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Initial time-resolved particle beam profile measurements at APS

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The commissioning of the Advanced Photon Source (APS) storage ring at 7 GeV began in early 1995. Characterization of the stored particle beam properties involved time-resolved transverse and longitudinal profile measurements using optical synchrotron radiation (OSR) monitors. Early results include the observation of the beam on a single turn, measurements of transverse beam sizes after damping using a 100-μs integration time (σ_x~150 ± 25 μm, σ_y~70 ± 20 μm), and measurement of the bunch length (σ_x = ~25 to 55 ps, depending on current per bunch). The measurements are consistent with specification and prediction based on the 8.2 nm rad natural emittance, the calculated lattice parameters, and vertical coupling less than 10%. The novel, single-element focusing mirror for the photon transport line, and the dual-sweep streak camera techniques which allow turn-by-turn measurements will also be presented. The latter measurements are believed to be the first of their kind on a storage ring beam in the USA.

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