Opened post-doctoral position

Attosecond XUV source at MHz repetition rate

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The generation of XUV pulses via high order harmonic generation (HHG) is spreading rapidly as it allows time resolved studies with high temporal resolution down to the attosecond level. The CELIA harmonic group has 10 years of experience in this domain and has a strong expertise in the development, optimisation, control and characterisation of these sources [Sola, Strelkov] and is now developing applications [Mairesse] with Ti:Sapph based HHG systems. In parallel, the CELIA laser team (GOLF) has developed a brand new femtosecond laser architecture (1030 nm, Yb doped-fiber based CPA fs laser) that is ideally suited for strong-field experiments [Boullet] as it can deliver femtosecond pulses at a high energy level (~100 µJ) with a high repetition rate (adjustable between 100 kHz and 1 MHz) associated with a high average power (30 to 100 W). Using this source to generate harmonics is very appealing as the typical kHz repetition rate of the Ti:Sapph based harmonic XUV sources now appears as a severe limitation for some applications.

In the framework of a new project entitled ATTOWAVE funded by the French ANR and devoted to the "Imaging of molecular dynamics with attosecond wavepackets", we will couple these two expertises and develop a new and unique XUV source operating at 100 kHz – 1 MHz repetition rate. We already performed a proof of principle experiment of HHG at MHz repetition rates, and now our goal is to optimize the XUV photon flux and characterize the XUV source. This setup will also allow pump probe time-resolved experiment and will be developed in such a way that the unique features (high repetition rate, 1030 nm central wavelength, stability, compactness, etc) of this attosecond XUV source can be fully used. After optimization and characterisation, we will use this ensemble for time resolved experiments. The first two planned experiments are the study of relaxation processes in solid samples excited by XUV (with P.Martin, CELIA) and, in collaboration with our ATTOWAVE partners, the time resolved coïncidence detection of fragments created by XUV molecular ionization in the presence of the IR field.

During this postdoctoral period, the researcher will have to use an existing state of the art high power femtosecond Yb fiber laser and adapt it to its need (for instance by performing post compression on the 300 fs fundamental pulse if necessary), to optimize the harmonic generation and detection system and to characterize the XUV output. The post-doctorant will also take part in the first experiments that will be performed with this source. The ideal candidate should have strong motivations for experimental activities and robust knowledge in optics. A previous experience with femtosecond laser is appreciated.
This one year position (likely prolonged) is already available and the salary is 30 k€/year. Applicants should send a CV, a letter of motivation and two letters of recommendation.

I. J. Sola, *et al.*, Nature physics vol. **2**, n° 5, 319-322 (2006).
V. Strelkov *et al.*, New journal of physics **10**, 083040 (2008).
Y. Mairesse *et al.*, New Journal of Physics **10**, 025028 (2008).
J. Boullet *et al.*, Optics Letters **34**, 1489 (2009).