

Phase Retrieval Methods for Hard X-ray Optics Characterization on the Nanoscale

Manuel Guizar-Sicairos, Kenneth Evans-Lutterodt, Abdel F. Isakovic, Aaron Stein, John B. Warren, Alec R. Sandy, Suresh Narayanan and James R. Fienup

Problem:

Traditional spot size measurements with fluorescence from knife edges gets more difficult as beam gets smaller.

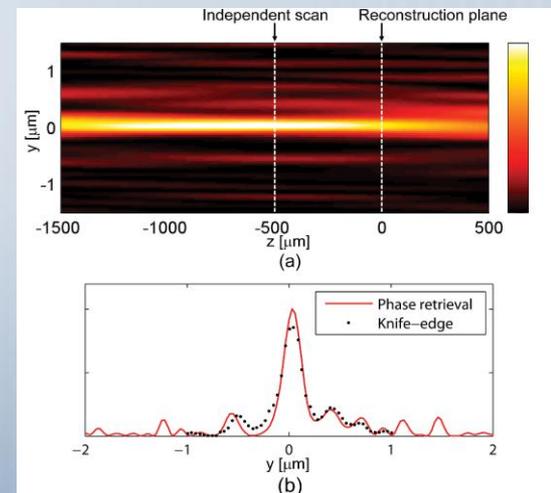
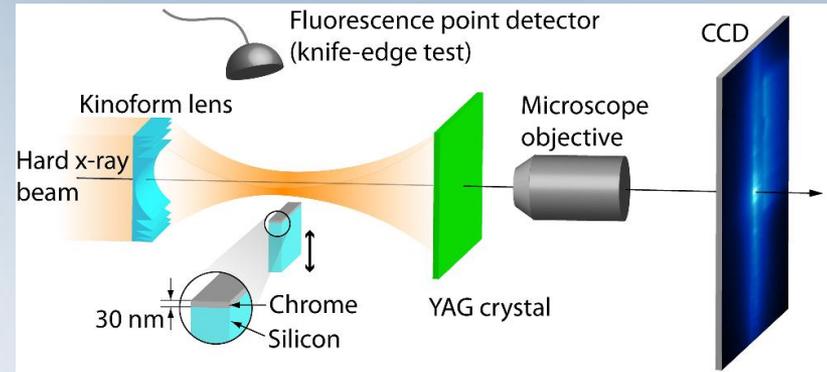
For a 1nm beam knife edge will have to be one atomic plane thick and 20nm wide!

Solution:

Instead, use phase retrieval. Perturber does not need to be so small and you do not have to be at the beam focus exactly.

To prove feasibility we use a spot size where we can do both conventional knife edge scans and phase retrieval.

Measure both phase retrieval and fluorescence at one position and then use phase retrieval to predict expected beam profile at a different position. It works!



“One-dimensional hard x-ray field retrieval using a moveable structure”, Manuel Guizar-Sicairos, Kenneth Evans-Lutterodt, Abdel F. Isakovic, Aaron Stein, John B. Warren, Alec R. Sandy, Suresh Narayanan and James R. Fienup, Optics Express, 18, 18374, (2010)