

**Vibration measurement and analysis techniques:
x-ray beamline vibration diagnosis at the APS**

Curt Preissner and Deming Shu

*Advanced Photon Source
Argonne National Laboratory
9700 S. Cass Ave.
Argonne, IL 60439
USA*

Low level vibration measurement and analysis is becoming more important in the operation and servicing of x-ray beamlines. State-of-the-art x-ray optics are routinely producing effective beam spot sizes of a few tens of nanometers, placing extreme requirements on the beamline support structures. As the x-ray optic performance has increased, demand for vibration measurements and data analyses have increased.

This paper reviews the Advanced Photon Source beamline engineers' accumulated experience in the vibration measurement and diagnoses of x-ray beamline equipment, particularly with low level vibrations. Areas to be addressed include low level measurements, transducer selection, transducer mounting, signal conditioning and data acquisition. Specific measurement case studies will include: a monochromator, a focusing element and an instrument support structure.