CNA: USER-ORIENTED ACCELERATOR FACILITY DEDICATED TO INTERDISCIPLINARY RESEARCH IN SPAIN

J. M. LOPEZ-GUTIERREZ

Centro Nacional de Aceleradores, Avenida Tomas Alva Edison, 7. 41092-Sevilla. Spain

The Centro Nacional de Aceleradores (CNA) is a joint-research centre of the University of Seville, the regional government of Andalucía and the Spanish National Research Centre (CSIC). It is recognized by the Spanish government as a Singular Scientific Technical Facility (ICTS) dedicated to interdisciplinary research and open to external users. It has six major facilities: A Van der Graaf 3 MV Tandem Accelerator, a 18/9 MeV Cyclotron Accelerator, an accelerator 1 MV Mass Spectrometer, a radiocarbon dating system called Micadas, a ⁶⁰Co irradiator and a PET/CT scanner.

The research lines applied with these set of facilities are numerous and cover fields as diverse as material sciences, environmental impact, nuclear and particle physics, nuclear instrumentation, medical imaging, biomedical research, ¹⁴C dating and irradiation samples of technological and biological interest, between others.

In this contribution, some research lines more related with sustainable development and with important socioeconomical impact will be summarized.

- The CNA neutron beam line associated to a charged pulsed beam in the Tandem (HISPANoS) allows for time-of-flight measurements which determine the neutron energy, opening research application related to astrophysics, detector characterization and electrical devices irradiation for aerospace purposes, between others.
- The use of an adequate stripper gas in the AMS Tandetron allows to measure heavy radionuclides with very low detection levels, allowing to perform environmental studies using these radionuclides as tracers. In fact, CNA is an active IAEA Collaborating Centre in the topic "Accelerator-based analytical techniques for the study of radionuclides in marine samples",
- The use of a microbeam line in the Tandem accelerator allows to apply the ion-beam-induced current technique (IBIC) to investigate the spectroscopic properties and radiation hardness of different semiconductor detectors. We are a member of the international CERN RD50 collaboration "Radiation hard scintillaor devices for hgh luminosity devces".
- The combined use of the 18/9 MeV Cyclotron and the PET/CT scanner located in the same building, allow to external users to perform in an optimized way clinical study using radiopharmaceuticals of very short life.
- In addition to conventional ¹⁴C dating application in archaeological, geological studies, forensic applications are being carried out in CNA by the measurement of ¹⁴C in the Micadas system, such as the dating of ivory samples against poaching and ivory smuggling.
- Unique irradiation studies are being performed in the Centre by combining the proton and heavy ion irradiation research lines associated to the 3 MV Tandem and 18/9 MeV Cyclotron accelerator, with the photon irradiation (⁶⁰Co) facility which generates in air and at 100 cm distance a maximum kerma rate of 100 Gy./h.