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Advances in X-Ray Imaging Crystal Spectrometer Design Through Raytracing[1] NOVIMIR PABLANT, M. BITTER, L. DELGADO-APARICIO, K.W. HILL, L. GAO, B.F. KRAUS, Princeton Plasma Physics Laboratory, A. LANGENBERG, Max Planck Institute for Plasma Physics, Z. CHENG, M. DE BOCK, ITER Organization, J. KRING, Auburn University, M. SLOMINSKI, Northwest Missouri State University, Y. YAKUSEVITCH, UC Santa Barbara, THE W7-X TEAM TEAM — X-ray imaging crystal spectrometers are powerful diagnostics for both magnetic confinement fusion (MCF) and high energy density physics (HEDP) experiments. Recent advances in spectrometer design have led to improvements in spectrometer capabilities, physical characteristics and calibration quality. These improvements have been driven, in part, by recently developed x-ray raytracing capabilities. In addition, ray tracing has also enabled improvement in analysis capabilities, both in improved accuracy of spectral analysis and in verification of tomographic inversion techniques. In this contribution we explore advancements, enabled by x-ray ray tracing, for several existing and proposed diagnostic systems including the W7-X XICS spectrometer, the ITER XRCS-Core spectrometer, and several variable crystal radii spectrometers for HEDP applications (multi-cone, modified toroid and sinusoidal spiral). We also introduce a new ray tracing software package, XICSRT, and discuss current capabilities and opportunities for future applications.

[1]The views and opinions expressed herein do not necessarily reflect those of the ITER Organization.

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