MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2025

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA School of Science and Technology

RESEARCH GROUP AND URL

Atomic and Molecular Collisions Laboratory
CEFITEC, Centre of Physics and Technological Research
https://lcam.cefitec.fct.unl.pt

SUPERVISOR (NAME AND E-MAIL)

Professor Paulo Limão-Vieira, plimaovieira@fct.unl.pt

SHORT CV OF THE SUPERVISOR

Paulo Limão-Vieira is Professor of Molecular Physics within NOVA School of Science and Technology (Universidade NOVA de Lisboa). His research interests include: the electronic state spectroscopy of biomolecules, aeronomic and plasma processing molecules by interaction with photons (VUV photoabsorption, REMPI, He(I) photoelectron) and electrons (dissociative electron attachment, electron energy loss); charge transfer processes in atom-molecule and anion-molecule collisions and the role of negative ions; surface induced chemistry, especially the reactivity of co-adsorbed molecular species and the formation of ices in the Earth's upper atmosphere and in the interstellar medium, that might be in the origin of some microorganisms. Charge transfer experiments in atom-(bio)molecule collisions with negative ion formation. Other research interests include positron scattering from atoms and molecules as well as positronium formation.

Since 2006 he has kept short-term visiting Professor positions the Federal University of Rio de Janeiro, Brazil, The Open University, UK, Flinders University, South Australia, Australia National University, Chungnam National University, Korea and Instititut für Ionenphysik und Angewandte Physik, Austria.

From 2010 he has been appointed regular visiting Professor at the Department of Physics/Department of Material and Life Sciences, Sophia University, Tokyo, Japan and from 2022 visiting Professor at the Department of Physics, Federal University of Paraná, Curitiba, Brazil. In 2016 he was a fellowship recipient from the Japan Society of Promotion of Science (JSPS). In 2021 and 2024 he was advisor to the Royal Swedish Academy of Sciences.

Currently he is author/co-author of over 300 publications in international peer-reviewed journals, he has delivered > 100 invited lectures across the globe, > 300 conference contributions and serves as reviewer for different international peer-reviewed journals and funding agencies.

5 SELECTED PUBLICATIONS

- SF_6 negative ion formation in charge transfer experiments, Molecules 29 (2024) 4118;
- Symmetry breaking in the lowest-lying excited state of CCl_4: valence shell spectroscopy in the 5.0 – 10.8 eV photon energy range, Molecules 29 (2024) 5619;
- Isotope effect in D_2O negative ion formation in electron transfer experiments: DO–D bond dissociation energy, J. Phys. Chem. Lett. 14 (2023) 5362;
- Bound electron enhanced radiosensitisation of nimorazole upon charge transfer, Molecules 27 (2022) 4134;

- Selective bond cleavage in potassium collisions with pyrimidine bases of DNA, Phys. Rev. Lett. 110 (2013) 023201.

PROJECT TITLE AND SHORT DESCRIPTION

Negative ion formation in electron transfer processes within clusters of 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 unique research apparatus will be used to study electron transfer by potassium – cluster 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 AREA WHERE THE PROJECT FITS BEST*

Physics (PHY) and/or Chemistry (CHE)