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Development of Radiated Power Diagnostics for NSTX-U¹ MATTHEW REINKE, Oak Ridge National Lab, G.G. VAN EDEN, FOM-DIFFER, JACK LOVELL, Durham University, BYRON PETERSON, National Institute for Fusion Science, TRAVIS GRAY, Oak Ridge National Lab, RIAN CHANDRA, University of Washington, BRENT STRATTON, ROBERT ELLIS, Princeton Plasma Physics Laboratory, NSTX-U TEAM — New tools to measure radiated power in NSTX-U are under development to support a range of core and boundary physics research. Multiple resistive bolometer pinhole cameras are being built and calibrated to support FY17 operations, all utilizing standard Au-foil sensors from IPT-Albrecht. The radiation in the lower divertor will be measured using two, 8 channel arrays viewing both vertically and radially to enable estimates of the 2D radiation structure. The core radiation will be measured using a 24 channel array viewing tangentially near the midplane, observing the full cross-section from the inner to outer limiter. This enables characterization of the centrifugally-driven in/out radiation asymmetry expected from mid-Z and high-Z impurities in highly rotating NSTX-U plasmas. All sensors utilize novel FPGA-based BOLO8BLF analyzers from D-tAcq Solutions. Resistive bolometer measurements are complemented by an InfraRed Video Bolometer (IRVB) which measures the temperature change of radiation absorber using an IR camera. A prototype IRVB system viewing the lower divertor was installed on NSTX-U for FY16 operations. Initial results from the plasma and benchtop testing are used to demonstrate the relative advantages between IRVB and resistive bolometers.

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Matthew Reinke Oak Ridge National Lab

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