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Active grating for monochromatization in the extreme-ultraviolet spectral region

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The monochromatization of radiation in the extreme ultraviolet spectral region is accomplished by using diffraction gratings at grazing incidence. In the most general case, the grating is roto-translated to perform the wavelength scanning. Different optical configurations have been proposed until now, both using plane and concave gratings and with uniform or variable line spacing.

In this work we propose the use of a bendable grating as dispersing element. The control of the curvature radius of this optical element permits to perform at the same time the spectral selection and the focalization of the selected spectral component. As a consequence, the number of the optical elements is reduced from three to two: the grating and a focusing mirror.

We will present a low-cost mechanical implementation of this optical concept in which a thin plane diffraction grating, with a flat at rest optical surface, is bended by the use of a mechanical device to an almost cylindrical shape.

The device has been tested in the 13-50 eV energy region, showing very good focal properties with very low residual aberrations. To quantify these aberrations, the shape of the bended surface has been measured using a wavefront sensor.

Possible applications of the proposed solution are both in large-scale facilities such as FELs or synchrotrons, but also in table-top setups, such as those exploiting high-order harmonic generation.

Journal of Synchrotron Radiation Special Issue: will you submit your contribution?

yes

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