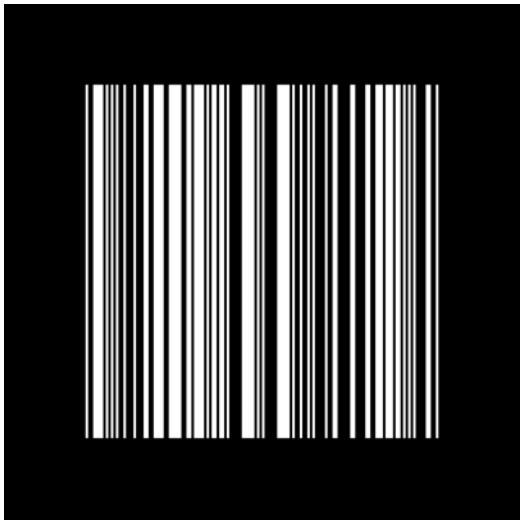
X-ray spatial coherence measurements

David Paterson, Advanced Photon Source

Conventional spatial coherence measurement techniques rely upon a sequential series of measurements to completely map the coherence function of a source. Typically, the separation of slits – for example in a Young's slits experiment – pinholes or mirrors must be varied. This is time consuming, limiting the parameter space that can be explored in an experiment and makes measurements of pulsed sources very difficult.

A technique that uses a diffracting mask to achieve the measurement of the entire coherence function with a single recording of a diffraction pattern will be described. The technique is directly applicable to measurement of sources with pulsed or DC nature. The mask is a class of coded apertures called a uniformly redundant array (URA). The technique can be performed with the URA as an absorption diffraction mask or a phase-shifting mask to measure harder x-ray sources. The analysis method and spatial coherence function measurements of 1.1–1.8 keV and 7.9 keV undulator radiation at the Advanced Photon Source will be described


Uniformly redundant array design