



Securing A Better Future For All **Nuclear Techniques for Global Development and Environmental Protection**

Nuclear Physics

Facilitating the Peaceful and Practical Uses of Nuclear Science

When properly applied, nuclear science—the study of atomic nuclei and other subatomic particles — can contribute in many ways to the health, development and security of communities around the world. In this context, the IAEA plays an important role in helping interested Member States develop the capabilities and infrastructure necessary to manage their own programmes devoted to nuclear and radiological applications.

The IAEA's nuclear science programme helps Member States to establish sound frameworks for the efficient, safe and secure use of new nuclear technologies, including accelerator facilities, research reactors and future nuclear fusion facilities. By applying nuclear technologies in a wide variety of areas such as energy production, health care, food and agriculture, industry and the environment, Member States can benefit immensely from the ensuing socioeconomic developments, as well as providing better living conditions for their citizens.

Meeting the Growing Demand for Nuclear Techniques

The effective development of new nuclear technologies and their applications, as well as the safe and cost effective maintenance of existing technologies, is essential for countries considering adopting radiation and nuclear techniques for non-energy applications. The interest in nuclear power around the world and the widespread adoption of radiation and nuclear techniques for non-energy applications are major drivers behind the IAEA's continued involvement in strengthening nuclear science capabilities in interested Member States.

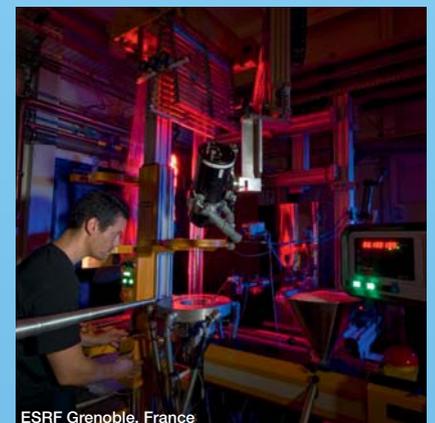
Accelerator facilities represent one means of growth for nuclear science, education and training. The application of accelerators for supporting materials research, analytical sciences for environmental purposes and the development of nuclear energy systems remains a field of high interest for both developed and developing countries. Materials science studies using accelerators, neutron beam techniques and nuclear analytical methods are important for advanced reactors and nuclear fuel cycles, as well as for fusion research, and all these areas are addressed by the IAEA's programmes.

“Building and maintaining scientific and technological capacities is key to achieving the Millennium Development Goals in Member States.”

Daud Mohamad

Deputy Director General
Department of Nuclear Sciences
and Applications

The IAEA's nuclear science programme supports Member States in optimizing the utilization of accelerator based technologies, which can be adopted for a variety of purposes, including the analysis of archaeological findings or for use by museum curators. For example, the techniques afforded by accelerator based technologies allow scientists to recognize the elemental composition of pigments or materials of art pieces in order to detect forgery, determine provenance and better understand the methods of production.



ESRF Grenoble, France

Developing Member States have also taken on a fresh interest in the role of research reactors (RRs) in nuclear science development and applications. The IAEA's RR thrust is fourfold: (i) assistance to support sustainable and strategic utilization of reactors and encouragement of networking and coalitions among RRs which serve nuclear applications in developing countries; (ii) support to strengthen the management of RR operations with a view to enhancing their availability for certain vital applications such as isotope production; (iii) assistance and guidance on infrastructure, including existing RRs and regional RRs; and (iv) facilitation of the conversion of reactors to the use of low enriched uranium fuel and targets, and return of fresh and spent highly enriched uranium (HEU) fuel to the countries where it originated. The IAEA continues to place emphasis on activities that minimize the use of HEU in RRs and other experimental facilities.

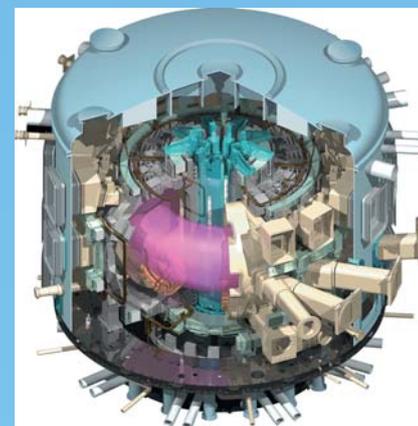
The IAEA's support of nuclear fusion research focuses on fostering international cooperation in the two major approaches of magnetic confinement and inertial fusion. The International Thermonuclear Experimental Reactor (ITER) aims to demonstrate the scientific and technological feasibility of fusion energy. The IAEA has been actively involved in the ITER project from its inception, providing practical support such as the publication of technical documents and the ITER newsletter.

