

Abstract Submitted
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Initial operation of the NSTX-U Real-Time Velocity diagnostic¹

M. PODESTA, R. E. BELL, PPPL — A Real-Time Velocity (RTV) diagnostic based on active charge-exchange recombination spectroscopy is now operational on the National Spherical Torus Experiment-Upgrade (NSTX-U) spherical torus. The system has been designed to supply plasma velocity data in real time to the NSTX-U Plasma Control System, as required for the implementation of toroidal rotation control. Measurements are available from four radii, spanning from the core to the plasma edge, at a maximum sampling frequency of 5 kHz. Post-discharge analysis of RTV data provides additional information on ion temperature, toroidal velocity and density of carbon impurities. Initial results from RTV measurements are presented and compared with those from the main NSTX-U charge-exchange recombination system. Examples of physics studies enabled by RTV measurements from initial operations of NSTX-U are then discussed, with emphasis on the effects of plasma disturbances such as sawteeth and MHD instabilities on toroidal velocity and its temporal evolution.

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