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## **Mechanical design of a plane grating monochromator for the new undulator at Aladdin**

Mike V. Fisher, Tim Kubala, Mary Severson, and Ruben Reininger  
*Synchrotron Radiation Center, University of Wisconsin-Madison, 3731 Schneider Drive, Stoughton,  
WI 53589-3097*

A nearly stigmatic plane grating monochromator (PGM) under construction for the new undulator beamline at SRC will provide a resolving power  $>10000$  as it scans from 8 to 240 eV with a single grating [1]. Scanning requires the precise, simultaneous movements of both a plane mirror and a plane grating in close proximity to one another inside a UHV chamber. The mirror, which absorbs up to 16.5 watts, is internally water cooled to minimize thermally induced slope errors. The radiatively cooled grating absorbs less than a watt. Careful examination of the focusing requirements revealed that the PGM could be scanned either in the conventional mode of rotating-translating the mirror and rotating the grating or in a new mode of rotating the mirror and rotating-translating the grating. The new mode was chosen for simplicity of design. The mirror and grating rotate nearly 30 and 40 degrees, respectively, with sub-arcsec resolution. Both utilize a stepping motor-lead screw-piezoelectric actuator scan drive that is controlled with a feedback loop using a laser interferometer to measure the actual rotation of the optics. The grating mechanism translates nearly 200 mm along a granite surface plate with a positional accuracy and vertical stability of a few micrometers.

[1] R. Reininger, S. L. Crossley, M. A. Lagergren, M. C. Severson, and R. W. C. Hansen, *Nucl. Instr. and Meth.*, A 347 (1994) 304.