

Synchrotron radiation beamlines in the vacuum ultraviolet and soft X-ray region

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The general conception of synchrotron radiation (SR) beamlines in the vacuum ultraviolet (VUV) and soft X-ray (SX) region will be presented, with emphasis on the points that one should verify before constructing a beamline. The most important role of the SR beamline is to shape SR, spatially and energetically, to meet the experimental requirements. With this viewpoint, basic information on reflecting mirrors and diffraction gratings as focusing and dispersion tools, respectively, will be summarized. For mirrors, I will mention the reflectivity of coating materials and various shapes of mirrors including aberration and astigmatism of spherical mirrors. Grating theory will be summarized based on geometrical optics together with a ray tracing method, which makes it possible to evaluate the performance of a beamline at the design stage. Furthermore, some typical spectroscopic beamlines, which are being used at a number of synchrotron radiation facilities in the world, will be introduced for reference in constructing a new beamline at the SESAME. It will be shown that undulator-based off-plane Eagle type beamlines can attain a resolving power $\geq 10^5$ in the normal incidence region. As for the grazing incidence region, contemporary monochromators, such as spherical grating monochromators, varied line spacing grating monochromators and the SX-700 monochromator, will be presented.