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## 13.4 ECE system for ITER

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The electron cyclotron emission (ECE) diagnostic on ITER will provide  $T_e(r,t)$  for pressure profiles, energy content, runaways, mode identification and plasma control. With its high electron temperatures and nuclear environment, ITER represents new challenges for each component of the diagnostic system. The frontend includes two Gaussian optics antennas and specially designed 1000 K calibration sources that can be put into view with mirrors on piezoelectric actuators. Long transmission lines (45 m) will transport the 70-1000 GHz radiation between the port and the diagnostic hall; low loss across the wide frequency band will be required. The first-line instruments will be a Michelson interferometer for multi-harmonic measurements, and two multichannel heterodyne radiometers, one for first harmonic O-mode and one for second harmonic X-mode. An additional instrument will be needed for low field operation. Critical issues for the diagnostic will be relativistic broadening and harmonic overlap at the expected high electron temperatures and dealing with possibly large stray power from the ECH system. The status of the design and some of the problems encountered and solutions found will be presented. \*Supported by US-IPO via PPPL subcontract S013464 to the University of Texas.

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