



Nuclear Sciences and Instrumentation Laboratory

By the Numbers



NSIL currently leads 2 Coordinated Research Projects involving over **25** research organizations.

The laboratory provides technical support to more than **30** Technical Cooperation projects, including **8** regional projects, involving more than **70** Member States.

More than **150** laboratories have participated in proficiency test exercises organized by NSIL to support their quality management efforts.

More than **300** fellows and scientific visitors have been hosted by NSIL for hands-on training. The laboratory organizes regional hands-on training courses with the support from Technical Cooperation Projects.



Fostering the effective use of nuclear instrumentation and related capacity building

As part of the IAEA Physics Section, the Nuclear Science and Instrumentation Laboratory (NSIL) helps Member States to establish, operate and maintain various nuclear instrumentation and spectrometry techniques in support of a wide range of applications such as health care, food, agriculture, environment, forensics, cultural heritage, and material science.

Four Key Areas



Nuclear Instrumentation

Successful use of nuclear technology depends on reliable instruments, monitoring and diagnostic equipment. These instruments allow the accurate measurement of both natural and man-made radiation.



Nuclear Spectrometry

Nuclear and related analytical techniques are an advantageous choice for comprehensive characterization of materials. In many cases these techniques are non-destructive, capable of measuring a variety of samples and cost-effective.



In situ techniques

Portable instruments have reached a high level of analytical performance and offer several advantages, including fast determination of contaminant concentrations and activities, identification of hot spots, cost reduction for investigations, and fast determination of the contaminant's spatial distribution.



Access to accelerator facilities

The laboratory facilitates access to accelerator facilities through practical arrangements and Coordinated Research Projects, in particular for researchers from Member States without access to such facilities.



IAEA

Nuclear
Sciences and
Applications

Key activities

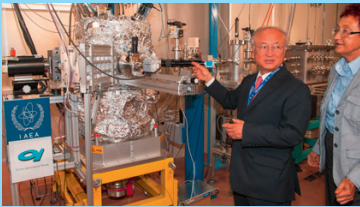
NSIL helps Member States' laboratories to **design, install, operate and maintain the nuclear instrumentation** suitable for their research and applications. NSIL supports the utilization of Member States' existing infrastructure and assists with planning for future facilities. Since its creation in the late 80s, NSIL has supported the establishment of more than 100 X-ray Fluorescence laboratories worldwide.

NSIL organizes **hands-on training courses** and provides **capacity building** through collaborating partner institutions in Member States or directly on-site at national laboratories. E-learning tools have been developed and are being used for both self-learning and teaching.

In the field of nuclear instrumentation, a **network of laboratories** has been created to support the needs of more than 100 institutions worldwide to reliably operate and maintain instrumentation, as well as to design and construct customized measuring systems and equipment.

NSIL organizes **periodic proficiency tests** for analytical laboratories, which help to maintain their quality assurance and quality control programmes or seek for accreditation.

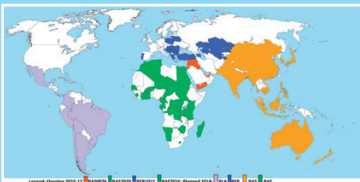
Success stories



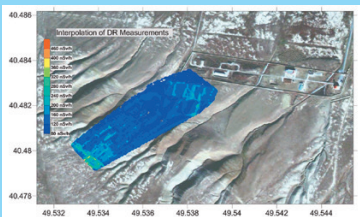
Since 2014, through the bilateral agreement between the IAEA and ELETTRA synchrotron light facility in Trieste, Italy, researchers from 18 Member States have been successfully applying these techniques in studies related to materials for energy storage and conversion technologies; environmental monitoring; elemental distribution/speciation on plant organs; preventive conservation of cultural heritage; food products security and authenticity.



Recently, specific X-ray-based techniques and procedures have been developed for elemental characterization of materials for near surface studies, micro analysis and 2D and 3D distribution of elements in archaeological samples or precious works of art.



More than 80 Member States participate in IAEA Regional Technical Cooperation Projects monitoring air quality, identifying the most probable sources of air pollution and trajectories of transboundary migration of air particulate matter.



NSIL, in cooperation with other IAEA units working on environmental remediation projects, has developed mobile gamma spectrometry capabilities, allowing on-request support to several Member States (Argentina, Azerbaijan, Gabon, Indonesia, Kyrgyzstan, Mexico, Uzbekistan and Zambia) by conducting pilot missions on radiological assessment of sites in environmental assessment and remediation-related projects.

Future development

The revised vision and mission of NSIL as part of the IAEA Physics Section includes enhanced capacity for in-house laboratory facilities and instrumentation using three analytical and irradiation probes: **X-rays**, **neutrons**, and **ions**. This will allow expanding IAEA's support to Member States in:

- Capacity building through education and training;
- Facilitation of applied research;
- Provision of specialized services both to internal and external users.