The Future of Applied Nuclear Sciences

The IAEA supports Member States' needs based development efforts through technical cooperation programmes, coordinated research activities, advisory missions, laboratory training and analytical services, publication of state of the art reports on specific topics and issues, and preparation and provision of materials for human resources development. Such activities address the requirements of both nuclear energy systems and non-power nuclear applications.

In light of the current growing interests and commitment towards opting for nuclear power, qualified human resources are vital. In the future, human resources will be needed not only to ascertain the safe and continuing operation of exiting nuclear programmes, but also to develop and implement new and expanding ones. The IAEA nuclear science programme supports Member States in maintaining and developing innovative nuclear education, training in nuclear sciences and using sustainable technologies.

The IAEA's activities in fusion focus on increasing international cooperation and support for the development of fusion power plant science and technology. This approach includes the use of smaller facilities in about 40 Member States for proof-of-principle experiments and basic research and training for scientists. Additional attention will be given to encourage talented female and male scientists to pursue higher education and research in nuclear fusion.



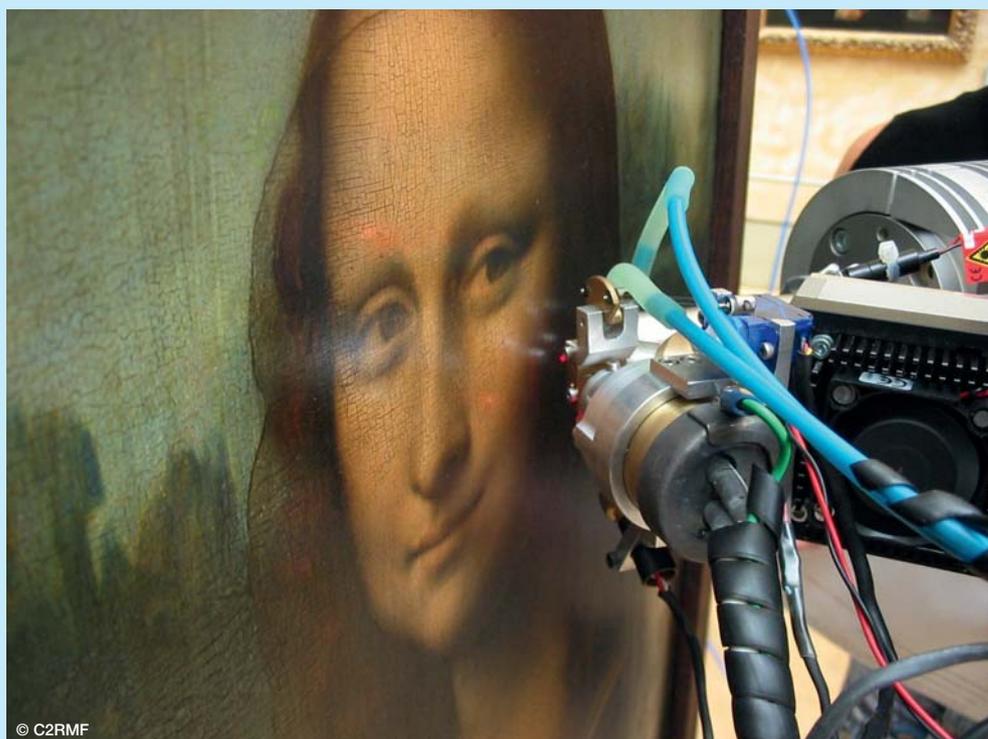
Providing the Tools for Global Development

By facilitating the peaceful use of nuclear techniques around the world, the IAEA has contributed to many developments in nuclear applications across a variety of fields.

The laboratory based services offered by the Nuclear Spectrometry and Applications Laboratory, located in Seibersdorf, contribute to activities in the field of instrumentation maintenance, servicing and repair, with a particular emphasis on assisting developing countries.



A major research activity is X ray fluorescence spectrometry, which is used worldwide for the analysis of geological materials, the monitoring of environmental pollution and the study of cultural heritage objects.



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