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Relativistic Confinement Resonances DAVID KEATING, STEVEN MANSON, Georgia State University, PRANAWA DESHMUKH, Indian Institute of Technology-Tirupati and Indian Institute of Science Eduation and Research — Photoionization of confined atoms in a C60 fullerene have been under intense investigation in the recent years, in particular the confinement induced resonances, termed confinement resonances. The effects of the C60 potential are modeled by a static spherical well, with (in atomic units) inner radius r0 = 5.8, width Δ = 1.9, and depth U0 = -0.302, which is reasonable in the energy region well above the C60 plasmons [1]. At very high Z, relativistic interactions become important contributors to even the qualitative nature of atomic properties; this is true for confined atomic properties as well. To explore the extent of these interactions, a theoretical study of several heavy atoms has been performed using the relativistic random phase approximation (RRPA) methodology [2]. In order to determine which features in the photoionization cross section are due to relativity, calculations using the (nonrelativistic) random phase approximation with exchange method (RPAE) [3] are performed for comparison. The existence of the second subshell of the spin-orbit-split doublets can induce new confinement resonances in the total cross section, which is the sum of the spin-orbit-split doublets, due to the shift in the doublet's threshold. Several examples for confined high-Z atoms are presented. Work supported by DOE and NSF. [1] V. K. Dolmatov, Adv. Quantum. Chem. 58, 13 (2009); [2] W. R. Johnson and C. D. Lin, Phys. Rev. A 20, 964 (1979); [3] M. Ya. Amusia, Atomic Photoeffect (Plenum, NY, 1990).

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