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 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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