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Upgraded Thomson Scattering Diagnostic on DIII-D¹

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General Atomics — A new final-design polychromator assembly and
data acquisition test system is being deployed during plasma opera-
tions at DIII-D for electron temperature and density measurement. The
new polychromator features APD detectors that incorporate 500 MHz
bandwidth amplifiers in a trans-impedance amplification circuit with
low input bias current with an overall amplification of 360 times and an
integration and a sample-and-hold circuit to provide analog output into
a data acquisition digitizer. The APD detector box has high voltage bias
supplies and temperature sensing incorporated in a single box. The SNR
will be improved at least by a factor of $2^{1/2}$. The data acquisition system
is a D-TACQ DT100 system with a 96 channel 250 kSPS ACQ196CPCI
board. We present gain calibration, spectral calibration, plasma run,
and calculated electron temperature and density data with respective
comparison of the data from the existing Thomson system. We also
present the plan for complete deployment of an upgraded system that
will incorporate two new 50 Hz lasers and a new Field Programmable
Gate Array (FPGA) control and timing module.

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