

Abstract

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Spherical-grating monochromator system with circular-polarization capability for the U5U undulator at Brookhaven

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Abstract

We plan to upgrade the U5U undulator beamline at Brookhaven with a 4-grating 3.5 m SGM (spherical-grating-monochromator) system offering the following enhancements in performance: (1) Improved imaging especially at the sample; (2) Small "expendable" gratings; and (3) Circular polarizer of the 4-reflection type. Ray tracing calculations are offered with emphasis on spot-size quality at the sample, and on the relative merits of scanning the exit- or entrance-slit to maintain focus. The excursion of the entrance slit coincides with the length of the undulator image. Calculations of the figure of merit TP^2 (T = transmission, P = polarization) are presented for a 4-reflection circular polarizer using the candidate mirror materials Al, Ag, Au and Rh. Ag offers the widest range of coverage, $h\nu = 10$ –150 eV, with reasonable throughput, $TP^2 = 4$ –18%.

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