STATUS AND FUTURE PROSPECTS FOR THE APS FEL PROJECT

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The Advanced Photon Source (APS) free-electron laser (FEL) project at Argonne National Laboratory (ANL) was designed to characterize self-amplified spontaneous emission (SASE) and to perform pioneering experiments with this new source. It is also being used to assess the challenges associated with producing SASE in preparation for an x-ray regime machine.

SASE to saturation was first observed in September 1999 at 530 nm and 385 nm. Since this time the SASE process has been studied in detail at these wavelengths as well as at 265 nm. Measurements of the optical energy, mode size, mode divergence, spectra, harmonics, SASE statistics, and microbunching have all been measured as a function of distance along the undulator to and beyond the saturation point.

Following a brief description of the system, some of the key results along with the analysis will be presented. Most recently the system has been operated at 120 nm, but not to saturation. These results will also be presented. An experiment planned for 2002 utilizing this 120-nm radiation will briefly be described as well as our plans for the APS FEL system for the next year.