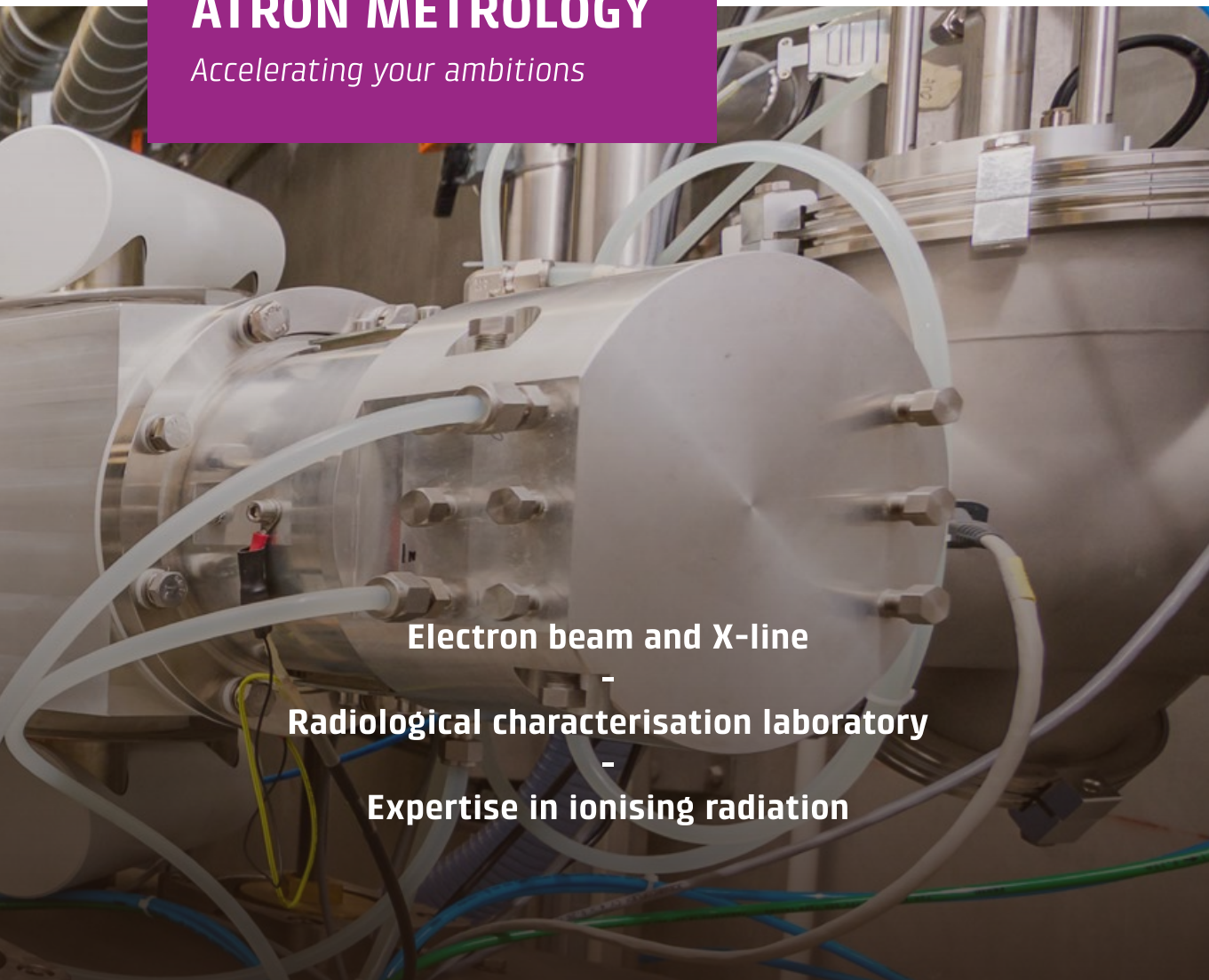
ATRON METROLOGY

Accelerating your ambitions



Electron beam and X-line

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Radiological characterisation laboratory

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Expertise in ionising radiation

Your contacts

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ATRON Metrology

"A unique model for the development of all activities related to irradiation"

ATRON Metrology is a technological platform based on a breakthrough technology in nuclear instrumentation, which aims to abandon the use of radioactive sources in favour of controlled irradiation, generated by an electrostatic electron accelerator.

