Abstract Submitted
for the SES13 Meeting of
The American Physical Society

Specificity of exchange and correlation in elastic electron scattering off semifilled shell atoms[1] VALERIY DOLMATOV, University of North Alabama, MIRON AMUSIA, Hebrew University, Israel & Ioffe Physical Technical-Institute, St.Petersburg, Russia, LARISSA CHERNYSHEVA, Ioffe Physical Technical-Institute, St.Petersburg, Russia — Atoms with multielectron semifilled shells in their ground states possess the highest spin multiplicity among other atoms. The current understanding of electron scattering off such atoms is rudimentary. Choosing e^-+Mn($3d^5 4s^2$, ^6S) elastic scattering as a case study, we scrutinize scattering phase shifts, partial, and total scattering cross sections versus the energy and spin polarization of a scattered electron. A drastic dependence of a correlation impact on electron scattering versus the spin-orientation of a scattered electron is unraveled. This, in turn, is found to be due to a specific impact of exchange interaction on correlation in the e^-+ atom system. The findings are argued to be inherent features of electron scattering off any multielectron semifilled shell atom. They result in significant differences between scattering of oppositely spin-polarized electrons off the atom. In particular, the existence of a narrow resonant maximum in the total scattering cross section of spin-down electrons near $\epsilon \approx 8$ eV but the absence of such in the cross section of spin-up electrons elastically scattered off the Mn atom is predicted. A "spin-polarized" Hartree-Fock approximation in combination with the Dyson equation for the self-energy part of the Green function of a scattered electron are employed in the study.

[1]Supported by the NSF grants PHY-0969386 and PHY-1305085.

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Date submitted: 17 Sep 2013 Electronic form version 1.4