

## Accurate characterization of radioactive deposition for nuclear data measurements



<b>Laboratory / Team</b>	Institute of Nuclear Physics, Orsay (IPNO) – physics and radiochemistry of nuclear energy - Back-end of the Nuclear Fuel Cycle and Spallation Physics Team (PACS) <a href="http://ipnwww.in2p3.fr/Physique-de-l-aval-du-cycle-et-de-la-spallation">http://ipnwww.in2p3.fr/Physique-de-l-aval-du-cycle-et-de-la-spallation</a>
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<b>Main topics</b>	Instrumentation / Metrology / Radioactive sources
<b>Objectives/context</b>	Measure the quantity of active material deposited on a thin target with a high-degree of accuracy (1%); study of surface distribution of the material, its surface condition and presence of light atoms.
<b>Equipment / resources / tools / software used</b>	radioactive source, alpha detector, vacuum chamber, automated displacement system, signal generator, oscilloscope / signal acquisition card, amplifier, spectroscopy software, data analysis software
<b>Level / Duration / Period</b>	L3 or M1 / 1 to 3 months / January-July 2019
<b>Number of trainees</b>	1 student / course period

### Course description / main tasks

- Get familiar with the working environment: vacuum chamber, constraints associated with use of unsealed source, detector polarization.
- Characterization of a silicon detector: measurement of geometry, calibration with a radioactive source. Observation of the oscilloscope signals, spectrum acquisition.
- Use of detector-source distance measurement system.
- Measurement of activity, then deduction of a total quantity of material. Detailed measurement by scanning, checking consistency of results.
- Analysis of energy spectrum of alpha particles. Simulation of their energy spectrum with the SRIM software.
- Comparison of experimental and simulation results.

### Skills acquired on completion of the course

- Use and setting of a measurement chain for analysis and detection of radioactive elements.
- Calibration of a detector, understanding calculation of solid angles.
- Radioactivity of actinides and slowing of alpha particles through the material.
- Measurement and analysis of energy spectra of alpha particles.
- Statistical methods.
- Metrology skills: identification of difficulties, uncertainty estimate.