

L-08

DIAMOND LIGHT SOURCE – A NEXT GENERATION SR FACILITY

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After the very successful start and the by now almost 10 years operation of the 3rd generation x-ray sources ESRF, APS and Spring-8 smaller storage rings are being planned and constructed with properties emphasising applications with photon energies around the 10 keV spectral region. In the UK the Government and the medical foundation Wellcome Trust have decided to build the Diamond Light Source Facility in the South of Oxfordshire right next to the Rutherford Appleton Laboratory. The joint venture company Diamond Light

Source Limited has been created to plan, construct, and operate this facility.

The parameters of this source are listed in Table 1.

Figure 1 shows the model of the building and Figure 2 shows a photograph of the building site in March 2004. The building is planned to be ready autumn 2005 while installation of machine components will already start in September 2004 section by section. With the first injection planned for January 2006, the first users are expected for early 2007.

Table 1: Key Technical Parameters

(Values in brackets are planned for the second stage of the project)

● Electron Beam Energy	3 GeV
● Circumference	561.6 m
● Number of cells	24
● Symmetry	6
● Straight section lengths	6×8 m, 18×5 m
● No. insertion devices	4×8 m, 18×5 m
● Beam current	300 mA (500 mA)
● Emittance (hor., vert.)	300 mA (500 mA)
● Lifetime	> 10 h (20 h and topping-up)

Figure 1.



Figure 2.



The UK user community has proposed by now in total 29 beamlines covering a wide range of applications. The **Diamond Science Programme** consists of the following structure:

- Phase 1: 7 beamlines on IDs; Jan 2007
- Phase 2: 15 beamlines on IDs and BMs at 4 per annum
- Operations: From Jan 2007

Phase I Beamlines

Year 1

- Extreme Conditions
- Materials and Magnetism
- Macromolecular Crystallography
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- Microfocus Spectroscopy
- Nanoscience

Phase II Beamlines

Year 2

- Non-Crystalline Diffraction
- Test beamline
- Small Molecule Single Crystal Diffraction
- High Resolution Powder Diffraction
- Microfocus Macromolecular Crystallography

Future Phase II Beamlines suggested to funder (sequence not confirmed)

- Circular Dichroism Spectroscopy
- JEEP: Joint Engineering, Environmental and Processing
- Monochromatic MX side-station
- Versatile X-ray Spectrometer (XAS-3)
- Infrared Microspectroscopy
- Surface and Interface Diffraction
- SISA: Surface and Interface Structural Analysis
- Core XAS
- Coherent X-ray Diffraction
- Surfaces, Interfaces, Gas Phase and Nanostructures (SIGNS)

Further Proposals

- Time Resolved X-ray Diffraction
- Polarised Soft X-ray Beamline
- Small Angle Scattering
- HERALDS: Disordered and partially ordered systems
- Low Energy X-ray Microscopy
- Macromolecular Crystallography
- Inelastic X-ray Scattering

The project will be described in this talk in detail together with the planned fields of applications.