While ATRON Metrology's primary vocation is the calibration of radiation survey meters for the nuclear, medical or defence industries, the many applications it offers in related fields make it a unique model for the development of all radiation activities.

The platform includes in particular:

- an electrostatic electron accelerator with a removable X target,
- tools allowing irradiation in special conditions,
- a measurement and analysis laboratory,
- a team with various scientific skills.

ATRON Metrology has proven the interest of such a platform for many applications in the fields of nuclear (EDF, ENGIE), space (ESA, CNES) or academic research (CNRS, CEA).

Our services >

FELIX – Electron beam and X irradiation line

The FELIX facility is based on an electrostatic electron accelerator capable of producing a continuous beam of mono-energetic electrons or an extended X-ray irradiation field, configurable in terms of energy and fluence over wide ranges.

In electron beam, irradiations are carried out under vacuum, in the extension of the accelerator line. The energy of the beam, adjustable from 200 keV to 3.5 MeV, induces depths of penetration of charged particles in matter that can be modulated over a scanning surface that can go up to 40×220 mm² and at controlled temperature.

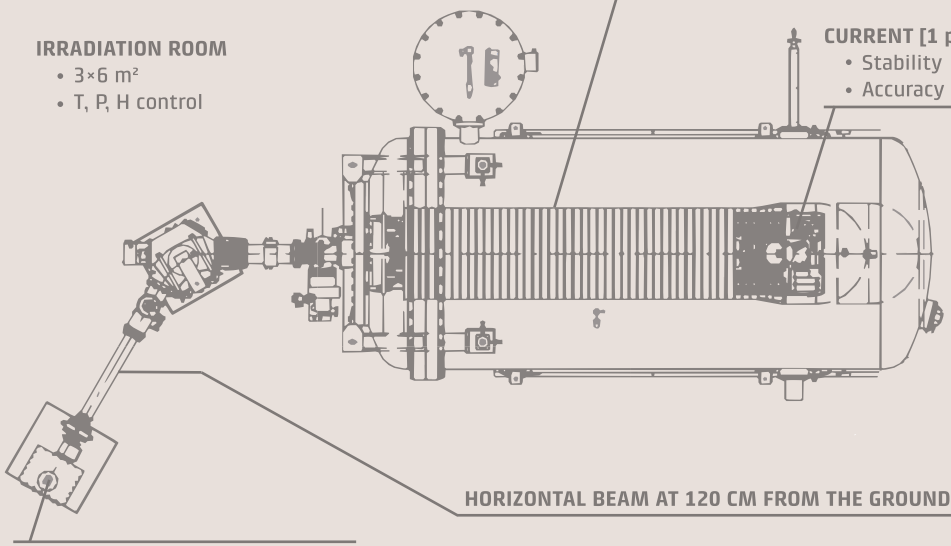
Concerning the X-ray irradiation field, the accessible energy ranges are just as wide, but three energies are used, up to 1.25 MeV, 2 MeV and 3 MeV, for which the traceability of our reference fields is ensured in terms of air kerma and ambient equivalent dose. Dose rates are adjustable over nine orders of magnitude and range up to 500 Gy/h at 1 m from the target.

