

# Magnetic and Atomic Structures Studied by Soft X-ray Spectroscopies

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Among various fascinating features of strongly correlated electron systems, magnetic properties have recently attracted many researchers in both fundamental physics and application. Soft X-ray spectroscopies based on X-ray absorption and/or scattering are powerful and promising probes for atomic and magnetic structures, especially when they are combined with the circular and/or linear polarizations. One can obtain element-specific quantitative information on spin and orbital magnetic moments including anisotropy by measuring the configuration and angle dependence of the X-ray magnetic circular dichroism (XMCD). The orbital and magnetic ordering with a nanometer period can be revealed also element selectively by using X-ray resonant magnetic scattering (XRMS). A depth-resolved technique has been developed for the X-ray absorption fine structure (XAFS) spectroscopy including XMCD, which enables us to directly investigate the surface and interface of thin films.

In order to achieve such powerful techniques, a soft X-ray beamline, BL-16A, has recently been constructed in the Photon Factory, as shown in Fig 1, which provides with circularly-polarized X rays at 250-1500 eV, as well as the linear polarization in horizontal and vertical directions. The beamline has at least three experimental stations, one of which (F2) is assigned to a configuration- and angle-dependent XMCD apparatus equipped with a 5 T superconducting magnet and a liq. He cryostat. An XRMS apparatus is now under construction, which will be installed at F1.

In this contribution, possibilities and prospects of applying the soft X-ray spectroscopies to the strongly correlated electron systems will be discussed. Some experimental data will be presented in order to show the effectiveness of such techniques in the magnetic and atomic structure investigations.

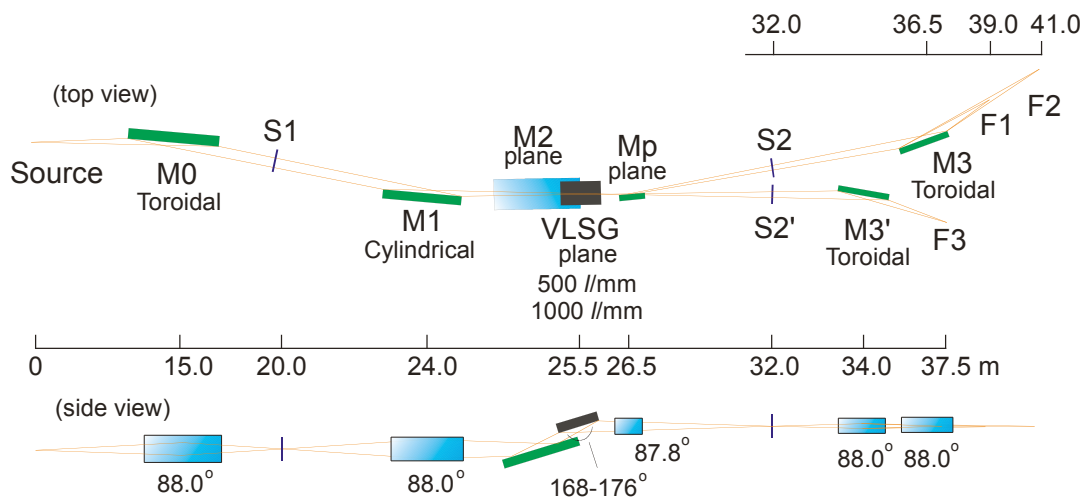


Fig. 1. Schematic layout for BL-16A in the Photon Factory.