New attosecond spectroscopies for correlation-induced electron hole dynamics¹

VITALI AVERBUKH, Department of Physics, Imperial College London

In this talk I will present two of our recent ideas for new attosecond time-resolved measurements of electron hole dynamics [1,2]:

- Single-photon laser enabled Auger decay (spLEAD) spectroscopy

and

- High-harmonic generation (HHG) spectroscopy of Auger-type transitions.

Unlike the well-known attosecond streaking, the proposed spectroscopies do not rely on photo- or secondary electron emission and are applicable to ultrafast electronic processes involving bound-bound transitions, such as electron correlation-driven charge migration. We simulate the new attosecond spectroscopies using both model and ab initio methods. Specific applications include hole migration in glycine, atomic Auger and Coster-Kronig decays as well as quasi-exponential dynamics of molecular orbital breakdown in trans-butadiene and propanal.


¹The author acknowledges the financial support of the Engineering and Physical Sciences Research Council (EPSRC, UK) through the Career Acceleration Fellowship (Award No. EP/H003657/1) and the Programme Grant on Attosecond Dynamics (Award No. EP/I032517).