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Progress toward ITER's First Plasma

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ITER reached 50% completion of the work required to achieve First Plasma in November 2017. Progress has been made on ITER infrastructure since the 2016 FEC, most visibly the construction of many key buildings. The tokamak assembly building and the tokamak bioshield have been completed. The tokamak building will be ready for equipment in 2020. The cryogenic plant and the magnet power supply buildings are complete, and these systems begin commissioning in 2019. The power conversion and distribution area is complete and the component cooling water system building has started construction. Commissioning of these systems starts in 2018. Thus, the physical plant is moving rapidly toward completion, and key systems are entering the commissioning phase. Equally impressive is progress toward manufacturing components of the ITER tokamak. The base and lower cylinder of the cryostat have been assembled on the ITER site. The first of the six modules of the central solenoid has been wound, and three of the six poloidal field coils are presently being wound. The first winding pack of the toroidal field magnets is complete, as is the first casing, which has been verified to meet the high tolerances required (<0.5 mm). The first complete set of parts comprising a vacuum vessel sector has been fabricated and demonstrated to meet strict tolerances (<1 mm). Therefore, the major components of the tokamak have passed into the fabrication phase. The Heating and Current Drive systems (NB, ECH and ICH) are also in the final design phase. The sequence of ITER operation from First Plasma (FP) to the achievement of the Q = 10 and Q = 5 project goals has been consolidated in a Staged Approach. This is a stepwise installation of components and ancillary systems, with all systems installed before the start of the FPO operational phase. The ITER Research Plan has been revised in 2017 to be consistent with the systems available in each phase. Physics R&D focuses on the Disruption Mitigation System, design of the ITER tungsten divertor, and modelling of ITER plasma scenarios. An international Task Force has been established to coordinate R&D on disruption mitigation. Modelling concentrates on the initial phases of the Research Plan and on the Q = 10 scenario, especially plasma termination. The focus is on scenarios that access the H-mode regime in the PFPO-1 and PFPO-2 phases.

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