Abstract Submitted
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Binding energies of ground state negative ion formation in large lanthanide atoms Ho, Er, Tm, Yb and Lu[1] ALFRED Z MSEZANE, ZINEB FELFLI, Clark Atlanta University — The robust Regge-pole methodology wherein is fully embedded the essential electron-electron correlation effects and the vital core polarization interaction has been used to explore negative ion formation in the lanthanide atoms Ho, Er, Tm, Yb and Lu through the electron elastic scattering total cross sections (TCSs) calculations. The TCSs are found to be characterized generally by Ramsauer-Townsend (R-T) minima, shape resonances and dramatically sharp resonances manifesting ground and metastable anionic formation during the collisions. The extracted ground state anionic binding energies (BEs) from the TCSs for Ho, Er, Tm, Yb and Lu are 3.51 eV, 3.53 eV, 3.36 eV, 3.49 eV and 4.09 eV, respectively. The novelty and generality of our approach is the extraction of the electron affinities (EAs) of complex heavy atoms from the anionic ground state BEs calculated through the electron TCSs. For Au and Pt atoms as well as C_{60} fullerene the BEs yielded outstanding match with the measured EAs. The investigation has been motivated by: 1) The experiment [1] searched in vain for the EA of Yb and concluded that it must be less than 3 meV; 2) For the Tm atom the measured EA value of 1.029 eV [2] agrees excellently with our anionic excited state BE of 1.02 eV. In [3] it has been concluded that theoretical calculations incorrectly identified the BEs of the metastable/excited anions with the EAs of the actinide atoms. 1. H. H. Andersen, et al., J. Phys. B **31**, 2239 (1998); 2. V.T. Davis and J.S. Thompson, Phys. Rev. A **65**, 010501 (R) (2001); 3. Z. Felfli and A. Z. Msezane, Applied Physics Research Vol. **11**, No. 1; 2019 ISSN 1916-9639 (2019)

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