IAEA Technical Cooperation Programme

Advancing environmental monitoring in Slovakia

The challenge

Slovakia's Comenius University has established a scientific and educational centre of excellence in Bratislava, which aims to support the expansion of nuclear power and the decommissioning of nuclear power plants in the country. It aims to provide improved analytical capabilities for environmental radioactivity monitoring. The centre's scientific programme focuses on the applications of accelerator mass spectrometry (AMS), ion beam analysis, ion beam modification of materials, and underground physics for radio-ecological, environmental, life and material sciences. The new centre of excellence is designed to strengthen protection of the environment from radiation from nuclear and non-nuclear technologies. It also will address issues pertaining to the long term storage of radioactive waste, and to examine groundwater and atmospheric vulnerability to pollution, while also developing new dating methods.

Additionally, the centre aims to expand capacities in non-destructive elemental analysis techniques in order to advance research into atmospheric pollution and the radiation damage of construction materials used in nuclear reactors.

The project

At the request of Slovakia, an IAEA technical cooperation project was launched in 2012 to facilitate the work conducted at Comenius University in Bratislava. The project focused on studies of the impact of greenhouse gases on regional and global climate change, food control and food analysis, and biomedical studies. Under the project, particle induced X-ray emission (PIXE) and particle induced gamma ray emission (PIGE) beam lines provided by the IAEA were installed in Comenius University in September 2015. This equipment is now being used for non-destructive, multi-elemental analysis of the construction materials for nuclear and thermonuclear reactors. It will also be used to

The Centre for Nuclear and Accelerator Technologies was officially opened on 3 December 2015 at the Faculty of Mathematics, Physics and Informatics of Comenius University, Bratislava, Slovakia (photo: IAEA).

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support nuclear forensic studies, environmental studies, biomedical research and a broad range of applications in other sciences, including nanotechnology, electronics, geology, archaeology and cultural heritage studies.

The impact

With the support of the IAEA's technical cooperation programme, the Centre for Nuclear and Accelerator Technologies was officially opened on 3 December 2015 at the Faculty of Mathematics, Physics and Informatics of the Comenius University in Bratislava, Slovakia. The aim of centre is to support research into, and the application of, new technologies in physical, technical, natural, biomedical and archaeological sciences. The centre is now equipped with two ion sources for gas and solid targets, an injection system, a tandem accelerator and a high energy analyser. The advanced equipment and comprehensive training provided by the IAEA will have a significant influence on research and developments in physics, natural sciences, biomedicine, archaeology and many other branches of science and cultural heritage in Slovakia. The results of the research conducted at the facility can be used in various fields, ranging from atmosphere-hydrosphere-biosphere studies to space physics.

H.E. President of Slovakia Andrej Kiska (centre), Aldo Malavasi, IAEA Deputy Director General and Head of the Department of Nuclear Sciences and Applications (left) Karol Micieta, Rector of the Comenius University (right) at the opening of the Centre for Nuclear and Accelerator Technologies (photo: IAEA).

PROJECT INFORMATION

Project No: SLR0008

Project title: Enhancing Capacity for Environmental Radionuclide Monitoring at the Centre for Nuclear and Isotope Technologies and Education/Training (CENIT) to Support the Expansion of Nuclear Power and the Decommissioning of NPPs

Duration: 2012–2015 (4 years)

Budget: €211 262

Contributing to:

Facts and figures

- The Centre for Nuclear and Accelerator Technologies can provide training for laboratories outside the country on topics such as the maintenance of tandem accelerators and on preparation of targets for AMS analyses;
- Slovak nuclear power plants in Jaslovské Bohunice and Mochovce have been assessed for radiation damage. Capacity is now in place to conduct similar studies elsewhere in Slovakia;
- The PIXE/PIGE method can now be applied in cultural heritage studies, including the study of old coins and archaeological objects;
- Radiation damage to construction materials used in nuclear power reactors can now be assessed.

The science

Accelerator mass spectrometry (AMS) is a technique for measuring long-lived radionuclides that occur naturally in our environment. The role of nuclear technology is crucial for the development of state of the art techniques for environmental monitoring, which are based on ion beam applications. These methods were originally developed for nuclear physics studies, specifically for investigations of low energy nuclear reactions, and for interaction studies of charged particles with matter.