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Recent Research and Developments on the Scattering Endstation of i10 Beamline of Diamond Light Source

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ABSTRACT

The Beamline for Advanced Dichroism Experiments delivers a soft X-ray beam in the 0.4–1.6 keV energy range. The availability of all polarisation states, combined with the pronounced dichroic effects characteristic of the soft X-ray regime, has facilitated advanced research on magnetism in novel nanostructured systems. The beamline features two endstations, scattering and absorption, each utilising distinct interactions between magnetic materials and incident X-rays to probe material properties.

The scattering endstation is equipped with a 2-circle diffractometer called RASOR [1]. The resonant elastic scattering measurements on RASOR range from magnetic reflectivity studies to soft X-ray diffraction probing magnetic ordering in crystals and multilayers. The scattered beam is detected either by a photodiode or one of the area detectors which may be fixed or movable. The detector arm includes a polarisation analyser which can be used with multilayers optimised for specific elemental absorption edges.

A Janis liquid helium cryostat enables measurements at sample temperatures down to 12K. A phi rotation can be added which allows rotation of the sample in situ about its surface normal. Its use, however, limits the minimum achievable sample temperatures to approximately 50K. The measurements can be performed under applied electric and magnetic fields. Various configurations of electromagnets and permanent magnets are available, providing field strengths up to 0.2T. A Halbach array is currently under commissioning which will allow in vacuum rotation of the magnetic field in all three dimensions.

REFERENCES

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