Study of a CW, 2-D Thomson Scattering Diagnostic System*

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Instead of a pulsed, high energy laser that every Thomson diagnostic employs now, the study presented here describes a different approach that relies upon a high power CW laser cavity and RF signal detection technique. The new system has three major elements: an ultra long (~100 m), closed laser resonance cavity that includes the plasma region; an array of CW diode lasers that pumps and maintains the cavity energy (~5 mJ); and a lock-in detection system of narrow frequency bandwidth (~1 kHz). The resonance cavity consists of a pumping chamber for power input from diode lasers, and many relay chambers (~20) distributed across the plasma cross section for Thomson measurement. It is estimated that the S/N of the new system is 3000 times better than the present DIII-D system due to an increase in usable laser energy (x100) and improved background signal rejection (x30).

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