

Abstract Submitted
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On the enhancement of the back-to-back two-electron-one photon ionization in molecules MIRON AMUSIA, Ioffe Physical-Technical Institute, St. Petersburg, Russia, EUGENE DRUKAREV, Konstantionov Nuclear physics Institute, Gatchina, Russia — Recently, the long ago predicted quasi-free mechanism of two-electron photoionization [1] was detected already at relatively low energy photoionization in He [2]. It was observed that some pairs of electrons are leaving the target atom back-to-back, i.e. in opposite direction with almost the same energy. They have opposite spin directions. The cross-section of this process depends upon the probability for a pair of electrons to be close to each other before meeting the incoming photon. Such probability is greatly enhanced in molecules with covalent bonding, like H₂. In this and similar molecules the electrons spend an essential part of time being between nuclei and thus screening them from each other. We demonstrate that indeed the back-to-back contribution is much bigger in H₂ than in He. We analyze qualitatively some other situations that lead to relative growth of back-to-back contribution. Atoms with electrons with bigger principal quantum numbers have bigger back-to-back contributions. An external pressure applied to molecules forces electrons to be closer to each other. As a result for them the back-to-back contribution can be controllably enhanced.

[1] M. Ya. Amusia et al, JPB, 1975, 8, 1248.

[2] M. S. Scheffler et al, M S PRL, 2013, 111, pp.013003

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