UNIKASSEL VERSITÄT

Physikalisches Kolloquium

Thursday, 09.11.2017, 17:15, HS 100
Reception with coffee & cookies 16:45
(For university staff: please bring your own cup for sustainability reasons)

Prof. Dr. Thomas Pfeifer, MPI for Nuclear Physics, Heidelberg:

Listening to the ultrafast chat of two excited electrons – and asking them some quick physics questions

Abstract
Electrons interact via the long-range Coulomb force, repel each other and feel attracted by a nucleus that traps them inside an atom. When both electrons are in excited states, they continue their repulsive interaction "language" until one of them drops back down to the ground state, giving its released energy to the other one, which then escapes the atomic binding potential (autoionization).
In this talk, I will show how this very fast communication and the corresponding fundamental dynamical processes are recorded (measured) and translated into understanding using time-domain physics pictures. The key methods of our experimental research are the combination of short-pulsed laser/light fields (including High-Harmonic Generation and Free-Electron Lasers) and multi-dimensional detection techniques accessing time scales of 1 femtosecond (10^{-15} s) and shorter. Moreover, we ask some quick questions encoded and carried at visible frequencies (time- and intensity-tunable laser pulses), and listen to the electrons' optical response (spectroscopy). From these responses, we learned to interpret a fundamental quantum interference process—the Fano resonance—in the time domain, with currently emerging science and technology applications ranging from x-ray lasing-without-inversion to frequency combs locked to nuclear resonances for precision spectroscopy in the hard-x-ray region.

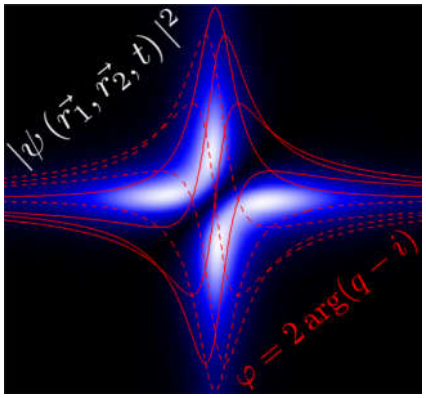

Photo: A correlated wavefunction of 2 electrons inscribed into a Fano family of curves, which can be parametrized by the Fano-q parameter or a phase φ related by a simple mathematical formula.

All of you interested in physics are cordially invited!

Contact: Prof. em. Dr. Burkhard Fricke, More Information: uni-kassel.de/go/physikalisches_kolloquium