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Hardware Overview of the Microwave Imaging Reflectometry (MIR) on DIII-D XING HU, CHRISTOPHER MUSCATELLO, CALVIN DOMIER, NEVILLE LUHMANN, XIAOXIN REN, ALEXANDER SPEAR, University of California Davis, BENJAMIN TOBIAS, Princeton Plasma Physics Laboratory, LIUBING YU, University of California Davis, UNIVERSITY OF CALIFORNIA DAVIS COLLABORATION, PRINCETON PLASMA PHYSICS LABORATORY COLLABORATION — UC Davis in collaboration with PPPL has developed and installed a 12 by 4 (48) channel MIR system on DIII-D to measure 2-D structure of density fluctuations. In the transmitter path, a four-frequency probing beam is generated by mixing the 65 GHz Gunn oscillator signal with two different $0.5 \sim 9$ GHz signals. Carefully designed imaging optics shape the beam to ensure the probing beam wavefront matches the cutoff surfaces. In the receiver path, large aperture imaging optics collect the reflected beam and focus it onto the mini lens antenna array, which provides improved LO coupling and antenna performance over earlier imaging systems. The reflected signal is down-converted for the first time on the array and goes into the innovative electronics for a second down-conversion. Low frequency LOs for the IQ mixer are generated by mixing two reference signals from phase-locked circuits. The double down-converted signal is mixed with the low frequency LOs yielding in-phase and quadrature components of the phase and thus density fluctuation information.

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