

The new BESSY-II Optics Laboratory - a Facility for Measuring ultra-precise X-Ray Optics

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The BESSY-II Optics Laboratory (BOL) at the BESSY-II storage ring of the Helmholtz Zentrum Berlin (HZB) has recently moved to a new laboratory space. It is located in a dedicated clean-room providing environmental and instrumental conditions essential to measure and characterize ultra-precise X-ray optical components like synchrotron mirrors or reflection gratings. Besides optical elements for beamlines at the BESSY-II storage ring, the BOL serves several further facilities that lack dedicated on-site optical metrology capabilities, including the new MAX-IV synchrotron in Lund (S), the European XFEL as well as PETRA-III, and the FLASH VUV-FEL at DESY in Hamburg (D). One of the major tasks of BOL, beside the acceptance test of optics, is to support the figure optimization of optics as well as the development and optimal beamline use of X-ray optical elements. Different instruments, like the Nanometer Optical component measuring Machine (NOM) for the measurement of slope deviation, a 18/4-inch Fizeau interferometer, a White Light Interferometer (WLI), different atomic force microscopes (AFM) and a vibrometer available in the lab enable separate, often complementary investigations of optical elements and systems, including mechanics. These different instruments allow to characterize optics on a wide range of spatial frequency from a few nanometer up to the full aperture length of more than one meter. We will review the current state of the lab, discuss latest developments on the characterization of instrument performance as well as report on latest measurement results of the characterization of state of the art sub-nm rms precise synchrotron optics.