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Overview of the FTU results

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Experiments of Electron Cyclotron (EC) assisted breakdown have shown the presence of runaway electrons (RE) also below the Dreicer electric field threshold, indicating that the RF power acts as seeding for fast electrons, and a large database of post-disruption generated RE beams has been analysed in order to identify linear dynamical models for new position and current RE beam controllers. A linear micro-stability analysis of Neon doped pulses has been carried out to investigate the mechanisms leading to the observed density peaking. A study of the ExB drift effect on the MARFE instability has been performed and the peaking of density profile has been well reproduced using a particle pinch term of the form D_T n d(lnT)/dr. The 2/1 tearing mode (TM) observed in high density plasmas has shown a final phase characterized by limit cycles on the amplitude/frequency plane. The analysis of the linear stability has highlighted a destabilization with increasing peaking of the current profile during the density ramp-up, and experiments of real-time control of such a TM, by means of EC heating of the magnetic islands, have shown a considerable stabilizing effect. A Cooled Lithium Limiter with thermal load capability up to 10 MW/m^2 has been tested. The pulse duration has been extended up to 4.5 s and elongated configurations have been obtained for 3.5 s, with the X-point just outside the plasma chamber. W/Fe samples have been exposed in the SOL in order to study the sputtering of Fe and the W enrichment of the surface layer. Dust has been collected and analyzed, showing that the metallic population exhibits a high fraction of magnetic grains. A new diagnostic for in-flight RE studies has allowed to provide simultaneously the image and the visible/infrared spectrum of the forward and backward radiation. A fast infrared camera for thermo-graphic analysis has provided the pattern of the toroidal limiter heating by disruption heat loads, and a triple-GEM detector has been mounted on one equatorial port for soft-X rays diagnostic. The Collective Thomson Scattering diagnostic has been upgraded and used for investigations on Parametric Decay Instability excitation by EC beams correlated with magnetic islands, and new capabilities of the Cherenkov probe have been explored in the presence of Beta-induced Alfvén Eigenmodes associated to high-amplitude magnetic islands.

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