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P1.1018 A plug-probe diagnostics for the measurement of electric field fluctuations in the turbulent state of the simply magnetised toroidal plasma device THORELLO

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Experimental investigation of magnetised plasma turbulence is actively pursued in fusion aimed as well as in basic plasma physics toroidal devices. In particular the understanding of turbulent transport mechanisms has a great interest for the improvement of the magnetic confinement. Here we discuss the use of plug-probes, a suitable modification of traditional Langmuir electrostatic probes, for an experimental investigation of plasma parameters fluctuations of a turbulent, low beta, low temperature plasma in a simply magnetised toroidal configuration. The experiments have been executed on the Thorello device, operating at the University of Milano-Bicocca [1]. In this device, a low temperature, high density plasma can be produced in a steady configuration by driving a hot cathode discharge in low pressure hydrogen gas. In particular, in toroidal magnetised plasmas a large fraction of anomalous particles and energy transport is attributed to the propagation of coherent structures [2]. These are isolated and intermittent structures, with density and temperature above the surrounding plasma, extending along field lines and propagating away from the bulk. In simply magnetized toroidal devices, like Thorello, the propagation is controlled mainly by the ExB drift velocity. The local electric field is determined by the overall discharge conditions as well as by the electrical potential fluctuations, in particular the contribution of the coherent structures themselves. In our presentation we discuss the use of a plug-probe diagnostics for a better reconstruction of the properties of electric field fluctuations. Besides a characterization and optimization of the probe performances, some properties related to the plasma structures that develops and propagates in the edge region are presented too.

[1] R. Barni, C. Riccardi, Plasma Phys. & Contr. Fusion 51 (2009) 085010.
[2] G.R. Tynan, A. Fujisawa, G. McKee, Plasma Phys. & Contr. Fusion 51 (2009) 113001.

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