

Large Research Facilities at PSI



The Paul Scherrer Institute (PSI) is a multi-disciplinary research centre for natural sciences and technology. PSI collaborates with national and international universities, other research institutions and industry in the areas of solid state research and material sciences, particle physics, life sciences, energy research and environmental research.

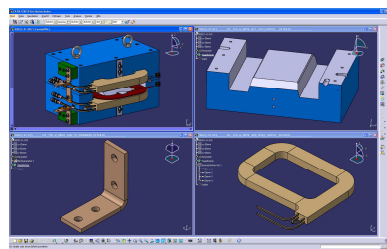
The PSI Department Large Research Facilities (GFA) takes responsibility for the operation and development of several particle accelerators. Two facilities, the [high intensity proton accelerator complex](#) and the [synchrotron light source SLS](#), form the core of a successful and productive research infrastructure for a large international and national user community. Mesons, neutrons and synchrotron radiation produced by our facilities are used for a broad variety of experimental research. In addition, GFA operates the proton cyclotron COMET for the [Centre for Proton Therapy](#). Besides performing routine cancer therapy, this facility is devoted to research and development of advanced therapeutic methods.

In the future, the research facilities at PSI will be extended by an [X-Ray Free Electron Laser](#) (SwissFEL) that will produce fully coherent, intense and very short light pulses with wavelengths in the Angström range.

Magnet Section (9 Persons)

Covering the complete lifecycle of magnets:

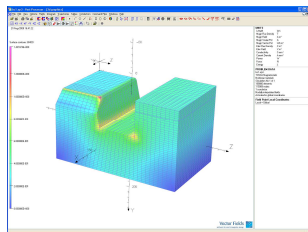
- Specification
- Calculation
- Design
- 3D construction, production drawings
- Purchasing and manufacture
- Assembly
- Measurements
- Installation, commissioning
- Service and repairs
- Replacement, Recycling



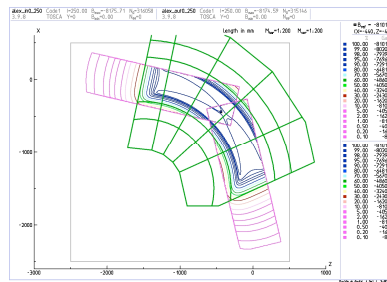
3D CAD design and construction in CATIA



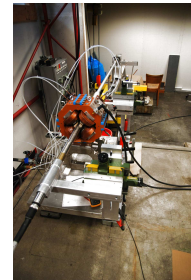
The magnet measuring machine with HALL probe



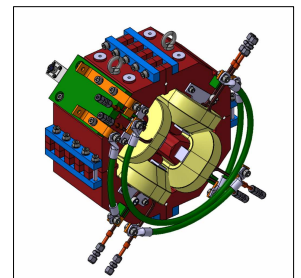
3D magnetic field calculations with OPERA



Measured Field Map of a 46 ton Dipole



The magnet measurement with rotating coil



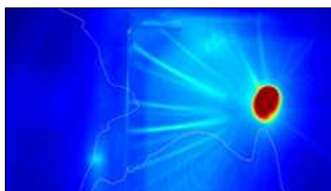
SwissFEL Injector Quadrupole

Challenge for 2011: Procurement and Commissioning of 120 Magnets for SwissFEL project

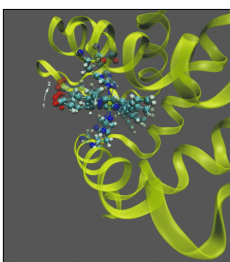
SwissFEL project advancement

Lights on.... Inauguration of the SwissFEL Injector Test Facility

An important milestone for the realization of the new SwissFEL facility was reached on the 24th of August 2010, when the core of the new SwissFEL facility was set into operation at the Paul Scherrer Institute. Guest of honour, cabinet minister Didier Burkhalter, pressed the red button to inaugurate the SwissFEL Injector Test Facility.



The first electron beam has been extracted and accelerated 5.5 MeV on the 12th of March 2010.



A Myoglobin protein, the oxygen storage of our body; SwissFEL will expand knowledge about fundamental aspects of function and control at a molecular level.

Key parameters and features of SwissFEL	
Overall length (incl. Experimental hall)	713 m
Total electrical power consumption	5 MW
Maximum electron beam energy	5.8 GeV
Height of beam line above tunnel floor	1.2 m
Electron gun	3 GHz RF gun with 2.5 cells
Cathode type	Cu photocathode driven by a frequency-tripled Ti:Sa laser
Linac repetition rate	100 Hz
Number of FEL lines	2 (Aramis and Athos)
Undulator type, Aramis FEL	In-vacuum permanent magnet with $\lambda_u=15$ mm
Wave length range, Aramis FEL	1Å - 7Å
Polarization, Aramis FEL	Linear
Undulator type, Athos FEL	Apple II permanent magnet with $\lambda_u=40$ mm
Wave length range, Athos FEL	7Å - 70Å
Polarization, Athos FEL	Variable (circular, elliptical and linear)



SwissFEL Injector Test Facility

Regular user operation is planned for the beginning of 2017.