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Progress in physics modelling in support of the ITER Research Plan

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To reach ITER's mission goals, a thorough understanding of the underlying physical processes, plant systems and operational scenarios is mandatory. Preparation for ITER operations is supported by state-of-the-art modelling implemented in the ITER Integrated Modelling & Analysis Suite (IMAS). This modular framework has been developed to standardize the communication between the various codes describing different ITER subsystems, thus enabling modelling studies to optimize the performance of ITER. An important example of the advanced physics modelling capability recently implemented in IMAS is the Heating and Current Drive (H&CD) workflow, capable to describe all of ITER's heating systems and synergies between them. The standardization imposed by the IMAS platform also allows a flexible coupling of the H&CD workflow with various transport solvers, particularly important to study burning plasmas in ITER with dominant alpha particle heating. This presentation starts by introducing briefly the ITER Research Plan, together with ongoing modelling efforts. The talk will illustrate various capabilities of the physics workflows in IMAS towards the development of a high-fidelity plasma simulator for ITER. Finally, examples of physics studies for scenario optimization in the non-active and D-T operational phases of ITER will be shown.

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