High resolution monochromator for synchrotron radiation based on flat VLS-gratings

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We present the design of a high-resolution plane-VLS-grating soft X-ray and VUV monochromator of synchrotron radiation for the 125 – 4200 Å spectral range.

Geometric features of the scheme:
- Source to Optic elements distance – 28 m
- Optic elements should set compact
- Optic elements to exit slit distance – 1200 mm

Modification of Hettrick-Underwood scheme [1]: The concave mirror is set in a highly asymmetric scheme and two replaceable VLS-gratings with line densities of 600 mm⁻¹ and 150 mm⁻¹ are planned for the 125 – 1000 Â and 900 – 4200 Â spectral ranges.

The frequency is scanned by rotation of only the plane VLS grating. The ruled area of the VLS gratings is 40x20 mm. The gratings and the mirror each operate for a deviation angle of 32˚, the total deviation angle being equal to zero.

Calculated resolving power excluding the effects of aberrations depending on the wavelength (blue) for two VLS-gratings. Purple line – resolving power for size of spectral image equal 13 μm. Green line – 5000. 1-8 for this wavelength shown spectral images obtained by numerical ray tracing.


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