

MASTER IN PHOTONICS – PHOTONICS BCN EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April - September 2017

Laboratory : Attoscience and Ultrafast Optics
Institution: ICFO – The Institute of Photonic Sciences
City, Country : Castelldefels (Barcelona), Spain

Title of the master thesis: Attosecond spectroscopy of electronic excitation (X-rays)

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Summary of the subject:

The motion of electrons, or excitations, inside matter determines photosynthesis, chemical reactions, the efficiency of sensors or e.g. solar cells. Attosecond soft X-rays are the key to investigate such electronic motion in real time. Our group has developed the first attosecond soft-X-ray source and your project will deal with experimental aspects of such research. You will investigate results from condensed matter and extract information about which molecular bond participates in the relevant processes.

Your task will be to familiarize yourself with our research. (We will explain it to you)

- Learn how to use Arthemis and Matlab/Python to analyze soft X-ray spectra
- Exfoliation and preparation of samples for a soft X-ray attosecond measurement
- Participate in a measurement campaign and analyze your data

Reading material:

- S.L Cousin, F Silva, S Teichmann, M Hemmer, B Buades, J Biegert, " High-flux table-top soft x-ray source driven by sub-2-cycle, CEP stable, 1.85- μm 1-kHz pulses for carbon K-edge spectroscopy" Optics Letters, 39, 5383-5386 (2014).
- F. Silva, S. Teichmann, S.L. Cousin, M. Hemmer and J. Biegert, "Spatiotemporal isolation of attosecond soft X-ray pulses in the water window" Nature Communications, 6, 6611 (2015).

Keywords : Attosecond, XAFS, electronic excitation

Additional information:

* Required skills: Diligence, some programming