SOL transport and filamentary dynamics in tokamaks: from L to inter-ELM filaments in high density regimes

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Addressing the role of Scrape Off Layer filamentary transport is presently a subject of intense studies in fusion science. Intermittent coherent structures are found to dominate transport in the L-Mode scenarios as but also to strongly contribute to particle and energy losses in the ELM and inter-ELM phases in H-mode. The role of convective radial losses towards the first wall has become even more important due to their contribution to the so called process of *shoulder formation* in L-Mode, with the progressive flattening of the density scrape off layer profile at high density [1–4]. Investigation on this process revealed the strong relationship between divertor conditions and the upstream profiles, mediated by filaments dynamics which varies accordingly to the modification of the downstream condition. Preliminary investigation suggested that similar mechanisms are likely to occur in H-Mode as well [5] and even contribute to the so-called H-mode density limit (HDL) [6]. The present contribution will report the results obtained in two different tokamak, ASDEX-Upgrade and TCV, coordinated on European level to investigate the role of filamentary transport in high-density regimes both in L and H-mode. The combination of results from different machines enlarge the operational space explored moving from a device with closed divertor, metallic first wall and highly efficient cryogenic pumping system to a carbon machine with a complete open divertor.

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