3.5 MeV
e⁻-beam & X-rays

VOLTAGE [150 kV : 3,5 MV]
- Accuracy < 1 %
- Reproducibility < 0,1 %

CURRENT [1 pA : 1 mA]
- Stability < 1 % + 2 pA
- Accuracy < 1 % + 2pA

IRRADIATION ROOM
- 3×6 m²
- T, P, H control

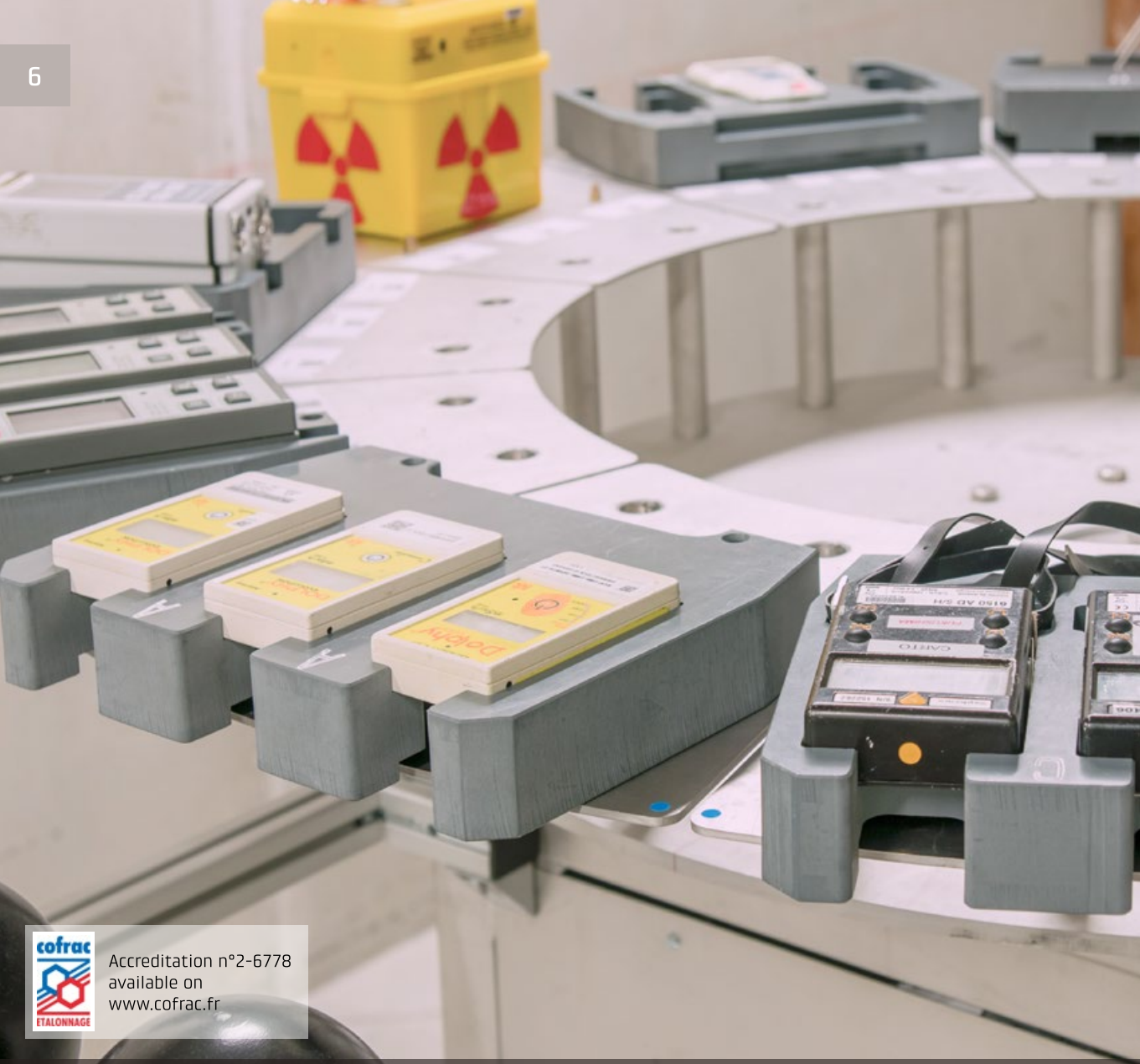


HORIZONTAL BEAM AT 120 CM FROM THE GROUND

REMOVABLE X CONVERSION TARGET
- From 0.1 µGy/h to 500 Gy/h at 1 m
- Homogeneous X-ray irradiation field > 98% over ± 15°

