

Title: The PANDORA Project: reproducing a stellar environment in a Laboratory

Description: Aim of the PANDORA project is to measure the decay rate, as a function of the ionization state, for β radionuclides (like ^{176}Lu) involved in several astrophysical process and cosmology. Radioactive species will be injected in a plasma produced inside a magnetic trap (reproducing stellar-like conditions in terms of ionization stages), where they will be ionized by energetic electrons. The trap will be equipped with a complete multi-diagnostic system, able to measure not only gamma rays following the β decay, but also the plasma self-emission. In this view, a precise knowledge of the plasma density and energy distribution is mandatory. The student will learn about:

- Fundamental of plasma physics and magnetic trapping.
- The numerical approaches used to simulate and described the magnetized plasmas of the PANDORA trap.
- The techniques to inject radioactive species into the trap.
- Notions about the radioactive decay and the problems connected with the detection of gamma ray in presence of a relevant self-emitted background of radiation.

The student will also have the possibility to take part to the operations of a small-scale magnetic trap, namely an ECR ion source, used to produce ion beams to feed the accelerator complex of LNL.

Tutor: Alessio Galatà

Activity period: September-October 2022

Local Secretariat: Luisa Pegoraro (luisa.pegoraro@lnl.infn.it)

Other information:

Free lunch at LNL Canteen

LNL Free Guesthouse