Grazing incidence telescopes: a new class for soft X-ray and EUV spectroscopy; addendum

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In our earlier Communication we presented three types of grazing incidence telescope and illustrated the use of a Type I or a Type II in combination with spectrometers. It has recently been brought to our attention that the Type III, a nonfocusing collimating telescope, was previously presented in detail by Schmidtke and by Schmidtke et al. We regret this omission.

References

Partial achromatization of the self-imaging phenomenon

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Image formation and transmission in free propagation of light have been the subjects of many recent investigations. It is well known that a grating when illuminated with a completely coherent light gives rise to a set of equally spaced images along the direction of light propagation. This phenomenon of self-imaging is called the Talbot effect. Here the several orders diffracted by a periodic structure propagate at fixed angles, thus interfering with a phase relation varying along the transmission axis. The analysis of the amplitude pattern conducts to two sets of maxima. One of them is associated with the Fourier images or self-images of the grating in the weak sense. The other corresponds to the grating replicas known as Fresnel images, which are located at intermediate positions between Fourier images. In this work, we only consider the former case. As established by Montgomery, periodicity is enough to originate self-imaging, but it is not a necessary condition. He found that the general condition for self-imaging establishes that the Fourier spectrum of the object restricts its nonzero values to a set of concentric rings whose radii vary with the square root of the positive integers. Thus 1-D gratings represent only a special case.

If a spatially coherent but polychromatic source is employed for illuminating the object, the self-images corresponding to each wavelength value are focused at different locations.