

Development of a LIDAR Thomson Scattering Diagnostic for DTT

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A LIDAR TS diagnostic is being developed for the measurement of the spatial profiles of electron temperature T_e and density n_e in the DTT (Divertor Tokamak Test) experiment under construction in Italy. The system will use a line of sight tangential to the central column in the equatorial plane, a layout that offers the possibility to diagnose the edge profiles on the high field side in addition to the plasma core. Possible detrimental effects of stray light pulses and mitigation countermeasures are discussed both for the core and edge measurements. The performances expected with two types of detectors, microchannel photomultipliers (MCP PMTs) or digital single-photon-avalanche-diode (SPAD) arrays type are compared for this layout. SPAD arrays show superior properties for many aspects such as spatial resolution, resilience against intense stray light pulses, and possible high repetition rate of the diagnostic. Last, but not least, their use can reduce the cost of the diagnostic by doing away with the need of a two-wavelength laser system and of very high bandwidth transient digitisers.

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