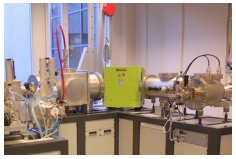
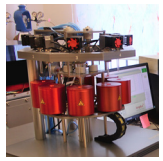
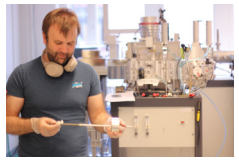

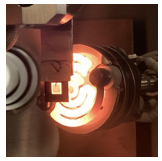


Education

The Tandem Laboratory supports the education of students, researchers, and society as a whole. We contribute numerous activities to courses in undergraduate education at Uppsala University. In addition, we provide advanced user training for graduate students and researchers all over Sweden. Please check our website for current opportunities.

We offer study visits for interested members of the public on request.

UPPSALA 2023. PHOTOS: M. KAMSTEN, D. PRIMETZHOFER, I. BERGSTRÖM, S. LOHMANN.

Contact

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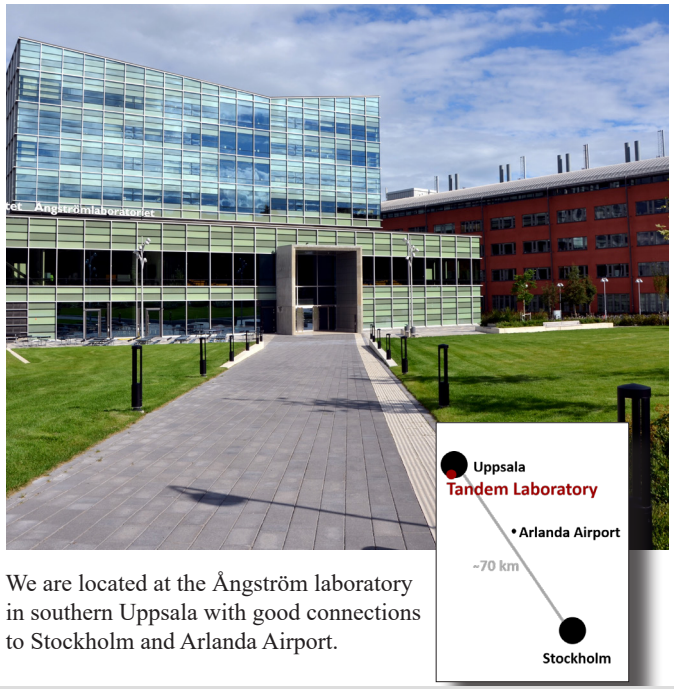
For general questions and enquiries:
tandemlaboratoriet@physics.uu.se

For specific questions regarding radiocarbon dating, as well as e-mails containing radiocarbon sample forms (available on our web site):
radiocarbon@physics.uu.se



We are located at the Ångström laboratory in southern Uppsala with good connections to Stockholm and Arlanda Airport.

Tandem Laboratory

A National Research Infrastructure

The Tandem Laboratory is a national research infrastructure for world-leading materials analysis. Active in a wide range of fields from natural sciences to answering applied questions of relevance to industry and the general public alike, the Tandem Laboratory located at Uppsala University is serving society on national and international level.

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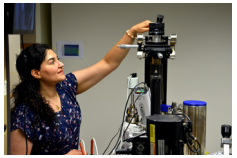

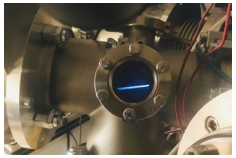
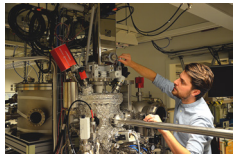
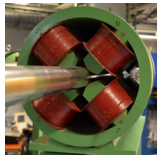

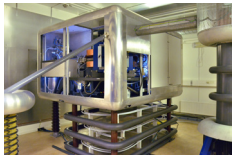
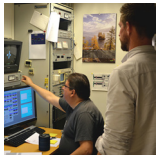


Our organisation

As a national infrastructure, the Tandem Laboratory has a unique status – equivalent to an independent department – within the Faculty of Science and Technology at Uppsala University. Run by a director and steered by a board of representatives from different Swedish authorities and foundations, we follow our mission to serve the Swedish academic, industrial and public sectors with world-leading ion-beam based materials research.

The initial decision to establish a national accelerator-based research center in Uppsala was taken by the Swedish parliament in 1965. Being dedicated to nuclear physics in its early years, the laboratory has been continually developing to an extremely versatile infrastructure addressing research questions within natural sciences, engineering to life sciences and beyond.

Our services

The Tandem Laboratory provides services in three areas. Specifically, we offer our users access to:

- non-destructive characterization of materials composition and structure on the nanoscale;
- ion-beam induced modification of materials and precise tailoring of material properties;
- ultrasensitive mass spectrometry for medicine, biology, archeology and geology.

Our services within ion beam analysis (IBA), ion-beam modification of materials (IBMM) and accelerator mass spectrometry (AMS) are requested by hundreds of customers annually.

Manifold possibilities

The Tandem Laboratory maintains a unique infrastructure within the Nordic countries. Four particle accelerators deliver ions to in total eleven endstations, enabling a plethora of different techniques. Accelerator-based methods are complemented by a number of smaller set-ups, providing further possibilities for sample preparation and analysis as well as material growth.

5 MV Pelletron - the largest accelerator at the laboratory. By supplying a broad range of different light and heavy ion species with energies from 2 MeV to several 10 MeV to six different beamlines, this machine can be used for a number of different techniques within mass spectrometry, ion beam analysis and ion beam modification of materials.

350 kV ion implanter - its highly versatile ion source produces ion beams from almost all elements of the periodic table. Currents up to a few mA enable high-dose implantations even on large targets. The system also serves as a source for low-energy ion beam analysis and our unique time-of-flight medium-energy ion scattering system for non-destructive, depth-resolved crystallography on the nanoscale.

MICADAS - a compact tandem accelerator specifically developed for mass spectrometry of highest quality. The instrument is equipped with permanent magnets reducing energy consumption and is specially designed for efficient handling of different sample types.

Time-of-flight low-energy ion scattering - with energies below 10 keV, this technique allows users to study the composition and structure of the outermost atomic layer of solids. An attached UHV chamber allows for in-situ thin film growth and characterization.

Fields of applications

Radiocarbon dating using accelerators combines high precision with extreme sensitivity, and is used in fields such as **archaeology, geology, glaciology** and **medicine**. **Climate research** using cosmogenic isotopes heavily relies on accelerator mass spectrometry.

The development of **energy materials**, such as solar cells or photo- and electrochromic materials, profits from advanced materials analysis at the Tandem Laboratory. In this area, we also form a node in the fusion research program **EUROfusion,** funded by the European Commission.

Many everyday applications in engines make use of **hard coatings** tested using our instrumentation. Advancing our digital society, **thin-film electronics** is heavily depending on both materials analysis and modification using accelerator-based instrumentation.

In **life sciences** and **regenerative medicine**, the enormous sensitivity of mass spectrometry has provided unique insights revolutionizing our understanding of human biology and related areas.

Funding and support

The Tandem Laboratory national infrastructure is supported by the Swedish Research Council.

Transnational access to our facilities can be gained via several programs within the Horizon Europe framework funded by the European Commision.