

Enhancing phase sensitivity through edge-illumination

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The underpinning idea of the “edge-illumination” imaging method, first developed at Elettra in the late ‘90s, is that, by illuminating only the edges of a detector pixel, one can perform a fine angular selection on the photon direction, similar to that performed by the crystal in analyzer-based imaging. As the x-ray refraction angle is directly proportional to the gradient of the phase shift, this angular selectivity translates directly into phase sensitivity.

The method has two significant advantages. First, it works with incoherent sources (x-ray tubes), producing a phase sensitivity equivalent to that of e.g. grating interferometry with a much simpler set-up and without the need for a source grating. Secondly, when implemented at synchrotrons, the beam can be tightly collimated and large sample-to-detector distances can be used, leading to phase sensitivities orders of magnitude higher than in other methods.