LAETICIA IRRADIATION CHAMBER
- Irradiation e^- up to 6×10^{15} e^-/s
- Controlled temperature

ELECTRON BEAM SCAN
- Up to 220 mm in width at 25 Hz
- Up to 40 mm in height at 1 kHz



Accreditation n°2-6778
available on
www.cofrac.fr

Automated carousel for survey meter calibration

Calibration of survey meters

Metrology | Maintenance | Health

The Calibration of radiation survey meters consists of measuring the characteristic quantities of the instrument, which are provided by its calibration certificate using standard sources. This obligation applies, for example, to survey meters calibrated in ambient equivalent dose rate.

ATRON Metrology provides calibration and calibration verification of probes, survey meters, beacons, using realistic radiation fields connected to a standard source. This breakthrough method and the result of three years of research, was developed in partnership with the CNRS / LPC Caen and the CEA / LNHB.

Absence of radioactive source

Reduction of health and environmental risks

Full support

Corrective maintenance of all models including contaminated instruments and reduced downtime

Metrological mastery

COFRAC accreditation n°2-6778, traceability of beam qualities, control of environmental measurement conditions

An innovative calibration method, without radioactive sources

Diagnosis of an irradiated electronic board

Reliability of embedded systems

Technology | Study | Quality

The growth of ever more complex information systems in the space, aeronautical, nuclear or defence industry leads to consideration of the impact of ionising radiation, of natural (such as cosmic) or artificial origin, on these components or integrated systems.

ATRON Metrology has a radiation source that faithfully reproduces the environmental conditions to which these systems may be subjected too in terms of doses and dose rates, as well as temperature and atmosphere.

X or electron irradiation

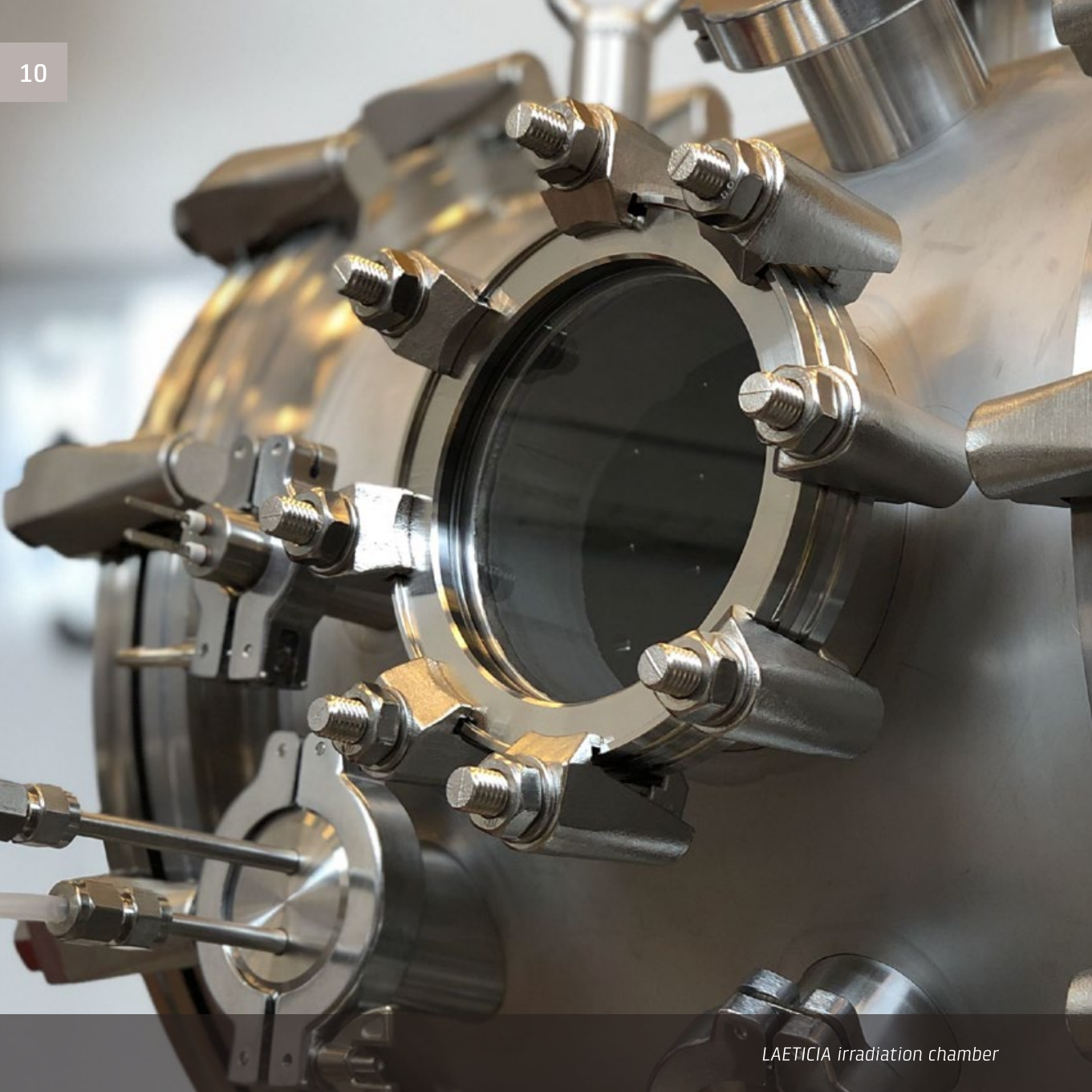
Determination of total ionising dose (TID) effects on components and systems

