

**PhD Position – Photoelectron Circular Dichroism on chiral systems including biomolecules and nanoparticles****Experimental Division****DESIRS beamline**

Position starts in September/October 2016. Deadline for submission of application: **April 30<sup>th</sup> 2016**

*SOLEIL is the French national synchrotron facility, located on the Saclay Plateau near Paris. It is a multi-disciplinary instrument and a research laboratory, whose mission is to run research programs using synchrotron radiation, to develop state-of-the-art instrumentation on the beamlines, and to make those available to the scientific community. SOLEIL, a unique tool for both academic research and industrial applications across a wide range of disciplines including physics, biology, chemistry etc., is used by over 5 000 researchers coming from France and abroad. It is based on a state-of-the-art synchrotron source, both in terms of brilliance and stability. The facility is a “public” company employing about 500 people, founded by the CNRS and the CEA, and partner of the Paris-Saclay University.*

Applications are invited for one post to work with Laurent Nahon as part of a European funded project at Synchrotron SOLEIL. The post benefits from a highly competitive and attractive salary, plus mobility and family allowances as applicable. The successful candidates will be part of the EU-funded Marie Skłodowska-Curie Innovative Training Network (ITN), “ASPIRE”, and will also register for a PhD at Université Paris-Sud (Orsay) part of Université Paris-Saclay.

The ASPIRE network comprises 9 member institutions, from both academia and industry, located in the United Kingdom, Germany, France, Denmark and Italy, together with 6 partner organisations. A total of 12 Early Stage Researchers (ESRs) will be hosted across the network and will take part in laboratory-based research, a network-wide training program, public engagement activities and collaboration with network partners through short-term placements in European industrial/academic partner laboratories. Details of all available projects can be found at: [www.ASPIRE-ITN.eu](http://www.ASPIRE-ITN.eu)

The overarching research goal of the ASPIRE project is the measurement of “molecular frame” (MF) photoelectron angular distributions (PADs) from isolated molecules of varying complexity. Individual projects in ASPIRE will involve the use of charged particle detection technology as well as either state-of-the-art laser systems or synchrotron radiation. Progress in this area of research is highly technologically driven, and the input of private company partners is critical to the scientific objectives, as well as to the enhanced training environment that will be provided.

## **1. Description of the project**

We are interested in the interaction of chiral molecules with Circularly Polarized Light (CPL) as provided by the state-of-the-art VUV high resolution variable polarization beamline DESIRS. See <http://www.synchrotron-soleil.fr/Recherche/LignesLumiere/DESIRS>

Such an interaction may lead, in the gas phase, to Photoelectron Circular Dichroism (PECD) in the angular distribution of photoelectrons produced by CPL-ionization of pure enantiomers. This effect is observed as a very intense forward/backward asymmetry with respect to the photon axis which reveals the chirality of the molecule (absolute configuration). PECD happens to be orbital-specific and photon energy dependent, and is a very subtle probe of the molecular potential being very sensitive to static molecular structures such as conformers, chemical substitution, clustering, as well as to vibrational motion. Therefore PECD studies have both a fundamental and analytical interest, especially since chiral species are ubiquitous in the biosphere, food and medical industry. For a complete review see also L. Nahon, G. A. Garcia, and I. Powis, J. Elec. Spec. Rel. Phen. 204 (2015) 322.

The main focus of the project will be on biomolecules and more specifically amino-acids. We wish to study PECD on selected free aromatic and non-aromatic amino-acids, brought in the gas phase via various methods. Among the goals of such a study will be a conformer analysis at several temperatures as well as the possible confirmation that PECD could be linked to the origin of life's homochirality. This work will be extended to the corresponding chiral nanoparticles in order to observe a possible amplification of the PECD-induced asymmetry by a local order effect as compared to the free molecule. As complementary subjects, we wish to observe PECD on molecules bearing various types of chirality (beyond the one based upon asymmetric carbon), including propeller-type and axial chirality, as well as to study chemical substitution effects.

## 2. Qualifications & Experience

The successful candidates for this post will possess an excellent Master's degree in a relevant subject (Physics, Chemistry, Chemical Physics), excellent English verbal and written communication skills, and the potential to conduct independent scientific research and perform well as part of a research team. Previous experience in fields such as molecular beams, nanoparticles, biomolecule spectroscopy, electron spectroscopy would be a plus.

Candidates will be required to meet the Marie Skłodowska-Curie Early Stage Researcher **eligibility criteria**: ([http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/main/h2020-wp1415-msca\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-msca_en.pdf), p40-41). In particular, at the time of appointment candidates must have had less than four years full-time equivalent research experience and must not have already obtained a PhD. Additionally, they must not have resided in France for more than 12 months in the 3 years immediately before the appointment.

## 3. General conditions & hiring procedures

This full-time post will be available from September/October 2016 and is offered on a fixed-term 36 month contract. The place of work will be at Synchrotron SOLEIL, located in the Paris suburbs (Saint-Aubin).

Synchrotron SOLEIL and "The ASPIRE Network" value diversity and are committed to equality of opportunity.

Informal enquiries may be addressed to the supervisor Laurent Nahon - Tel: +33 (0)1 69 35 96 47 - [nahon@synchrotron-soleil.fr](mailto:nahon@synchrotron-soleil.fr).

Applications should include a cover/motivation letter, resume (CV), Bachelor and/or master's degree transcript as well as the name and contact details of 2 to 3 referees. Applications should be done on-line at:

<http://candidature.synchrotron-soleil.fr/VotreCandidature/?ref=PHD-ASPIRE>

The application should be completed by April 30<sup>th</sup> 2016 to receive full attention, with interviews expected to be held in May 2016. If no suitable candidates are identified by April 30<sup>th</sup>, the position will remain open until filled.

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