Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Profound role of inelastic electron collisions in endohedrals' photoabsorption MIRON AMUSIA, Racah Institute of physics, Hebrew university, Jerusalem, Israel, LARISSA CHERNYSHEVA, Ioffe Physical-Technical institute, St. Petersburg, Russia, EUGENE DRUKAREV, Konstantinov Institute of Nuclear Physics, Gatchina, Russia — We demonstrate that a photoelectron on its way out of an inner atom in an endohedral at reasonably high photon energy has an almost 100% probability to collide inelastic with electrons of the fullerenes shell. As a result the one-electron photoionization cross-section tends to zero. All its total oscillator strength goes to ionization channels that include along with elimination of the electron from the inner atom, also elimination of one or several fullerenes electrons. As a result the photon absorption is followed by emission of additional electrons and carbon ions or atoms. With photon energy decrease this inner inelastic collision becomes gradually less and less important. We estimate the energy of disappearance of inner collisions and demonstrate that for Xe@C60 ionization the C60 cannot be substituted by a static pseudo-potential already at photon energies of about 100 eV. At this energy the inelastic collision of photoelectrons from 4d Xe with C60 contributes about 80% of the total photoabsorption cross-section. This result explains why calculations that include automatically all two and multi-step processes give cross-sections that are by about an order of magnitude bigger than the experimentally measured one-channel cross-sections.

Miron Amusia
Racah Institute of physics, Hebrew university, Jerusalem, Israel

Date submitted: 29 Jan 2014 Electronic form version 1.4