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Statistical Analysis of Charge Exchange Measurements of Ion Temperature and Velocity at the Edge of Alcator C-Mod¹ RACHAEL MCDERMOTT, BRUCE LIPSCHULTZ, IAN HUTCHINSON, MIT, Plasma Science and Fusion Center, WILLIAM ROWAN, Fusion Research Center, University of Texas at Austin — Charge exchange spectroscopy yields ion temperatures and velocities by measuring the Doppler width and shift of a spectral line emitted by the population of ions in question. There are uncertainties inherent in such measurements due to the photon statistics associated with the spectra and the presence of a distribution of background photons. These statistical uncertainties can be calculated without fitting the line shape provided that knowledge of the CXS signal and background distributions is available. These uncertainties represent the minimum uncertainties achievable through the line fitting process. Two such analyses have been performed at Alcator C-Mod to determine the constraints statistical uncertainties impose on the reliability of charge exchange measurements in the pedestal region of Alcator C-Mod. The uncertainty imposed by the fit to the spectrometer instrument function has also been examined.

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