Abstract Submitted
for the APR06 Meeting of
The American Physical Society

A new X-ray imaging Crystal Spectrometer for Measurements of the Ion-Temperature Profile in Tokamak Plasmas * M. BITTER, C. BUSH, K. W. HILL, L. ROQUEMORE, B. STRATTON, D. MASTROVITO, P. BEIERSDORFER, Lawrence Livermore National Laboratory, M. F. GU, Stanford University, J. E. RICE, MIT — Future large tokamaks, such as ITER, require new diagnostic concepts for measurements of the ion-temperature profile, since the currently used methods, which are based on neutral charge-exchange recombination spectroscopy, may not be applicable due to the fact that, at high plasma densities, neutral beams will not penetrate to the core of the plasma. An alternative method relies on Doppler broadening measurements of X-ray lines emitted from highly charged high-Z ions. However, the X-ray crystal spectrometers, used so far, have recorded spectra from only a single sightline through the plasma and have therefore provided only a single point of an ion-temperature profile. Therefore, a new X-ray imaging crystal spectrometer is presently being developed. This spectrometer consists of a spherically bent crystal and a two-dimensional position-sensitive detector and can simultaneously record spectra from multiple sightlines through the plasma. The spatial resolution in the plasma of about 1-3 cm is only determined by the height of the crystal and the Bragg angle. The paper will present the spectrometer concept and results obtained with a prototype instrument. * Work supported by DOE contract DE-AC02-76-CH03073 and DOE grant 1083

M. Bitter
Princeton University

Date submitted: 13 Jan 2006 Electronic form version 1.4