energies for Superheavy Elements[1] AHMAD K. RAZAVI, REZVAN K. HOSSEINI, DAVID A. KEATING, STEVEN T. MANSON, Georgia State University, JOBIN JOSE, IIT-Patna, PRANAWA C. DESHMUKH, IIT-Turupati — A study of the subshell energies of the superheavy elements Z=102, 112 and 118 has been performed at the Dirac-Fock (DF) level and compared with nonrelativistic results to assess the qualitative and quantitative effects of relativistic interactions on the energies of the various subshells. The strength of these relativistic effects is of order Zα, which is not small compared to unity for these elements, especially for inner shells. As a result, the energies of the inner shells are altered substantially by relativity, by as much as about 50 keV for 1s of Z=118, as compared to nonrelativistic energies. In addition, the wave functions of the inner shells are contracted by relativity, and these contracted wave functions screen the nucleus more effectively so that the outer shells experience a smaller effective nuclear charge, which tends to expand them. Thus, the relativistic contraction of the outer shell wave functions are counterbalanced by this expansion, leading to interesting phenomenology for outer-shell energies; this has been studied earlier at much lower Z [1,2]. [1] J.-P. Desclaux and Y. K. Kim, J. Phys. B **6**, 1177 (1975); [2] B. R. Tambe and S. T. Manson, Phys. Rev. A **30**, 256 (1984).

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