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14.39 Development of Charge Exchange Recombination Spectroscopy Diagnostics for the C-2W Field-Reversed Configuration Plasma

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Charge Exchange Recombination Spectroscopy (ChERS) diagnostics will provide measurements of ion temperature, velocity and density profiles in C-2W field-reversed configuration (FRC) plasmas. Currently, two diagnostic systems are planned, one for impurity ions and the other dedicated to main ion measurements. Both diagnostic systems will use a common diagnostic neutral beam, currently under development, and high-speed CCD cameras coupled with intensifiers using high-efficiency optics. Impurity ion ChERS can also be used as a passive diagnostic in the absence of a diagnostic neutral beam, and is able to provide a full radial profile every hundred microseconds. Impurity charge exchange signals are typically produced by partially ionized oxygen impurities. Design of the systems will be presented. Operational configurations and significant improvements to the sensitivity and signal-to-noise ratio will be discussed.

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