Design and construction of equipment

Proper functioning tests for hostile environment, establishment of preventive maintenance plans

Modelling tools

Optimisation of the resistance of electronic equipment to the effects of ionising radiation and dimensioning of shielding



LAETICIA irradiation chamber

Treatment of material by irradiation

Innovation | Characterisation | Safety

Supplying energy to matter can lead to the improvement of its characteristics and the emergence of new highly technical materials for specific applications. Irradiation can also cause early degradation of the material.

The material samples of irradiation capabilities available to ATRON Metrology, with electrons or X-rays, allow a fine evaluation of the effects of irradiation on the material for the purposes of developing innovative materials or qualifying materials subjected to irradiation.

Various means of irradiation

Faithful reproduction of specific irradiation conditions and control of environmental conditions

Experimental approach

Irradiation of metallic or non-metallic materials, characterisation of irradiated or control specimens

Culture of safety

Mastery of standards and specific requirements, equipment reliability and ASN authorisation

Our services >

Radiological characterisation laboratory

ATRON Metrology's test, measurement and analysis laboratory relies on state-of-the-art sampling and measurement resources.

They are implemented by a team with recognised skills in nuclear measurements and analyses, in order to meet various needs such as, non-contamination controls, environmental monitoring or the characterisation of nuclear waste.

All laboratory services are carried out in accordance with the ISO/IEC 17025 standard relating to the general requirements for the competence of testing and calibration laboratories, guaranteeing the reliability of the results delivered and the optimisation of the detection limits.

The laboratory accepts most alpha, beta or gamma emitting radionuclides and is responsible for the total management of nuclear waste generated by its activities.

Test, measurement and analysis laboratory

Liquid scintillation counter

Alpha and beta counting

Contamination | Counting | Cleanliness

Since alpha or beta radiation is not very penetrating, its detection requires a sample preparation phase. For liquids, this can be evaporation in the case of global alpha/beta counting, or dilution in the case of liquid scintillation counting.

