



Mardi 14/11/2017, 14h00-17h00

SPEC Amphi Bloch, Bât.774,, Orme des Merisiers

## Jean-François Hergott

IRAMIS/LIDYL

### **HDR Jean-François Hergott : Femtosecond pulses control for single attosecond pulse generation**

HDR abstract :

Since the discovery of the Chirped Pulse Amplification technique in 1985, the performances of the Ti: Sapphire laser systems have continuously progressed. On the one hand, the available energy per pulse is increasing and, on the other hand, the duration of the pulses is continuously reduced, now to less than 20 fs. The use of this type of pulses for single attosecond pulse generation through high order harmonic generation requires an additional step of reduction of the driving pulses duration by post compression to reach sub-7fs durations. The position of the carrier of the field with respect to the maximum of the envelope of the pulse called Carrier Envelop Phase (CEP), has then to be controlled on the attosecond scale in order for the target to always, pulse after pulse, interact with a similar electric field.

I will present some research and development results that I have been able to carry out during the last thirteen years at CEA-Saclay in parallel with the operation and maintenance of LIDYL's high repetition rate laser facilities. After a brief review of the post-compression technique by self phase modulation in a hollow core fiber filled with gas and of the expected performances, I will present the developments realized on the CEP stabilization of laser chain with high stretching/compression ratio. A new 10 kHz regenerative cavity for short duration and low residual CEP noise will also be discussed. In parallel with this work, I was fortunate to participate in the experiment demonstrating the possibility of using the attosecond lighthouse technique to generate unique attosecond pulses through HHG in gases using sub 10fs, CEP stabilized pulses.

Much of my work was carried out within the joint laboratory Impulse, founded in 2009, associating us with the company Amplitude Technologies. I will try to show how these various developments, produced in Impulse, equip now the new FAB1 / 10 laser system installed within Attolab, allowing to achieve certain characteristics of the highest level.