ECE Radiometer Upgrade on the DIII-D Tokamak

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The electron cyclotron emission (ECE) heterodyne radiometer diagnostic on DIII-D has been upgraded with the addition of eight channels for a total of 40. The new, higher frequency channels allow measurements of electron temperature into the magnetic axis in discharges at maximum field, 2.15 T. The complete set now extends over the full usable range of second harmonic emission frequencies at 2.0 T covering radii from the outer edge inward to the location of third harmonic overlap on the high field side. Full coverage permits the measurement of heat pulses and magnetohydrodynamic (MHD) fluctuations on both sides of the magnetic axis. In addition, the symmetric measurements are used to fix the location of the magnetic axis in tokamak magnetic equilibrium reconstructions. Also, the new higher frequency channels have been used to determine central T_e with good time resolution in low field, high density discharges using third harmonic ECE in the optically gray and optically thick regimes.

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