

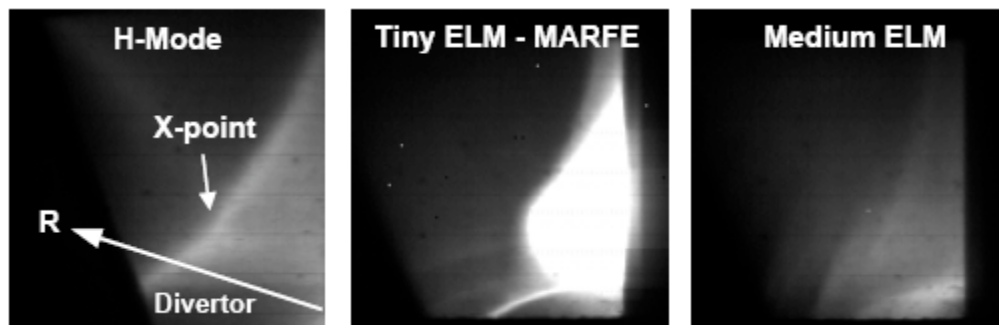
NSTX BOUNDARY PLASMA MEASUREMENT BY FAST CAMERA AND INTERPRETATIONS

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Instabilities and turbulences of the boundary in toroidal plasmas, and their interactions with the plasma facing components (PFC: divertors, first walls, rf launchers, etc.), have been identified as one of the important scientific issues to resolve to ensure successful operation of the ITER burning plasma. Fast cameras on NSTX have recently shed much new light on the complex nature of these phenomena, and introduced new possibilities to moderate the challenging PFC requirements on ITER and other future high performance fusion experiments.

The performance of ultra-high speed cameras ($\leq 10^6$ frames/sec) has recently made rapid progress, enabling extensive diagnosis of the plasma. Gas Puff Imaging (GPI) has been successful in visualizing the turbulence in local boundary regions in ST [1,2], tokamak [3], and helical systems [4]. A more conventional fast camera ($\sim 10^4$ frames/sec) has been used to obtain plasma images over large regions. Usually the peripheral plasma images are obtained in the visible and near infrared lights. More recently on NSTX, the divertor and nearby regions have been studied using a fast camera at $\sim 10^5$ frames/sec. A wide range of boundary turbulence behaviors under a variety of discharge conditions has been obtained. Example images of the divertor region are shown below. In this paper we summarize the most recent NSTX measurements and interpretations from this research [5-7].



References

- [1] R. Maqueda, et al., RSI **74**, 2020(2003).
- [2] S. Zweben, et al., NF **44**, 133(2004).
- [3] S. Zweben, et al., Plasma Phy. **9**, 1981(2002).
- [4] N. Nishino, et al., JPFR **80**, 175(2004).
- [5] N. Nishino, et al, JPFR **78**, (2002)
- [6] A.L. Roquemore, et al., RSI **75**, 4190(2004)
- [7] R. Maingi, et al, EPS (2004); Maingi, et al., to be published in NF