

Laurent Nahon, Dr. (HDR), Beamline group leader



Synchrotron SOLEIL
Beamline DESIRS
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DESIRS beamline webpage : <https://www.synchrotron-soleil.fr/fr/lignes-de-lumiere/desirs>

Education

2011 HDR (Habilitation to be Research Director)
1991 PhD in physics (Université d'Orsay, France) with special honors
1988 MSc in AMO Physics (Université d'Orsay, France)
1986 Bachelor in fundamental Physics (Université Paris 6- UPMC, France)

Positions

2005–today Secondment from CEA to synchrotron SOLEIL as beamline group leader
1994–2005 Permanent scientist at the CEA (DSM/SPAM) & associated scientist at LURE
1992–1993 Post-doctoral fellow at the department of chemistry, University of California at Berkeley (USA), group of YT Lee.

Current Responsibilities

2004–present Group leader of the DESIRS VUV beamline
2013–present Head of the “dilute matter” scientific group of SOLEIL
2014–present Head of the “AMO & Plasma” axis of the Physics Department (PhOM) of University Paris-Saclay

Recently-funded large projects

- Full Beneficiary of an ITN EU Marie-Curie Network (ASPIRE): 2016-2020 (<https://www.nottingham.ac.uk/~pczklr/ASPIRE-index.html>)
- Scientific responsible for the SOLEIL partner in ANR AAAS : 2019-2022
- Scientific responsible for the SOLEIL partner in ANR CRESUSOL : 2012-2017
- Scientific responsible for the SOLEIL partner in ANR CHIRGEN : 2013-2016
- Scientific responsible for the SOLEIL partner in ANR SRMS2 : 2009-2011
- Scientific responsible for the SOLEIL partner in ANR AAAP : 2007-2010

Current scientific interest

At the head of two VUV beamlines (SU5 @ LURE and DESIRS @ SOLEIL), for more than 20 years, I have been working on VUV photodynamics (absorption, photoionization, fragmentation) on a wide range of samples, mainly isolated species such as cold molecules, radicals, clusters, trapped ionic biopolymers and nanoparticles, as well as condensed matter samples (thin films, ices). My work is centered on fundamental molecular physics and gas phase physical chemistry, with strong interfaces with chemistry, life sciences, planetary sciences and astrophysics.

Among this large field, part of my activity is focused onto the interaction of Circularly Polarized Light (CPL) and chiral species and in particular onto the so-called Photoelectron Circular Dichroism (PECD) effect at the field crossing between molecular photoionization and chirality (for a review see ref. [1] & [8]). Besides its fundamental interest and analytical applications, PECD could also be, complementary to asymmetric *photochemical* processes in condensed matter, a possible asymmetric

photophysical process in link with the origin of biomolecular asymmetry (see ref. [1]), a central and still open issue in astrochemistry.

Summary of scientific production (march 2018)

- *h*-factor 34 (source WOS), 40 (source Google Scholar)
- 189 publications in peer-reviewed international journals
- 66 Invited Conferences
- 57 Invited seminars

→ Full bibliography available at :

https://scholar.google.fr/citations?hl=fr&user=1HvUXKEAAA&view_op=list_works&sortby=pubdate

Selected representative publications

1. R. Hadidi, D. K. Bozanic, G. A. Garcia, L. Nahon, Electron asymmetries in the photoionization of chiral molecules: possible astrophysical implications. *Advances in Physics X* **3**, 1477530 (2018). (Invited Review paper).
2. S. Tigrine, N. Carrasco, D. K. Bozanic, G. A. Garcia, L. Nahon, FUV Photoionization of Titan Atmospheric Aerosols. *The Astrophysical Journal* **867**, 164 (2018).
3. N. Carrasco, S. Tigrine, L. Gavilan, L. Nahon, M. S. Gudipati, The evolution of Titan's high-altitude aerosols under ultraviolet irradiation. *Nature Astronomy* **2**, 489-494 (2018)
4. S. Beaulieu, A. Comby, D. Descamps, B. Fabre, G. A. Garcia, R. Géneaux, A. G. Harvey, F. Légaré, Z. Mašín, L. Nahon, A. F. Ordonez, S. Petit, B. Pons, Y. Mairesse, O. Smirnova, V. Blanchet, Photoexcitation circular dichroism in chiral molecules. *Nature Physics* **14**, 484 (2018).
5. S. Hartweg, B. L. Yoder, G. A. Garcia, L. Nahon, R. Signorell, Size-Resolved Photoelectron Anisotropy of Gas Phase Water Clusters and Predictions for Liquid Water. *Phys. Rev. Lett.* **118**, 103402 (2017)
6. C. Meinert, I. Myrgorodska, P. de Marcellus, T. Buhse, L. Nahon, S. V. Hoffmann, L. L. S. d'Hendecourt, U. J. Meierhenrich, Ribose and related sugars from ultraviolet irradiation of interstellar ice analogs. *Science* **352**, 208-212 (2016)
7. A. Comby, S. Beaulieu, M. Boggio-Pasqua, D. Descamps, F. Légaré, L. Nahon, S. Petit, B. Pons, B. Fabre, Y. Mairesse, V. Blanchet, Relaxation Dynamics in Photoexcited Chiral Molecules Studied by Time-Resolved Photoelectron Circular Dichroism: Toward Chiral Femtochemistry. *The Journal of Physical Chemistry Letters* **7**, 4514-4519 (2016)
8. L. Nahon, G. A. Garcia, I. Powis, Valence shell one-photon photoelectron circular dichroism in chiral systems. *J. Elec. Spec. Rel. Phen.* **204**, 322-334 (2015) (Invited Review paper)
9. P. Modica, C. Meinert, P. de Marcellus, L. Nahon, U. J. Meierhenrich, L. L. S. d'Hendecourt, Enantiomeric Excesses Induced in Amino Acids by Ultraviolet Circularly Polarized Light Irradiation of Extraterrestrial Ice Analogs: A Possible Source of Asymmetry for Prebiotic Chemistry. *The Astrophysical Journal* **788**, 79 (2014)
10. C. Meinert, S. V. Hoffmann, P. Cassam-Chenai, A. C. Evans, C. Giri, L. Nahon, U. J. Meierhenrich, Photonenergy-controlled symmetry breaking with circularly polarized light. *Angew. Chem. Int. Ed. Engl.* **53**, 210-214 (2014)
11. M. Tia, B. Cunha de Miranda, S. Daly, F. Gaie-Levrel, G. Garcia, I. Powis, L. Nahon, Chiral asymmetry in the photoionization of gas-phase amino-acid alanine at Lyman- α radiation wavelength. *J. Phys. Chem. Lett.* **4**, 2698 (2013).
12. G. Garcia, L. Nahon, S. Daly, I. Powis, Vibrationally induced inversion of photoelectron forward-backward asymmetry in chiral molecule photoionization by circularly polarized light. *Nature Communications* **4**, 2132 (2013).
13. A. Giuliani, A. R. Milosavljevic, K. Hinsen, F. Canon, C. Nicolas, M. Refregiers, L. Nahon, Structure and Charge-State Dependence of the Gas-Phase Ionization Energy of Proteins. *Angew. Chem.-Int. Edit.* **51**, 9552 (2012)