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8.40 Experimental Tests of an Infrared Video Bolometer on Alcator C-Mod

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A prototype of an infrared imaging bolometer (IRVB) was successfully deployed and tested on the Alcator C-Mod tokamak during the end of the FY16 campaign. The IRVB method interprets the power radiated from the plasma by measuring the temperature rise of a thin, 2.5 micron Pt absorber that is exposed, through a pinhole aperture, to the full-spectrum of plasma photon emission. The IRVB was installed on C-Mod with a view of the poloidal cross-section of the core plasma. The temperature of the absorber was measured using a Cedip Titanium 550M camera with spectral response from 3.6-5.1 microns and framing rates up to 1 kHz for an image size of 256 x 64 pixels. Measurements taken over two run days (~50 discharges) included Ohmic and ICRF-heated H-mode and I-mode plasmas. Raw signal-to-noise ratios of ~100 were achieved. Initial quantitative comparisons of total radiated power and on-axis emissivity from IRVB are compared to results from resistive bolometers and AXUV-diodes. This IRVB is shown to be immune to electromagnetic interference from ICRF, which strongly impacts resistive bolometers, but sensitive to mechanical oscillations between the camera and absorber. Results of the benchtop calibration are summarized, showing noise equivalent power and frequency response.

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