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## **A Novel Multi Slit X-Ray Backscatter Camera Based on Synthetic Aperture Focusing**

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A special slit collimator was developed earlier for fast acquisition of X-ray back scatter images. The design was based on a twisted slit design (ruled surfaces) in a Tungsten block to acquire backscatter images. The comparison with alternative techniques as the flying spot and the coded aperture pin hole technique could not prove the expected higher contrast sensitivity. In analogy to the coded aperture technique, a novel multi slit camera was designed and tested. Several twisted slits were parallelly arranged in a metal block. The CAD design of different multi-slit cameras was evaluated and optimized by the computer simulation packages aRTist and McRay. The camera projects a set of equal images per slit to the digital detector array, which are overlaying each other. Afterwards, the aperture is corrected based on a deconvolution algorithm to focus the overlaying projections into a single representation of the object. Furthermore, a correction of the geometrical distortions due to the slit geometry is performed. The expected increase of the contrast-to-noise ratio is proportional to the square root of the number of parallel slits in the camera. However, additional noise has to be considered originating from the deconvolution operation. The slit design, functional principle, and the expected limits of this technique will be discussed.