Characterisation of SOL density fluctuations in front of the LHCD PAM launcher in Tore Supra

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The density fluctuations, modified by Lower Hybrid Wave (LHW), is analyzed in Tore Supra with reference to the injected LHW power, density and the gap between LCFS (Last Closed Flux Surface) and the PAM (passive-active-multijunction) launcher [1][2]. The density fluctuations are measured with RF probes installed at the PAM launcher front. A density scan at nominal toroidal field (3.8T) shows that the fluctuations rate stays nearly constant (~ 50%) for $<n_e> < 3.5*10^{19}m^{-3}$ and with LHW power up to 2MW. The fluctuation spectra are dominated by low frequency fluctuations (< 50kHz). At constant LHW power, the cross-correlation between two adjacent probes (~ 2cm apart) indicates these low frequency structures increase with increasing density. However, when increasing the density above $<n_e> \sim 4*10^{19}m^{-3}$, using strong gas puffing, the fluctuation rate increases to > 100% and is characterized by strong negative spikes, with typical frequency > 100kHz. These are most likely originating from acceleration of electrons in the LHW near field due to parasitic absorption, as evidenced on the IR images, showing hot spots on the side limiters. For this case, the hard X-ray emission from fast electrons in the plasma, and hence the LH current drive, drop to zero [3].

[1] D. Guilhem et al., Fus. Eng. Des. (2011), article in press.
[2] A. Ekedahl et al., this Conference.
[3] M. Goniche et al., PPCF **52** (2010) 124031.