The Upgrade of the ESRF, Plans for 2008-2017

Sine Larsen
European Synchrotron Radiation Facility, Grenoble, France

The 6 GeV ESRF was the first third generation synchrotron radiation facility to be constructed in Europe. It started operation with 10 beamlines in 1993 and was fully operational with 30 beamlines in 1999. At present 17 European countries and Israel contribute to the operational budget of 80 M€ (112 M$). The activities of the ESRF have continued to develop, more than 6000 users come every year to the ESRF to do experiments on its 40 beamlines. The scientific productivity can be measured by the about 1500 scientific publications in refereed journals per year (corresponding to one per experimental session) based on experiments carried out at the ESRF. The use of synchrotron radiation have also been extended to many new scientific areas, most recently in paleontology and cultural heritage. The last years the European landscape for synchrotron radiation has been undergoing significant changes, a number of national lower energy synchrotron facilities have been built or are under construction (SLS, Diamond, Soleil, Alba, Petra3). This made the ESRF management reflect on the best ways to protect the investments made by the member countries and preserve the position as a leading research facility in Europe.

Since 2003 the ESRF has in close collaboration with its advisory bodies worked on developing plans that will enable the ESRF to continue to serve a broad range of scientific and national communities and maintain its position as a leading European Research Facility as a provider of hard X-rays. In June 2006 the ESRF council gave a green light to go ahead with a more detailed planning of a 10 ten years Upgrade Programme that integrates the Medium Term Scientific Plans with a Long Term Strategy for the facility. The Scientific Programme that forms the basis for the Upgrade Programme is based on the following five key areas: Nanoscience and nanotechnology, Pump Probe Experiments and Time-resolved Diffraction, Science at Extreme Conditions, Structural and Functional Biology and Soft Matter, and X-ray Imaging. This programme is supported by Conceptional Design Reports for 39 new or extensively refurbished beamlines. Advanced sample environment and the use of nanometer sized X-ray beams are an important components of the many of these beamlines. Satisfaction of both aspects requires long beamlines enabling a demagnification of the source. This will necessitate an extension of the Experimental Hall, which at the same time will give room for the creation of new and improved research infrastructures including improved laboratory facilities. All this is supported by a strong development of SR instrumentation.

The estimated costs for the Upgrade Programme are 240 M€ (337 M$). The socalled “Purple Book” published in October 2007 contains a detailed description of the ESRF Upgrade Programme, which comprises:

1. Upgrade of the Accelerator Complex for increased brightness, stability, reliability, and operation flexibility.
3. Extension of ~1/3 of the Experimental Hall for long beamlines enabling nanometer beams.
4. Development of new SR Instrumentation within the framework of European Collaboration to underpin beamlines and source improvements.
5. New Infrastructure Enabling Science-driven Partnerships for new science and applications with increased participation of Academia, Research Labs, Industry, ……

It is the ESRF’s long term goal to provide the best possible facilities for European Science. An overview will be given on plans for the Upgrade of the ESRF.