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Relativistic convergent close-coupling calculation of the spin polarization of electrons scattered elastically from zinc and mercury[1]
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— We present spin asymmetry parameters (Sherman functions) for elastic electron scattering on zinc and mercury atoms calculated using the relativistic convergent close-coupling (RCCC) method. The Zn and Hg atoms are each modeled as two active electrons above a Dirac-Fock core. Three key features of the RCCC method are critical: (1) an em ab initio treatment of spin via the Dirac equation, (2) a unitary treatment of the scattering process, and (3) correct antisymmetrization of the total wave function. There is excellent agreement between the RCCC results and experiment for the case of Hg across a wide range of energies, and similarly there is excellent agreement between RCCC results and experiment for Zn across the range of energies where $3d^{10}$ core excitation levels do not appear. The results are relevant in light of the recent controversial claim by Williams *et al.* [Phys. Rev. A 85(2011)022701] that relativistic scattering theories do not account for spin properly during electron scattering on quasi two-electron targets such as Zn and Hg; the claim is made that a geometric "Berry" phase is required to augment fundamental scattering theories.

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