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Phase contrast imaging with conventional x-ray sources at acceptable dose levels and exposure times[1]

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X-ray Phase Contrast imaging (XPCi) generates image contrast from interference and refraction effects (instead of x-ray attenuation), which leads to enhanced visibility of all details and to the detection of features classically considered "x-ray invisible." XPCi thus has great potential in a wide range of applications, from the earlier diagnosis of lesions in medical imaging to the detection of faint blemishes in non-destructive testing. However, XPCi seemed to require a high level of (at least spatial) coherence, which restricted its use to synchrotron facilities. Microfocal sources can be used but, due to low emitted flux, result in exposure times too long (hours) for most practical applications. Other attempts were based on aperturing/collimating the focal spot of a conventional source to create sufficient spatial coherence, again limiting the source output and resulting in excessive exposure times and/or delivered dose. This talk will present a method, based on appropriately designed x-ray masks, which works with unapertured and uncollimated conventional sources, at acceptable exposure times and delivered doses. It will describe how the method works, explain how quantitative features can be extracted from the images, and provide examples of application in various fields.

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