

Physics and Accelerators Unit

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During the year 2008 and within the framework of the Re-Equipment programme, several researchers and technicians of the Unit were pretty much involved in the upgrading and installation of new experimental equipments or facilities.

In addition, the research activities covering different topics in Advanced Materials, Environment, Health and Biomedical Sciences followed the approved time schedule and were supported exclusively by externally funded projects. Along with the scientific achievements the post graduated formation was maintained with the engagement of graduated students in the research activities, leading to M.Sc. and Ph.D. theses. The strategic collaborations with Institutions and Universities worldwide were strengthened and were fundamental to maintain the high scientific production of the Unit. The following laboratories and Groups are responsible for the R&D activity:

1 – Ion Beam Laboratory (IBL) equipped with a 2.5 MV Van de Graaff Accelerator and an ion microprobe end-station, a 3 MV tandem accelerator with a micro-AMS system, and a 210 kV high fluence ion implanter. The laboratory is open to external users and the experimental studies cover the fields of Materials Science, Environment, Health, Biomedicine, Atomic and Nuclear Physics (cross-sections measurements). The research topics will appear in the next pages under the headings *Advanced Materials Research Group, Materials Characterization with Radioactive Nuclear Techniques, Elemental Characterization and Speciation Group, Group of Biomedical Studies and Nuclear Reactions Group.*

2 – High Temperature Materials Laboratory (MA³T) equipped with a high-resolution, high-temperature diffractometer (*Hotbird*), particularly adapted to solve difficult problems in advanced materials (*e.g.* materials for the electronics industry, high temperature alloys for fusion applications) and a high resolution

diffractometer to study low dimensional single crystalline structures. The research activity in the laboratory is merged with the Advanced Materials Research Group.

3 – Ionising Radiation Laboratory is fitted with a Co-60 unit (UTR) with a semi-industrial dimension that 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 have been carried out by the *Radiation Technologies: Processes and Products Group*. The project implies new ionizing radiation equipment (*e.g.*: electron accelerator and gamma experimental facilities), a multidisciplinary laboratory with controlled environment, and use of automation–robotic systems in the facilities. The main R&D activities will appear under *Radiation Technologies: Processes and Products Group.*

4 – Nuclear Instruments and Methods Laboratory activities are focussed in modelling radiation fields, calculating neutron physics parameters, measuring neutron cross-sections and application of electric discharges in analytical methods and environmental problems. The design of instrumentation for nuclear applications, and providing of specialized technical assistance in nuclear instrumentation is also part of the activities carried out. These will be presented under the title *Nuclear Instruments and Methods.*

5 – Condensed Matter Group is focused in the processing of hybrid materials and the modification of new polymeric materials by gamma-irradiation using the ⁶⁰Co (UTR) source as well as in their characterization using a wide range of techniques. The R&D work on these materials progress in collaboration with groups in Aveiro, Saclay and Budapest. The activities will be presented under *Condensed Matter Physics.*

Physics and Accelerators Unit Staff

Researchers

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