Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

A Holographic Iterative Algorithm for X-ray Microscopy[1] DILING ZHU, Department of Applied Physics, Stanford University, BENNY WU, RAMON RICK, Department of Applied Physics, Stanford University., JOACHIM STÖHR, ANDREAS SCHERZ, Stanford Synchrotron Radiation Lightsource — In recent years X-ray Fourier transform holography has gained recognition as a high resolution microscopy technique. The phase information is encoded in the hologram which renders this lensless approach as a true imaging technique by applying a simple inverse Fourier transform. In previous experiments the resolution was limited by imperfect knowledge of the reference and therefore was determined by the size of the reference. We report an alternative technique based on direct calculation of the encoded phase by recording multiple holograms. This phase information provides additional constraints to uniquely deconvolve the reference and the object using iterative phase retrieval algorithms. In numerical simulations we observe rapid convergence of this new reference-guided phase retrieval method which also shows high immunity against noise. We present two different experimental implementations and their results to demonstrate the feasibility of the concept.

[1]The experiments were carried at SSRL. Both SSRL and the conducted research are supported by the U. S. Department of Energy, Office of Basic Energy Sciences.

Diling Zhu
Department of Applied Physics, Stanford University

Date submitted: 21 Nov 2008 Electronic form version 1.4