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14.27 First Results from a High Time-Resolution Thomson Scattering System Applied to Pellet Fuelled Wendelstein 7-X Plasmas

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Studies of transient plasma events may reveal fast relaxation mechanisms of the plasma pressure or MHD events. A particular application specifying measurement requirements is the fuelling of fusion plasmas with cryogenic pellets. The paper describes a Thomson Scattering System, simultaneously providing electron temperature and density profiles, combining high temporal resolution and adjustable measuring times. This "burst" Thomson Scattering mode has a 10 kHz time resolution for repetitive bursts of typically 1.2 ms duration, compared to the 10 Hz standard mode. A burst can be either triggered at pre-defined times or by plasma events, for which a fast trigger logic circuit was developed. Currently, a single laser is employed emitting four laser pulses per burst. For the next campaign three lasers will be available providing twelve consecutive measurement points with 100 µs spacing. Burst measurements of pellet series have been conducted to demonstrate the viability of the approach. The event trigger employed the Hα emission of the pellet. Magnetic high and low field side pellet injections were compared. The assessment of potential grad-B effects did not show differences for different fuelling geometries. However, within a pellet series the deposition depth per pellet increased.

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