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6.25 Validation of electron temperature profiles on W7-X as measured using a x-ray imaging crystal spectrometer

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A detailed description of the design and performance of the x-ray imaging crystal spectrometer systems (XICS, HR-XIS) installed on W7-X is presented, along with cross-validation of analysis methods and comparison with other diagnostic measurements. A detailed comparison of tomographically inverted electron temperature profiles from XICS is made with local measurements from Thomson scattering over a wide range of plasma parameters. These comparisons show good agreement within the range of electron temperatures that XICS is sensitive to, and highlight the use of XICS as a robust electron temperature profile diagnostic. Also presented is a comparison between measurements made using the four impurity spectra routinely recorded by the XICS system (Ar16+, Ar17+, Fe24+ and Mo32+). Finally a comparison of XICS analysis techniques between a Bayesian model using the Minerva framework, and a stepwise analysis based on fitting of line integrated spectra is shown.

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