Abstract Submitted
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Alternative Design Concepts for the ITER Core Ion-Temperature Diagnostics[1] MANFRED BITTER, LUIS DELGADO-APARICIO, PHILIP EFTHIMION, RUSSELL FEDER, KENNETH HILL, DAVID JOHNSON, NOVIMIR PABLANT, BRENT STRATTON, KENNETH YOUNG, Princeton Plasma Physics Laboratory, PETER BEIERSDORFER, ERIC WANG, Lawrence Livermore National Laboratory, ROBIN BARNSLEY, ITER Organization — Measurements of the ion temperature and plasma flow velocities in the ITER core must be made with spatial and temporal resolutions of 10 cm and 10 ms, respectively, over the range r/a=0-0.85. These requirements can be met by Doppler measurements of the spectral lines of neon- or helium-like, ion of tungsten, iron, and krypton with high-resolution x-ray imaging crystal spectrometers consisting of one spherically bent crystal and an array of two-dimensional pixilated detectors in a Johann configuration. One detector dimension displays spectral information and the other displays spatial information in a direction perpendicular to the toroidal magnetic field. It is challenging to implement this type of spectrometer on ITER due to neutron and gamma streaming through the viewing apertures. This paper discusses the feasibility of two alternative design concepts: a spectrometer with two concentric, spherically bent (convex and concave) crystals and a new von Hamos type spectrometer with one spherically bent (concave) crystal.

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