**Characterization of core and edge turbulence in L- and H-mode Alcator C-Mod plasmas**

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Turbulent transport associated with low (L-) and high (H-) mode confinement in fusion plasmas remains enigmatic. In the present talk we will address that challenge by studying fluctuations in the electron density of Alcator C-Mod plasmas using reflectometry [1] and phase-contrast imaging (PCI) [2]. These measurements will in turn be correlated with magnetic, $D_\alpha$ and electron temperature fluctuations.

Recently, two high frequency (132 and 140 GHz) O-mode reflectometer channels became operational in C-Mod [3]. The corresponding densities are $2.2 \times 10^{20}$ m$^{-3}$ and $2.4 \times 10^{20}$ m$^{-3}$. We use these channels to study turbulence associated with H-L-mode backtransitions, the so-called enhanced neutron (EN-) modes. Here, the density decays from the outside inward, allowing us to study fluctuations progressively towards the plasma core. Correlating the reflectometry measurements with the PCI line-integrated vertical chords provides valuable information on spatially localized density fluctuations.

The PCI diagnostic has been upgraded from 12 to 32 channels, leading to increased coverage in ($R$, $k_R$)-space; the digitization rate is 10 MHz. We show some initial results from the upgraded diagnostic, focusing on high frequency turbulence seen during both edge localized mode (ELM-) free and enhanced $D_\alpha$ H-mode operation.

# References

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