ATRON Metrology implements the appropriate sampling and measurement resources to achieve low detection limits:

- <0.4 Bq/cm² in beta and <0.04 Bq/cm² in alpha on 100 cm² smears
- <0.1 Bq/L in beta and <0.01 Bq/L in alpha on liquid samples

Non-contamination control

Analysis of liquid or smear samples, indirect alpha and beta measurements, compliance with release thresholds

Global alpha/beta index

Low noise proportional counter and automated sample changer

Liquid scintillation counting

Low energy beta emitters, 3H or 14C and rapid rendering of results

Gamma spectrometry chains

Gamma and X spectrometry

Detection | Identification | Monitoring

Nuclear decays are often accompanied by the emission of de-excitation gamma radiation from the daughter nucleus. It can also result in an electronic rearrangement on the atomic scale, responsible for the emission of X-rays. Their energies are characteristic of the emitting radionuclide.

By tracking them by X or gamma spectrometry, ATRON Metrology enables the identification of emitting radionuclides and the determination of the activity concentration of the sample, liquid or solid, at thresholds as low as a few Bq/kg.

Identification of radionuclides

Low resolution GeHP detectors, X-ray spectrometry chain, low background noise and spectral signature

Environmental monitoring

Radiological cleanliness of effluents, soils, sediments, plants

Characterization of waste

Medical sector or nuclear industry, discharge of liquid effluents, determination of IRAS

Our services >

Expertise in ionising radiation

The interaction of ionising radiation and its effects on matter are complex phenomena to understand which depend on multiple parameters.

ATRON Metrology has acquired recognized expertise in the fields of radiation-matter interaction and nuclear measurement. On the basis of Monte-Carlo modelling or the performance of tailor-made tests, we contribute to the understanding of the physico-chemical phenomena involved and to the optimisation of your processes.

Interaction of ionising radiation

Understanding of physical processes, Geant4 or MCNP-X modelling libraries

Capacity for innovation

Expertise shared with partner laboratories, participation in international research projects, scientific collaborations

Collaborative approach

Respect for ethics, mutual values, and total confidentiality of work

Monte-Carlo modelling

Our services >

Professional training

The application of theoretical knowledge is essential for good learning. However, the necessary equipment can be expensive or difficult to implement, in particular in the nuclear field.

Our technological platform presents the appropriate means and skills to support learning. It is regularly made available to training organisations for this purpose. Driven by the desire to transmit, our experts also contribute to the animation of tailor-made training at ATRON Metrology and within higher education establishments.

Knowledge sharing

Assembly of tailor-made training in radiation protection, radiological characterization, effects of irradiation

Facilitation of training

CAMARI particle accelerator, theoretical and practical modules, initial training, and renewal

Competent person in radiation protection

Sealed sources, unsealed sources, particle accelerator, radiological zoning

Training session at ATRON Metrology's premises

About

ATRON Metrology is a subsidiary of CERAP Prevention, an expert in risk prevention in the nuclear industry for 35 years.

Through its various entities, CERAP Prevention brings together a set of expertise that contributes to the protection of people, the environment, and nuclear installations.

Our expertise in prevention is based on an in-depth knowledge of the facilities and their operation, on a good understanding of the context of the intervention and on the correct definition of the countermeasures to be implemented.

It is also based on the reliability of the facilities, from design to deconstruction. Contributing to it is an integral part of our commitments.

Present throughout the life cycle of nuclear installations, CERAP Prevention and its entities support the key players in the fields of radiation protection, nuclear safety, instrumentation and nuclear measurement, project management and training in occupational health and safety.

CERAP Prevention has a solid understanding of radiological measuring instruments built on a long experience of their use and on strong skills in electronics and metrology.

Initiated in 2015, the ATRON Metrology project was born from a strong ambition of CERAP Prevention to consolidate its position in the field of nuclear instrumentation.

2015

Development by CERAP of a method for calibrating survey meters without radioactive sources

2018

Start of operation of ATRON Metrology and realization of the first irradiations

2021

Participation in international R&D programs and obtaining COFRAC accreditation n° 2-6778

Visit us at

www.atron.fr/en

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