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Spectroscopy of L-shell Xenon for Ion Temperature and Velocity Measurements on ITER[1] JAAN LEPSON, University of California Space Sciences Laboratory, PETER BEIERSDORFER, Lawrence Livermore National Laboratory, HYUN CHUN, International Atomic Energy Agency — In the ITER tokamak, the ion temperature and bulk toroidal velocity will be measured as a function of plasma minor radius using an imaging crystal spectrometer. The diagnostic relies on measuring the Doppler broadening and shift of x-ray lines from embedded impurity ions. However, in line with current trends in magnetic fusion devices, the ITER plasma is designed to have few heavy impurity ions, limited to those of argon and tungsten. Neither element produces ions whose radiation can cover the broad range of temperatures that are expected for ITER plasmas between the core and a fractional minor radius of $r/a < 0.8$, throughout which the diagnostic is to function. While L-shell tungsten lines, in particular those from neonlike W^{64+}, can be employed to diagnose the hottest parts of the plasma, it has been suggested to inject iron in order to utilize its K-shell emission to diagnose the cooler regions. Here, we show that the L-shell x rays of neonlike Xe^{44+} can provide the same information as iron. Moreover, we show that L-shell xenon ions will also persist in the hottest part of ITER plasmas and thus can be used in lieu of tungsten or krypton, whose injection had also been suggested. Moreover, because xenon is a noble gas, it can be readily removed from the plasma withou

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