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A new spectrometer design for the x-ray spectroscopy of laser-produced plasmas with high (sub-ns) time resolution[1] M. BITTER, Retired, K.W. HILL, P.C. EFTHIMION, L. DELGADO-APARICIO, N. PABLANT, Princeton University, P. BEIERSDORFER, H. CHEN, Lawrence Livermore National Laboratory — This paper describes a new type of x-ray crystal spectrometer, which can be used in combination with gated x-ray detectors to obtain spectra from laser-produced plasmas with a high (sub-ns) time resolution. The spectrometer consists of a convex, spherically bent crystal, which images individual spectral lines as perfectly straight lines across multiple, sequentially gated, strip detectors. Since the Bragg-reflected rays are divergent, the distance between detector and crystal is arbitrary and can be chosen to optimize the experimental arrangement with respect to detector parameters. The spectrometer concept was verified in proof-of-principle experiments by imaging the Lβ1- and Lβ2-lines of tungsten, at 9.6735 and 9.96150 keV, from a micro-focus x-ray tube with a tungsten target onto a two-dimensional pixilated Pilatus detector, using a convex, spherically bent Si-422 crystal with a radius of curvature R of 500 mm. These experimental results will be presented.

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