

# Electron Correlations in Photoionization of Spin-Orbit Doublets

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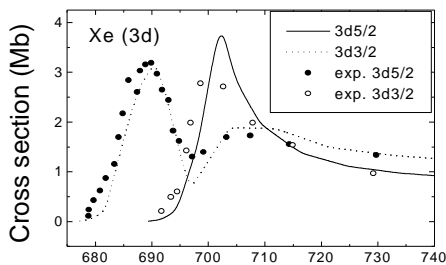
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Measurements of absolute photoionization cross section of 3d subshell spin-orbit doublet components in Xenon 3d<sub>5/2</sub> and 3d<sub>3/2</sub> [1] are analyzed. Of particular interest is the observation of an additional broad maximum in the 3d<sub>5/2</sub> cross section that lie 17.5 eV above the near threshold maximum. To understand the nature of this feature we have performed calculations of the cross sections and angular anisotropy parameters in the frame of a new specially adjusted version of Spin Polarized Random Phase Approximation with Exchange-SPRPAE, which also include the effect of core relaxation [2].

Good agreement with experiment is achieved. It is demonstrated for the first time that strong interaction exists between electrons belonging to different components of a spin-orbit doublet. It is shown that the action of electrons belonging to the 3d<sub>3/2</sub> spin-orbit component causes the additional broad maximum in the photoionization cross section 3d<sub>5/2</sub> component. Our calculations, along with the experimental data, demonstrate the existence of a very interesting and important physical effect: strong interaction between electrons belonging to different components of a given spin-orbit doublet. This interaction qualitatively modifies not only the partial photoionization cross section leading to an additional maximum and minimum, but also the angular anisotropy parameters and, without doubt, parameters that characterize the polarization of photoelectrons.

All cases of this intershell interaction considered until now include either the influence of subshells with big photoionization cross sections upon that with small ones or the mutual influence of subshells with comparable cross sections well separated from each other. In the latter case this interaction proved to be important near the threshold of the subshell with bigger ionization threshold where the other cross section is small enough. The case considered here is qualitatively different from what was studied before.

The results of calculations are presented on the figures.



We are positive that presented results reflect a rather universal effect.

## References

[1] Kivimaki A., Hergenhahn U., Kempgens B. et al. Phys. Rev.A 63, 012716, 2000.

[2] M. Ya. Amusia and L. V. Chernysheva, *Computation of Atomic Processes* (IOP Publishing Ltd., Bristol and Philadelphia, 1997).