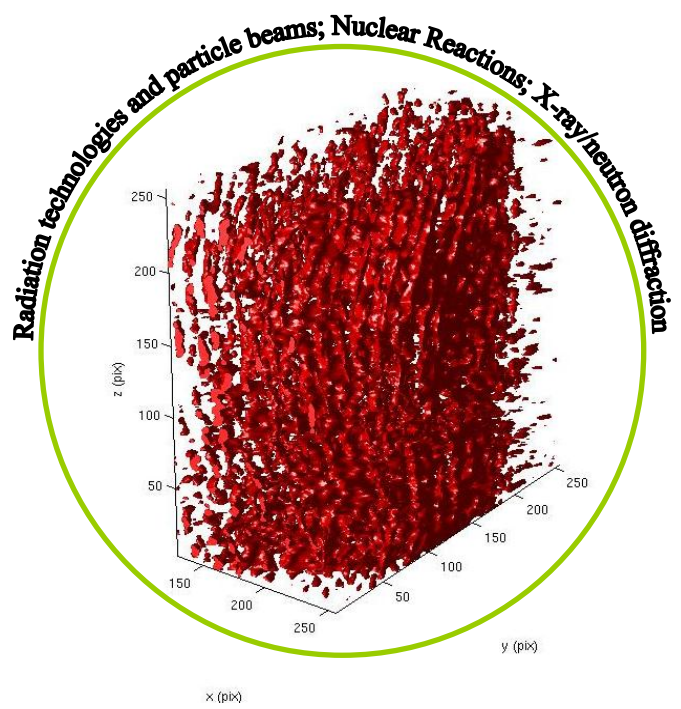


# Physics and accelerators Unit



# Physics and Accelerators Unit

*Eduardo Alves*

In 2010 the activities in the unit fostered its major goal: searching excellence biased by competence, innovation and creativity. The laboratories and new infrastructures installed under the re-equipment programme are fully operational.

The multidisciplinary approach of the research activities contributed to the reinforcement of competences in priority areas like Environment and Biomedical sciences as well as Advanced Materials and Nuclear sciences. Along with scientific achievements the post graduated formation was maintained through engagement of graduated students in the research activities, leading to M.Sc. and Ph.D. theses. The strategic collaborations with Institutions and Universities worldwide strengthened and were fundamental to maintain the high scientific production in 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 opened 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 Nuclear Techniques, Elemental Characterization and Speciation Group, Group of Biomedical Studies and Nuclear Reactions Group.*

**2 – High Temperature Materials Laboratory (MA<sup>3</sup>T)** equipped with one high-resolution, high-temperature diffractometer (*Hotbird*), particularly adapted to solve difficult problems in advanced materials 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 mainly to apply services for industrial purposes (under exploitation of CHIPionizing, S.A.). In order to develop R&D for 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 multi-disciplinary 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 <sup>60</sup>Co source of UTR 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*.

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