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12.44 The WEST X-ray imaging crystal spectrometer system

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The X-ray imaging crystal spectroscopy system installation has been completed for WEST operation. The system aims at providing spatially resolved and high accuracy measurements of ion and electron temperatures, toroidal and poloidal rotation velocities, as well as impurity densities. It consists of three viewing lines hence three spectrometers imaging the full plasma height. Line emission from H-like Argon, He-like Argon and He-like Iron are measured. Optimized throughput and sensitivity are achieved using large spherically bent crystals (up to 80 mm × 120 mm) with appropriate choices of materials, cuts, reflectivity and focusing conditions, the Bragg angles being about 54°. For each spectrometer, the plasma to crystal distance is ˜6.7 m, the crystal to detector distance is ˜2 m and the magnification is ˜0.3. Also, the detector position is fixed, orientated horizontally and tangential to the Rowland circle. In this paper, a detailed description of the instrument is presented, including the specific and unique crystal rotary table developed with absolute indication and reproducibility of ⊠rad. The spectrometer alignment procedure is also discussed, and first analyses of the core spectrometer performance on plasma are presented and compared to predictions.

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