UNIKASSEL VERSITÄT

Physikalisches Kolloquium

Thursday, 03.12.2015, 17:00, HS 100
Reception with coffee & cookies 16:45

Dr. Sang-Kil Son, CFEL-DESY, Hamburg:

What happens to atoms and molecules during x-ray free-electron laser pulses?

Abstract

X-ray free-electron lasers (XFEL) open a new era in science and technology, offering many unique opportunities that have not been conceivable with conventional light sources. Because of their very high x-ray photon fluence within very short pulse duration, materials interacting with XFEL undergo significant radiation damage — they possibly become highly ionized and then explode. To comprehend underlying physics, it is crucial to understand detailed ionization and fragmentation dynamics of atoms and molecules during intense XFEL pulses. In this talk, I will present a theoretical framework to treat x-ray-induced processes and to simulate radiation damage dynamics, introducing two dedicated x-ray physics toolkits, XATOM and XMOLECULE. I will discuss how theory can explain recent experiments conducted at LCLS and SACLA, for instance, deep inner-shell multiphoton ionization and ultrafast x-ray-induced explosion of small molecules, and how it can lead to new XFEL experiments.

References:
1. S.-K. Son and R. Santra, Phys. Rev. A 85, 063415 (2012).
2. B. Rudek et al., Nature Photon. 6, 858 (2012).
3. H. Fukuzawa et al., Phys. Rev. Lett. 110, 173005 (2013).
4. B. Murphy et al., Nat. Commun. 5, 4281 (2014).
5. Y. Hao et al., Struct. Dyn. 2, 041707 (2015).

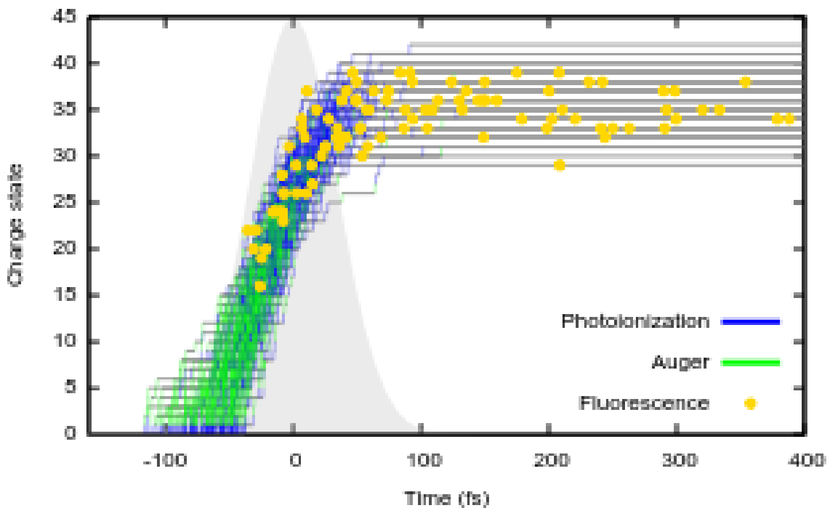

Foto: Exemplary pathways of multiphoton multiple ionization dynamics of Xe at 4.5 keV

All of you interested in physics are cordially invited!

Contact: Prof. Dr. Philipp Demekhin, More Information: uni-kassel.de/go/physikalisches_kolloquium