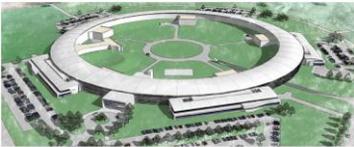


NSLS-II

National Synchrotron Light Source II

Preliminary Design Report
November 2007



National Synchrotron Light Source II

BROOKHAVEN NATIONAL LABORATORY

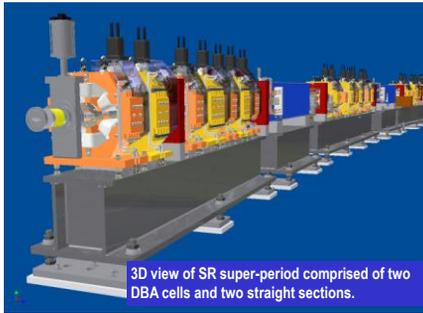
A highly optimized, third generation, medium energy storage ring for the production of ultra-bright synchrotron radiation. Operations expected in 2015.



www.bnl.gov/nsls2

NSLS-II Accelerator overview

- 30 DBA Lattice.
- Damping wigglers plus soft bends to achieve ultra-low emittance



3D view of SR super-period comprised of two DBA cells and two straight sections.

Optimized to achieve:

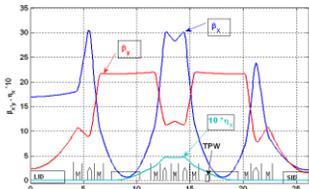
- 1 nm spatial resolution, (Hard x-ray Nanoprobe)
- 0.1 meV energy resolution (Inelastic X-ray Scattering)
- Single atom sensitivity

Storage ring parameters:

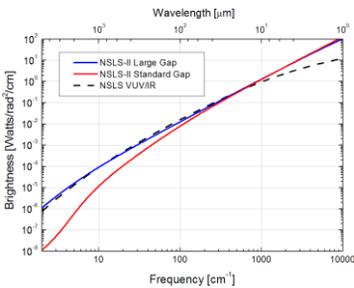
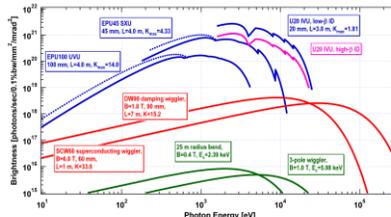
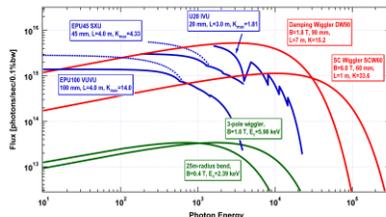
- 3 GeV, 500 mA , top-off injection
- Brightness > 10²¹ photons/sec/0.1%bw/mm²/mrad²
- Flux > 10¹⁶ photons/sec/0.1% bw
- Ultra-low emittance (ϵ_x, ϵ_y) 0.6 nm-rad horizontal, 0.008 nm-rad vertical
- 30 straight sections (15 low β , 6.6 m long and 15 high β , 9.3 m long)
- 30 bending magnets (25 m bending radius)
- 15 three-pole wigglers

Radiation sources cover far-IR (<0.01 eV) to High Energy X-ray (>100 keV):

Undulators, Elliptically Polarized Undulators (EPU's), Damping Wigglers, Superconducting Wigglers (SCW), soft bending magnets, and 3-pole wigglers



Lattice functions for half a super-period



Soft bends and large gap dipoles allow world-leading performance from far-IR to near-IR



NSLS-II is situated adjacent to the Center for Functional Nanomaterials (CFN)