Comparison of methods for fitting gaussian curves to edge-illumination data

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Abstract

Edge-illumination is a novel X-ray imaging method that is able to provide better contrast between biological tissues which have similar atomic numbers. It uncovers information on how the imaged material affects the phase of the radiation going through it. Additionally, attenuation and scattering information can be retrieved simultaneously, given a suitable imaging setup. The method works by using a coded aperture mask between an X-ray source and a sample to form beamlets. As the beamlets go through an object, the changes in phase also cause them to change direction. This causes sub-pixel shifts in the locations of the photons hitting the detector, which can be tracked. An important part of this tracking process is fitting a function to the measurements of photon distributions at each pixel. These functions are assumed to be Gaussian. In this work, we explore different ways of fitting Gaussians to X-ray edge-illumination data.