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Magnetic X-Ray Scattering

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The 1980s saw the convergence of the development of synchrotron sources; the development of techniques to grow new materials layer by layer, and the realization that x-rays could probe the magnetic properties of materials. In addition to magnetic x-ray scattering, most magneto-optical effects have been extended from the visible to the soft x-ray region. Because of the tunability of both the energy and the polarization, synchrotron sources are element and site specific probes, and there are large resonant enhancements in the scattering or absorption cross sections at atomic absorption edges. Synchrotron radiation is routinely used to study the magnetic polarization of different components of a material and to separate their spin and orbital angular momentum densities. In addition synchrotron radiation can be used to determine the interplay between the atomic, orbital and magnetic ordering in materials. The history and current trends in magnetic x-ray scattering will be reviewed. Future trends include further development of the spectroscopic aspects of magnetic scattering and probing magnetism on smaller and smaller length scales and at shorter and shorter time scales.