

The Beams and Applications Seminar Series

NSLS-II: An Evolutionary Light Source Design

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Bldg. 401, Rm. B2100
Friday, February 22, 1:30 pm

Host: Michael Borland, ASD

The NSLS-II light source, a 3 GeV storage ring with 792 m circumference, will replace the existing NSLS sources and will span the photon energy range from far-IR to hard X-rays. The design is based on a moderate emittance lattice with $\epsilon_x \sim 2$ nm, which will be further reduced as damping wigglers (DW) and insertion devices (ID's) are installed, reaching an ultra-low value of 0.6 nm and providing a hard X-ray brilliance of $> 10^{21}$ ph/sec/mm²/mrad². This design relaxes the nonlinear design issues of the bare lattice, while increasing the importance of the nonlinear properties of the DW and user ID's, an issue for any lattice design. The emittance reduction of the DW is enhanced by the choice of low field dipoles (B=0.4T), which allows high flux IR beams to be extracted permitting the wide photon energy range to be achieved in a single ring. The major challenges to NSLS-II are to provide 500mA beam current with a stability of position, angle and size to sub-micron values, requiring careful design of vacuum chambers, magnet supports, beam monitors and feedback systems. The photon flux must be stable within 1%, which will require top-off injection (> 1min injection interval) and at least a 3hrs beam lifetime (requiring large momentum and dynamic aperture for Touschek lifetime). This talk will update the design and R&D progress on the NSLS-II project.

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