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JET helps prepare for ITER operation

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The main focus of the JET programme (2006-10) in preparation of ITER operation is a new ITER-like ICRH antenna (total RF power increased to ∼15MW), a new ITER-like first wall (beryllium in the main chamber, tungsten in the divertor, and possibly CFC at the strike points), upgraded NB power (to 35MW/20s or 17.5MW/10s), and an improved diagnostic and control capability. Mass flows for ITER Scenarios with the ITER-like first wall will be optimised, particularly to minimise in-vessel tritium inventory, since this must be controlled strictly in ITER and has been shown on JET with a carbon first wall to depend sensitively on plasma conditions. Higher power will allow confinement scalings to be resolved for normalised parameters closer to ITER (beta dependence of ELMy H-modes, confinement of improved H-modes at low ρ^*) and offers the prospect of high beta operation at high current and density, and new fully non-inductive, high performance, ITB discharges sustained to long pulse by real time current and pressure profile control, particularly in bootstrap current dominated regimes. Together, the first wall and increased heating power place strict constraints on the optimisation of ITER scenarios for long pulse operation with low melt damage. Large ELMs (in excess of 1MJ; marginally accessible on JET at present) and disruptions could cause melt severe damage which must be studied and controlled. The testing and optimisation of techniques for ELM mitigation (impurity seeding, demonstrated on JET; use of a new high frequency pellet injector (10-60Hz) to prevent large ELMs, demonstrated on ASDEX Upgrade) and disruption mitigation (fast gas injection from a new disruption mitigation valve, demonstrated on DIII-D) will be even more relevant under the ITER-like edge plasma conditions accessible with the increased power. Acknowledgement : Contributors to EFDA-JET Workprogramme