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Charge Exchange Spectrometer for HSX KAN ZHAI, FREDERIC ANDERSON, ALEXIS BRIESEMEISTER, HSX Plasma Lab, UW-Madison — A new charge exchange recombination spectroscopy (CHERS) diagnostic system is now being installed on the Helically Symmetric eXperiment (HSX). This system will provide local profile measurement of the poloidal and toroidal rotation velocity of the ion impurity, and hence the local electric field, at ten radial locations. It consists of a hydrogen neutral beam, two collection optics systems and corresponding spectrometer-CCD detection systems. The beam, on loan from Madison Symmetric Torus (MST), is a nearly monoenergetic (94%) 30 keV, 4A neutral hydrogen beam, which has low divergence ($<1^\circ$), focuses to a 3 cm diameter waist in the center of the plasma, and has a duration of 3 ms. The collection optics collect the radiation emitted by impurity ions (oxygen or helium) after they charge exchange with hydrogen beam atoms. Light is coupled to the fiber optics which then transfer the collected photons to the spectrometer, which uses a fast frame CCD of 30ms full-frame rate attached at the image surface. Since the low ion temperature in HSX (20$\sim$50eV) will cause fine structure spreading around the main spectral feature, we will use the Atomic Database and Analysis Structure (ADAS) to model these processes to interpret CHERS data. Details of the system design and data processing will be presented. *Work supported by US DoE under grant DE-FG02-93ER54222

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