Electron beam size evaluation by coherence measurement using bi-lens interferometry at P06

Ken Vidar Falch

Deutsches Elektronen-Synchrotron DESY, Notkestr. 85 D-22607 Hamburg, Germany

The P06 insertion device beamline at DESY have recently installed a set of bi-lens interferometers [1] for the purpose of coherence measurement. A bi-lens interferometer consists of a pair of x-ray refractive lenses, and an imaging detector to observe the interference fringe patterns. The fringe patterns are modulated by a sinusoidal wave modulated, and the frequency of the modulation is determined by geometrical layout, lens separation, as well as the wavelength of the radiation. We demonstrate that one can use energy scanning to reach a wider and continuous range of spatial frequencies, and we also present an automated tool for analysing bi-lens interference patterns directly from single images. While a high resolution imaging detector is ideal, we investigate whether the widely available, low resolution and low cost, X-ray eye diagnostics camera can be used for the purpose. We demonstrate close correspondence between electron beam size measurements made with the X-ray eye, and high resolution detector.

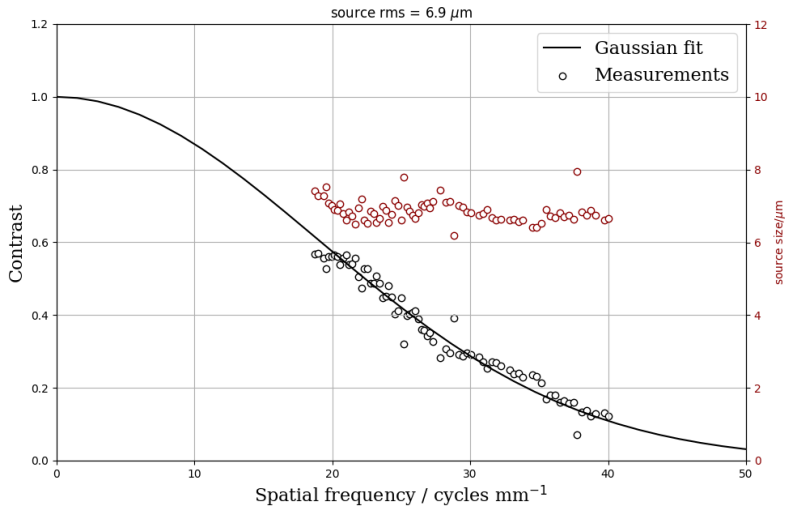

Figure 1: Interference contrast measured with bi-lens interferometry using a high resolution imaging detector.

References

[1] M. Lyubomirskiy. High energy x-ray inline interferometry based on refractive optics.