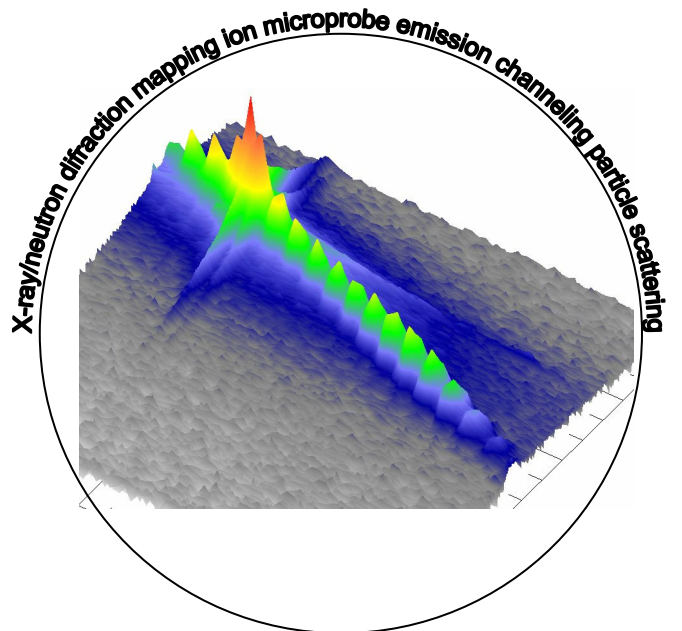


Physics Sector



Physics

Eduardo Alves

The activities developed in the Physics Department are mainly oriented to Applied and Fundamental Research in Materials Science. The research groups in the sector have a long tradition of combining High level Education (M.Sc., Ph.D.) with their own research projects making the department an active scientific Centre. The Physics department owns unique research facilities in Portugal grouped in the following laboratories:

1 - Ion Beam Laboratory (IBL) has a 2.5 MV Van de Graaff Accelerator with an ion microprobe end-station and a 210 kV high fluence ion implanter. This infra-structure is open to external users and the experimental studies cover the fields of material science, environment, health, biomedical, atomic and nuclear physics (cross-section measurements).

The research highlights will appear in the following pages under the headings *Advanced Materials Research, Biomedical Studies, Elemental Characterization and Speciation, Materials Characterization with Radioactive Nuclear Techniques, and Nuclear Reactions.*

2 - High Temperature Materials Laboratory (MA³T) is equipped with a high-resolution, high-temperature diffractometer (*Hotbird*). The *Hotbird* owing to its high specificity and extended capabilities is used to solve difficult problems in advanced materials used in the electronic industry, high-temperature alloys for fusion applications and superconductors. The research activity in the laboratory is merged with that of the Advanced Materials Research Group.

3 - Neutron Spectrometers at the ITN nuclear research reactor RPI comprise a 2-axis diffractometer, DIDE, one SANS instrument, EPA, and one TOF

diffractometer for educational purposes. A new detector assembly for DIDE is projected and awaits a funding decision. Tests to improve signal-to-noise ratios are currently under way at the EPA facility. R&D on the characterization of new materials and instrument optimization currently involves collaboration with groups in Aveiro, Saclay, Budapest and Sofia. Design and fabrication of neutron spectrometer components under contract, was carried out for the Greek research reactor at Demokritos NRC. Activities are presented under *Condensed Matter Physics.*

4 - Ionising Radiation Facilities – The Co-60 unit (UTR) with a semi-industrial dimension, has been running to develop applied research for Industrial purposes. In order to develop new radiation technology applications, the upgrading and renewal of the equipment is being carried out by the “Radiation Technologies: Processes and Products Group”. This project implies the use of ionizing radiation equipment (e.g. accelerator and gamma experimental facilities), a multidisciplinary laboratory with controlled environment and application of automated-robotic systems in the facilities. The main R&D activities for the application of ionising radiation are described under the heading *Radiation Technologies: Processes and Products.*

5 – Nuclear instruments and Methods activities focus in modelling of radiation fields, calculation of neutron physics parameters, measurement of neutron cross-sections; development of software for control, design of electronic instrumentation for nuclear applications, instrumentation and technical assistance. Activities are presented under *Nuclear Instruments and Methods.*

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