



UNIVERSIDADE
NOVA
DE LISBOA

MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS 2018

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA School of Science and Technology | CEFITEC - Centre of Physics and Technological Research

RESEARCH GROUP AND URL

LCAM - Atomic and Collisions Laboratory
<http://lcam.cefitec.fct.unl.pt/>

SUPERVISOR (NAME AND E-MAIL)

Paulo Limão-Vieira
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SHORT CV OF THE SUPERVISOR

Full Professor of Molecular Physics; 2010, Habilitation in Atomic and Molecular Physics, Universidade NOVA de Lisboa, Portugal; 2003, PhD in Experimental Physics, University of London, UK; 1994, Degree in Physical Engineering, Universidade NOVA de Lisboa, Portugal; Since 2010 visiting professor at The Open University, UK, Sophia University, Tokyo, Japan, Flinders University, Australia and Chugnam National University, Korea.

2009 –Appointed member of the scientific council of the Faculty of Science and Technology, Universidade NOVA de Lisboa, Portugal; 2008 –Head of research of Centre of Physics and Technological Research, Universidade NOVA de Lisboa, Portugal (<http://www.cefitec.fct.unl.pt>); 2004 –Head of the Atomic and Molecular Collisions Laboratory, Centre for Physics and Technological Research, Universidade NOVA de Lisboa, Portugal (<http://lcam.cefitec.fct.unl.pt/>). Since 2013 Programme Director of Radiation Biology and Biophysics Doctoral Training Programme, Universidade NOVA de Lisboa, Portugal (<http://sites.fct.unl.pt/rabbit/>).

2004 –National Delegate and Member to several international scientific and steering committees of EU COST Actions/ESF networks; 2009 –Member of the Editorial Board of European Physical Journal D; 2006 –Referee for research grants to the Qatar National Research Fund (QNRF), Qatar, National Council for Scientific and Technological Development (CNPq), Brazil, National Centre for Science and Technology Evaluation, Kazakhstan, Australian Research Council, US Department of Energy, National Agency for Science and Technology Argentina; Slovak Grant Agency and the Engineering and Physical Sciences Research Council (EPSRC), UK; 2004 –Permanent refereeing activity to more than a dozen international peer reviewed journals;

2016 Awarded a prestigious Japan Society for the Promotion of Science (JSPS) FY2016 JSPS Invitation Fellowship for Research in Japan;

Since 2005 has been supervisor to 4 Post-Docs, 8 PhDs, 12 Masters and 3 undergraduate last year research project students. Since 2002 he has more than 195 papers published in international journals, four books, five chapters of books, has been invited for more than 90 oral contributions in international scientific meetings and ca. 300 published contributions in scientific meetings (most of them in international conferences). H-index 24 and over 2500 citations.

His current research interests and activities are on the VUV electronic state spectroscopy by synchrotron radiation, negative ion yields by electron attachment in the gas phase (<20 eV) and electron scattering (HREELS) from biological relevant and aeronomic molecules. Other research activities are focused on the effects of



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radiation damage in the biomolecular environment at the molecular level and negative ion production by electron transfer processes to biomolecules (pyrimidines, purines, small amino acids, ...) in atom-molecule collisions.

5 SELECTED PUBLICATIONS

- Site-Selective Bond Excision of Adenine upon Electron Transfer, T Cunha, M Mendes, F Ferreira da Silva, S Eden, G García, and P Limão-Vieira, J. Chem. Phys. 148 (2018) 021101.
- Experimental and theoretical electron scattering cross section data for dichloromethane, K Krupa, E Lange, F Blanco, A S Barbosa, D F Pastega, S d'A Sanchez, M H F Bettega, G García, P Limão-Vieira, and F Ferreira da Silva, Phys. Rev. A 97 (2018) 042702.
- Experimental scaling of plane-Born cross sections and ab initio calculations for electron-impact excitation and dissociation of XF₄ (X = C, Si, and Ge) molecules, M Hoshino, D Duflot, P Limão-Vieira, S Ohtomi, and H Tanaka, J. Chem. Phys. 146 (2017) 144306.
- Electronic Excitation of Carbonyl Sulphide (OCS) by High-Resolution Vacuum Ultraviolet Photoabsorption and Electron-Impact Spectroscopy in the Energy Region from 4 to 11 eV, P Limão-Vieira, F Ferreira da Silva, D Almeida, M Hoshino, H Tanaka, N J Mason, S V Hoffmann, M-J Hubin-Franskin, J Delwiche, J. Chem. Phys., 142 (2015) 064303.
- Selective bond cleavage in potassium collisions with pyrimidine bases of DNA, D Almeida, F Ferreira da Silva, G García and P Limão-Vieira, Phys. Rev. Lett., 110 (2013) 023201.

PROJECT TITLE AND DESCRIPTION

Negative ion formation in electron transfer processes to biomolecules

The effects of ionising radiation on biological material have been studied on the tissue scale for many years. However, research to understand the processes at a molecular level has begun only recently. Relatively few experiments have been carried out on the effects of ionising radiation and secondary electrons on key biological molecules such as DNA and its constituent bases. Cross-sectional results for these interactions are highly relevant to the use of radiation in medicine. Today, it is possible to isolate biomolecules including uracil, thymine, and adenine (bases of RNA and DNA) in the gas phase. The current research apparatus will be used to study the electron transfer on DNA bases (nucleotides) by atom (potassium) – molecule (DNA bases) collisions. The experiment thus represents a novel perspective spanning two traditionally independent research areas: electron attachment and electron harpooning studies of gas phase molecules. Total partial cross sections will be obtained in an energy range from about a few eV up to several hundreds of eV. These experiments will allow us to probe whether such electron transfer process is a correct model for electron transport in DNA or whether electron harpooning by bound electrons supplied in K - molecule scattering is a more appropriate model for electron transport under physiological conditions.

SCIENTIFIC REQUIREMENTS

Applicants with a PhD in Physics or Physical Chemistry or Engineering Physics or related field, with at least 4 years proven experience; Knowledge in mass spectrometry.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST

Physics (PHY)