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An elliptical wiggler beamline for the ALS

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A beamline for circular polarized radiation produced by an elliptical wiggler has been designed for the ALS. It covers the broad energy range from 50 eV to 2000 eV. The rigorous theory of grating diffraction efficiency has been used to maximize throughput. This is a challenging optical problem, due to the nature of the elliptical wiggler insertion device. The wiggler has large source size in the vertical and horizontal directions, and the monochromator requires high resolution necessitating small slits, a wide tuning range, and cooling for high heat loads. These problems have been solved by using a variable included angle monochromator with high demagnification onto the entrance slit, a “constant length” monochromator for large vertical aperture and aberration correction, and cooled premirrors, entrance slit, monochromator mirror, and gratings.