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Overview of Recent COMPASS Activities

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The COMPASS tokamak is one of the present devices operating with an ITER-like plasma shape. Its flexibility combined to an extensive set of diagnostics and NBI heating allow to address a broad range of key areas in support of the worldwide fusion programme such as H-mode, MHD, RAE, disruptions, PWI. The recent results obtained in COMPASS addressing these key issues are reviewed here.
The control and characterization of the L-H transition and the pedestal physics represent a large part of the COMPASS scientific programme. Recycling and actuators such as the X-point height play a significant role in accessing H-mode. GAMs oscillating at frequencies 25-40 kHz are observed in L-mode discharges, increasing with the ion mass and with a decreasing amplitude from D to H plasmas. COMPASS also contributes to multi-machine databases with pedestal and SOL width scalings studies. Using perturbation coils, the influence of 3D fields on the strike-points splitting, ELM control and transport is reported.
The MHD modes studies mainly concern the plasma interaction with RMPs, the characterization of Alfven-like modes and disruption/mitigation experiments. High frequency quasi-coherent oscillations (ranging from 200 kHz to above 1 MHz) that follow Alfvenic frequency scaling are observed in ohmic discharges. An extensive experimental study of MHD effects in losses of runaway electrons has been performed. In the field of disruptions, an inter-machine empirical scaling of critical magnetic disruption precursors has been developed, as well as the study of the disruptions toroidal asymmetry.
The exhaust and plasma-material interaction studies in COMPASS contributed to the ITER divertor monoblocks design as part of the ITPA. Power deposition on leading edge was investigated both experimentally (inner-wall limiters with gaps and leading edges viewed by a high-resolution IR camera) and numerically (PIC simulations), with the latter reproducing well this experiment and the recent lamella melting experiment on JET. The ITER monoblocks shaping was also investigated in the frame of an ITER contract. Comparison with the deposited power from ion orbit calculations are consistent and confirm results presented at the previous IAEA FEC. However, the role of the E-field and the contribution from the electrons on the total power flux accounted in PIC calculations predict marginally lower power.

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