

SPiRiT

The Institute of Ion Beam Physics and Materials Research is coordinating the Integrated Infrastructure SPiRiT under the FP7 Capacities Programme of the European Union. The duration of the project is from March 2009 to February 2013, the total funding is 6.991.000 €.

SUPPORT OF PUBLIC AND INDUSTRIAL RESEARCH USING ION BEAM TECHNOLOGY

Integrated Activity,
EU Project No. 227012
www.spirit-ion.eu





SPiRiT integrates 11 leading ion beam facilities from six European Member States and two Associated States. Seven of the partners provide Transnational Access to European researchers and industry at their infrastructures. Ion beams in an energy range from ~10 keV to ~100 MeV are supplied for modification and analysis of solid surfaces, interfaces, thin films and nanostructured systems, being mainly applied in research related to materials, biomedicine, environment, and cultural heritage. SPiRiT aims at increasing user access and the quality of research by sharing best practice, balancing supply and demand, harmonizing procedures and extending the services into new emerging fields and to new users especially from the New European Member States and industry. The project comprises a management section (4% of the total funding) and three interlinked activities, which are Transnational Access (45%), Networking (19%) and Joint Research (32%).

Analysis Techniques		Materials Modification Techniques	
Rutherford Backscattering Spectrometry	RBS	Ion Implantation	II
Elastic Recoil Detection	ERD	High-Energy Ion Irradiation	HEIR
High-Resolution Ion Beam Analysis	HRIBA	Plasma-Immersion-Ion-Implantation	PIII
Proton-Induced X-ray (γ -ray) Emission	PIXE/ PIGE	Ion Beam Lithography	IBL

Potential users from public or industrial research are invited for free use of the ion beam facilities at the SPiRiT partners laboratories, either by conducting experiments personally or by sending samples in case of standard ion implantation or ion beam materials analysis. Regularly, access is given on a transnational basis, i.e. the user has to be employed in a European Member or Associate State in which the specific infrastructure is not situated. However, there are exceptions in particular in case of industrial use and/or non-conventional use of ion technologies.

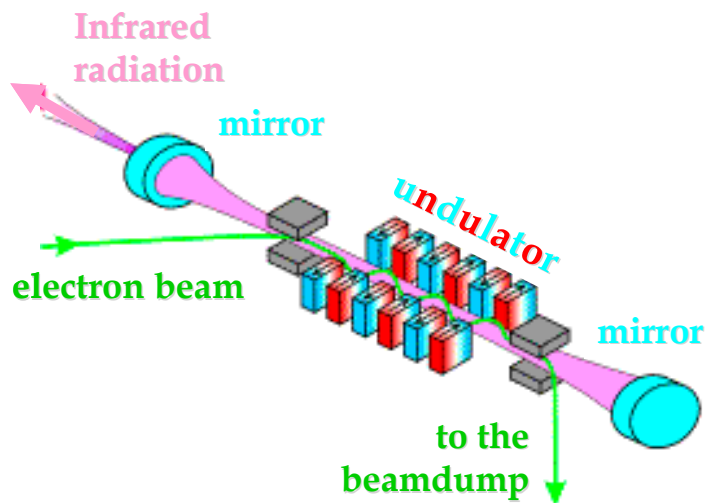
Proposals may be turned in continuously through the SPiRiT website and will be evaluated promptly by an international User Selection Panel. Any successful proposer will be granted free access to the infrastructure, with the associated travel costs and daily expenses being covered by the European Commission.

Until 31-March-2010, the institute is still providing Transnational User Access under the FP6 project AIM, which then will be followed up by access under SPiRiT.

The SPiRiT Consortium	
	Forschungszentrum Dresden-Rossendorf Germany
	CNRS - CENBG Bordeaux France
	Katholieke Universiteit Leuven Belgium
	Jozef Stefan Institut Ljubljana Slovenia
	Universität der Bundeswehr München Germany
	CEA - JANNUS Saclay and CIMAP Caen France
	University of Surrey U.K.
	Instituto Tecnológico e Nuclear Lisboa Portugal
	University de Pierre et Marie Curie Paris France
	Ruder Boskovic Institute Zagreb Croatia
	Swiss Federal Institute of Technology Zurich Switzerland
	(The top seven partners provide Transnational Access)

Free Electron Laser FELBE

ELBE is an acronym for the free-electron laser (FEL) at the Electron Linear accelerator with high Brilliance and Low Emittance (ELBE) located at the Forschungszentrum Dresden-Rossendorf, Germany. The heart of ELBE is a superconducting linear accelerator operating in cw mode with a pulse repetition rate of 13 MHz. The electron beam (40 MeV, 1 mA max.) is guided to several laboratories where secondary beams (particle and electromagnetic) are generated. Two free-electron lasers (U27-FEL and U100-FEL) produce intense, coherent electromagnetic radiation in the mid and far infrared, which is tunable over a wide wavelength range (4 - 250 μm) by changing the electron energy or the undulator magnetic field. Main parameters of the infrared radiation produced by FELBE are as follows:



Parameter	Range / Value	Remarks
Wavelength	4 - 22 μm 18 - 250 μm	FEL with undulator U27 FEL with undulator U100
Pulse energy	0.01 - 2 μJ	depends on wavelength
Pulse length	1 - 25 ps	depends on wavelength
Repetition rate	13 MHz	3 modes: cw / macropulsed (> 100 μs , < 25 Hz) / single pulsed (Hz...kHz)

