Polarized X-Ray Facility at the Advanced Photon Source*

J. W. Freeland, J. C. Lang, G. Srajer, D. Shu and D. M. Mills

Advanced Photon Source, Argonne National Laboratory, 9700 S. Cass Ave, Argonne, IL 60439, USA

To utilize the unique element-specific nature of polarized x-ray techniques to study a wide variety of problems related to magnetic materials, we have developed two beam lines that provide synchrotron radiation in both the hard and soft x-ray regimes. This facility, which is located in sector 4 of the SRI-CAT, is equipped with two different insertion devices providing capability in both the intermediate (0.5 - 3 keV) and hard x-ray regions (3-100 keV). For the intermediate range, x-rays are generated by a fully electromagnetic undulator. This circularly polarizing undulator will provide left- and right-handed circular, as well as horizontal- and vertical-linear, polarization states. Hard x-rays are generated by the planar undulator A. The horizontally polarized hard x-rays generated by undulator A are converted to circular polarization through the use of diamond phase-retarding optics. Another unique feature of this sector is that the axes of the insertion devices are placed at a small angle (0.270 mrad) with respect to each other. A dipole electromagnet between the devices introduces the angular deviation of the electron beam, so 30 m away in the first optics enclosure, the two beams are separated by 8 mm. This is sufficient to use two horizontally deflecting mirrors to further separate the beams. The implementation of this concept enables simultaneous operation of both branch lines.

Here we report on the capabilities and current status of the sector, which is currently in the commissioning phase.

*This work was supported by the U.S. Department of Energy, Basic Energy Sciences, Office of Science, under contract W-31-109-ENG-38 at Argonne National Laboratory.

Submitting author: G. Srajer, e-mail: srajerg@aps.anl.gov