11-nm Focus Achieved
Multilayer Laue Lens Developed for HXN Beamline at NSLS-II

Scientific Achievement
A multilayer Laue lens (MLL), developed for the HXN beamline at NSLS-II, has achieved an 11-nm focus. This MLL has a 43-µm aperture and will provide sufficient working distance for in-situ experiments.

Significance and Impact
Following this success, the HXN beamline team expects to have a set of 10-nm MLL optics ready for early science experiments by December 2013.

Research Details
- The team used an established imaging technique called ptychography to obtain quantitative characterization of x-rays focused by an MLL.
- The experimental result agrees very well with theoretical simulation, which confirms the reliability of the method.
- The obtained wavefront is directly related to MLL quality, which provides critical feedback for refining a multilayer growth process that will achieve a 1-nm focus.


Above: The left figure shows the propagation of a reconstructed wavefront through the focus from the measurement. The measured wavefront is remarkably similar to the simulated wavefront propagation. Below: The line profile through the focus shows that most of the energy is under the central peak. The fitting error of the peak is +/- 0.1 nm.