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Operational experience at the Advanced Light Source

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The Advanced Light Source (ALS) has been operational for users since October 1993 when white light from a bend magnet was delivered to the Center for X-Ray Optics (CXRO) x-ray microprobe end-station. Since then the ALS has installed and commissioned three undulators and their beamlines (including monochromators and post-monochromator focusing optics), and seven bend magnet beamlines, including one dedicated to machine diagnostics. Apart from one serious outage, when scheduled beam was not available to users for 17 days, the ALS has enjoyed remarkable operating statistics, with typically 95% of scheduled beam-time delivered to the users. Beam quality also has been very good. With a vertical emittance measured at 0.06 nm-rad, the electron beam is kept stable to about one-tenth of its transverse dimensions, in the face of changing error-fields in the insertion devices (as their main fields are varied), and temperature variation and floor vibration. The longitudinal motion of the beam, which leads to an increase in the electron beam energy spread and thence to a degradation of the undulator spectra, has recently been brought under control by the addition of an innovative feedback system. This paper focuses on those aspects of electron beam stability that we find most affect the ALS users: beam size and position, and energy spread.