Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **2321** Type: **Invited Speaker / Conférencier(ère) invité(e)**

Attosecond-Resolved Soft X-Ray Excitonics (I)

Monday 11 June 2018 11:45 (30 minutes)

Attosecond Physics explores ways to follow and control matter with unprecedented temporal resolution (1 attosecond= 10-18 s.). Strong laser fields used to apply forces on the sub-cycle timescale, together with the availability of tabletop attosecond soft x-ray pulses, now open avenues for time-resolving ultrafast dynamics on the unexplored attosecond timescale [1, 2]. In this first attosecond pump - attosecond probe experiment, an isolated 100 eV attosecond pulse initiates an Auger decay followed by an attosecond broadband (250-1100nm) optical pulse. The observable is the soft x-ray absorption spectrum as a function of pump-probe delay. A first experiment in krypton atoms allows us to model the effect of the optical probe as a gate of the Auger electronic dipole, a universal analog to the *frequency-resolved optical gating* technique [3]. Applying our attosecond x-ray absorption near-edge spectroscopy (AXANES) to the L-edge of fused silica enables us to directly observe and control sub-femtosecond core-excitons in solids, laying the foundation of soft x-ray excitonics.

[1] J. B. Bertrand et al., Nature Physics **9**, 174 (2013).
[2] S. R. Leone et al., Nature Photonics **8**, 162 (2014).
[3] R. Trebino, FROG, Kluwer Academic Publishers, Boston (2002).
[4] A. Moulet, J. B. Bertrand, T. Klostermann, A. Guggenmos, N. Karpowicz, E. Goulielmakis, Science **357**, 1134-1138 (2017).

Author: Dr B. BERTRAND, Julien (Laval University)

Presenter: Dr B. BERTRAND, Julien (Laval University)

Session Classification: M1-1 Ultrafast EM waves I: Materials Science (DAMOPC/DCMMP) | Ondes EM ultrarapides I: Sciences des matériaux (DPAMPC/DPMCM)

Track Classification: Division of Atomic, Molecular and Optical Physics, Canada / Division de la physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)