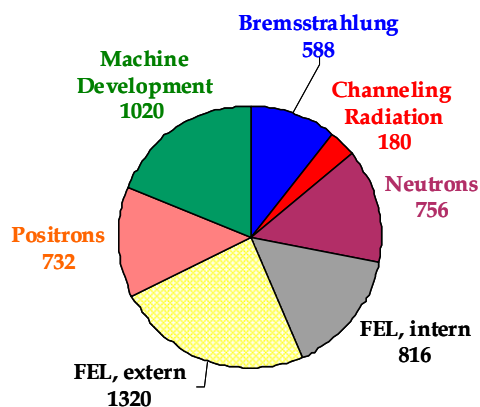
The free electron laser is a user facility. Applications for beam time can be submitted twice a year, typically by April, 15 and October, 15. User from EU countries can receive support through the FP7 Integrated Infrastructure Initiative (I3) ELISA (European LIght Sources Activities). Typical applications are picosecond pump-probe spectroscopy (also in combination with several other femtosecond lasers, which are synchronized to the FEL), near-field microscopy and nonlinear optics. The FELBE facility also serves as a far-infrared source for experiments at the High-Field Laboratory Dresden (HLD) involving pulsed magnetic fields up to 70 Tesla.

The statistics shows that the FEL used 2136 hours beamtime of the ELBE accelerator, which corresponds to 40% of total beamtime. These 40% were again distributed among internal and external users as shown in the graph.

For further information please contact Prof. Manfred Helm (m.helm@fzd.de) or visit the FELBE webpage www.fzd.de/FELBE.



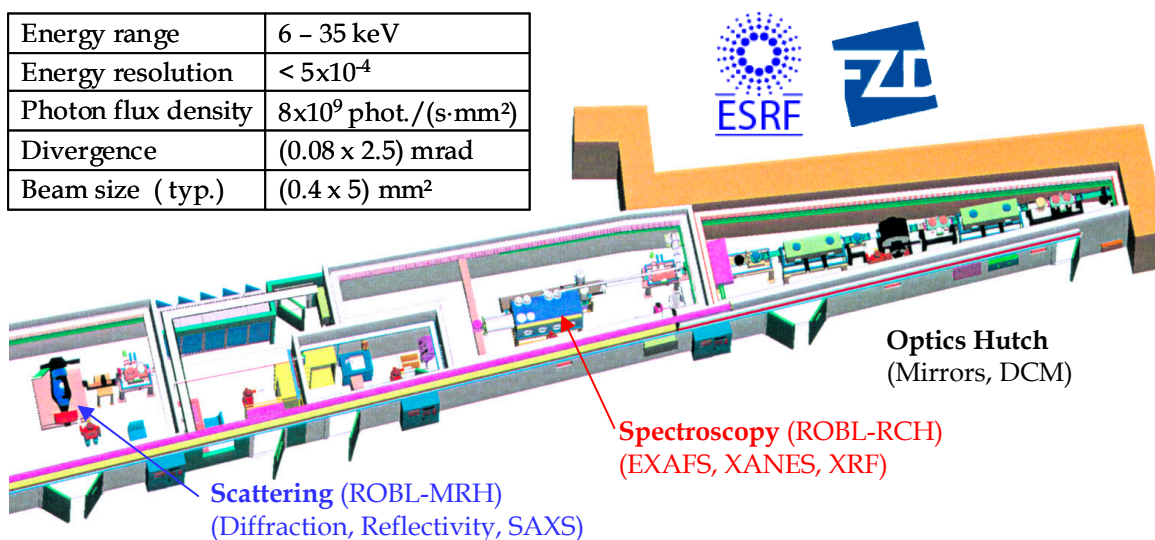
Beamtime Distribution at ELBE 2009
Scheduled: 5.412 h; Used: 4.395 h



ROBL

The ROssendorf BeamLine (ROBL), operated by the FZD since 1998, is a bending magnet synchrotron beam line located at the European Synchrotron Radiation Facility (ESRF) in Genoble, France. The set-up and main parameters are sketched as follows:

Energy range	6 – 35 keV
Energy resolution	$< 5 \times 10^{-4}$
Photon flux density	8×10^9 phot./ $(s \cdot mm^2)$
Divergence	(0.08×2.5) mrad
Beam size (typ.)	(0.4×5) mm ²



The activeness of ROBL is based upon the high specialization of its two end-stations for Radiochemistry (RCH) and Materials Research (MRH). ROBL-RCH is one of only two stations in Europe dedicated to X-ray absorption spectroscopy of actinides and other radionuclides. The core competence of ROBL-MRH is the analysis of thin films, multilayers and (ion-beam-synthesized) nanostructures using X-ray scattering techniques. A continuously increasing number of experiments are performed as *in-situ* X-ray studies using process chambers for magnetron sputter deposition, ion irradiation or annealing under vacuum or various (including reactive) atmospheres, respectively. Non-destructive X-ray analysis during materials processing is applied to characterize the formation or transformation of crystalline phases, their texture, the evolution of nanostructures, surfaces and interfaces properties or strain/stress development at thin films. These data are the key to understand the underlying physical or chemical processes and to interpret the corresponding macroscopic materials properties with the general aim to design materials with well defined properties.

ROBL has the status of an user facility. Applications for ROBL beam time can be submitted twice a year, typically by March, 1 and September, 1 via the official ESRF proposal submission portal. Successfully reviewed proposals will be financially supported by the ESRF by covering the travel and accommodation costs. In addition, there is the possibility to use in-house research beam time for collaborative experiments between external users and FZD scientists for studies of common interest.

With more than 5000 beam time hours per year ROBL belongs to the most reliable and booked beam lines at the ESRF. The diagram at the right plots the beam time distribution of ROBL which reveal an availability of about 90% for experimental research studies. In 2009 visitors from more than 20 European and Overseas Universities and Research Institutions were involved in ROBL experiments.

For further information please contact

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or visit the ROBL webpage www.fzd.de/ROBL.

