



NeMPO – Neutrons & Muons in Portugal

Elastic and inelastic neutron diffraction, and muon relaxation spectroscopy are important experimental techniques in scientific research, from fundamental to applied studies, ranging from condensed matter physics and material science, studies of biosystems (proteins, DNA, bacteria, cells and tissues) and design of new pharmacological agents, to the analysis of archaeometric artefacts and works of art. The impact of these techniques on Fundamental Sciences, Industry, Anthropology, Cultural Heritage, Forensic Sciences, Food Sciences and Human Health is currently undeniable. The fact that these techniques are complementary to other analytical methods (*e.g.* x-ray diffraction and vibrational spectroscopies) render them particularly useful. No wonder, therefore, that the number of researchers applying for beamtime in large infrastructures where these techniques are available has increased significantly in recent years.

This area of activity has been identified as a priority by the European Science Foundation, which is currently involved in building the European research consortium European Spallation Source (in Lund/Sweden). In Portugal, there has been a growing involvement of R&D centres in these types of methodologies. This fostered the creation (in 2017) of the ***Portuguese Group of Users of Neutrons and Muons (Neutrons & Muons in Portugal – NeMPO)*** hosted by the Portuguese Society for Physics (<https://fisica-materia-condensada.spf.pt/NeMPO>). Presently, NeMPO comprises about 60 members from different scientific areas and institutions throughout the country, with a quite high number of young generation researchers.

Periodic workshops (typically 2 *per* year) are organised by NeMPO, under the general title ***Neutron and Muons: from Science to Society***, involving international researchers within the field, to sustain a fruitful contact among members and to foster scientific cooperation and spread of knowledge within this area of knowledge.

NeMPO's coordination is ensured by the President (Maria Paula Matos Marques, Department of Life Sciences, University of Coimbra, pmc@ci.uc.pt) and the vice-President (Joaquim Agostinho Moreira, Department of Physics and Astronomy, University of Porto, jamoreir@fc.up.pt), which are elected biannually by the members.

In particular MPM Marques, in its R&D Centre “Molecular Physical-Chemistry” of the University of Coimbra (<https://qfm.uc.pt/>), has contributed in the last 20 years to foster neutron scattering techniques in Portugal, and to train junior researchers in this field – with a quite high number of MSc and PhD students relying on these types of techniques (at facilities such as ISIS Muon and Neutron Source/UK and Institut Laue-Langevin/France). This research activity has delivered several highlights, namely (last 5 years):

- ISIS Highlight (2024) – “*How water dynamics could be a new cancer biomarker*”
M.P.M. Marques, A.L.M. Batista de Carvalho, C.B. Martins, J.D. Silva, M. Sarter, V. García Sakaic, J.R. Stewart, L.A.E. Batista de Carvalho
<https://www.isis.stfc.ac.uk/Pages/How-water-dynamics-could-be-a-new-cancer-biomarker.aspx>
- ISIS Highlight (2021) – “*Towards Neutron Scattering Identification of Olive Oil’s Antioxidant Properties*”
R. Senesi, C. Andreani, P. Baglioni, L.A. E. Batista de Carvalho, S. Licoccia, M.P.M. Marques, G. Moretti, A. Noce, R. Paolesse, S.F. Parker, E. Preziosi, G. Romanelli, A. Romani, N. Di Daniele.
https://www.isis.stfc.ac.uk/Pages/SH21_olive-oil.aspx
- ISIS Highlight (2021) – “*Human Tissue Measured for the First Time using QENS*”, M.P.M. Marques, I. Santos, A.L.M. Batista de Carvalho, A.P. Mamede, V. Garcia-Sakai, L.A.E. Batista de Carvalho.
https://www.isis.stfc.ac.uk/Pages/SH21_QENSontissue.aspx
<https://www.isis.stfc.ac.uk/Pages/LifeSciencesVision.aspx>
- ISIS Highlight (2021) – “*Profiling of Human Burned Bones: Oxidising versus Reducing Conditions*”, M.P.M. Marques, D. Gonçalves, A.P. Mamede, T. Coutinho, E. Cunha, W. Kockelmann, S.F. Parker, L.A.E. Batista de Carvalho.
https://www.isis.stfc.ac.uk/Pages/SH21_Dem-bones.aspx
- ISIS Highlight (2020) – “*First Analysis of Ancient Burned Skeletal Human Remains Probed by Neutron and Optical Vibrational Spectroscopy*”, G. Festa, C. Andreani, M. Baldoni, V. Cipollari, C. Martínez-Labarga, F. Martini, O. Rickards, M.F. Rolfo, L. Sarti, N. Volante, R. Senesi, F.R. Stasolla, S.F. Parker, A.R. Vassalo, A.P. Mamede, L.A.E. Batista de Carvalho, M.P.M. Marques.
- “*Anticancer Drug Impact on DNA – A Study by Neutron Spectroscopy coupled to Synchrotron-based FTIR and EXAFS*”
A.L.M. Batista de Carvalho, A.P. Mamede, A. Dopplapudi, V. Garcia Sakai, J. Doherty, M. Frogley, G. Cinque, P. Gardner, D. Gianolio, L.A.E. Batista de Carvalho, M.P.M. Marques
Phys.Chem.Chem.Phys. **21** 4162-4175 (2019) (DOI: 10.1039/C8CP05881D).
Editor’s choice for the themed collection 2019 *PCCP* HOT articles (<https://rsc.li/2KeAVAY>)
Back cover of *Phys.Chem.Chem.Phys.* **19** 2702 (2017) (<https://doi.org/10.1039/C6CP05198G>)