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Detailed Performance Assessment for the ITER ECE Diagnostic[1]

W. ROWAN, M. AUSTIN, S. HOUSHMANDYAR, P. PHILLIPS, IFS, Univ. of Texas, Austin, J. BENO, A. BRYANT, A. OUROUA, D. WEEKS, CEM, Univ. of Texas, Austin, A. HUBBARD, MIT PSFC, G. TAYLOR, PPPL — One of the primary diagnostics for electron temperature (T_e) measurement on ITER is based on the detection of electron cyclotron emission (ECE) Here we describe the predicted performance of the newly completed ECE diagnostic design by quantitatively following the emission from the plasma to the instruments and including the calibration method to assess accuracy. Operation of the diagnostic at 5.3 T is the main interest here but critical features of the emission spectra for 2.65 T and 1.8 T will be described. ECE will be collected by two very similar optical systems: one a radial view, the other an oblique view. Both measurements are used for T_e while the oblique view also allows detection of non-thermal distortion in the electron distribution. An in-vacuum calibration source is included in the front end of each view to calibrate out the effect of any degradation of in-vessel optics. Following collection, the emission is split into orthogonal polarizations and transmitted to the detection instruments via waveguides filled with dry nitrogen, a choice that simplifies construction and analysis. Near the instruments, a switchyard is used to select which polarization and view is detected by each instrument. The design for the radiometer used for 5.3 T will be described in detail.

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