Development of ITER Non-Activation Phase Operation Scenarios (TH/P2-22)

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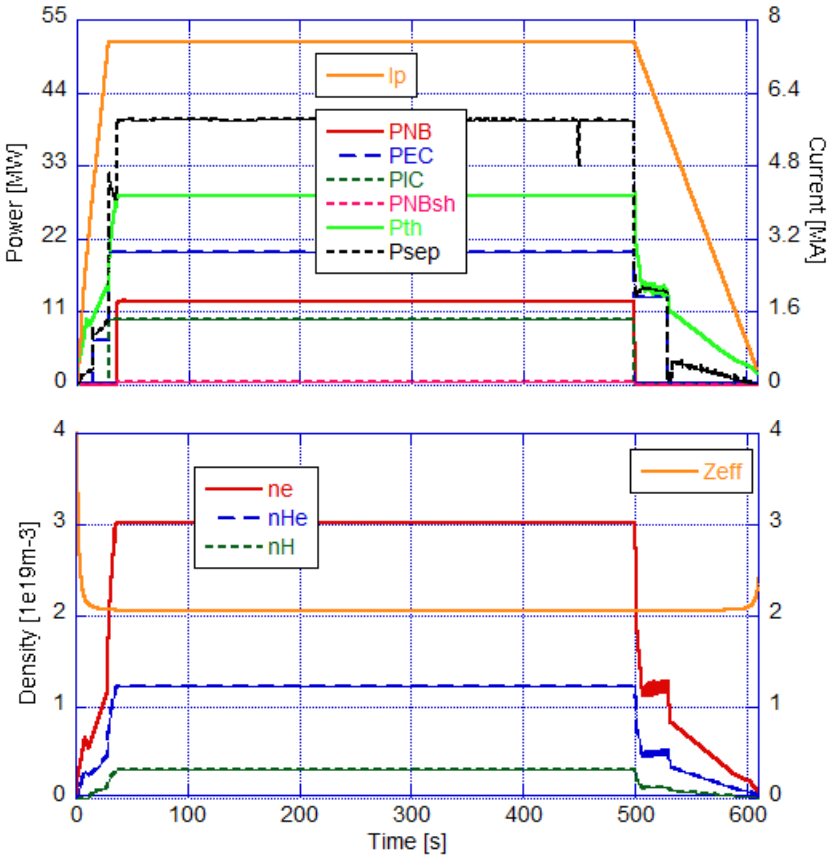
Background of the research

- Non-activation phase H/He operations in ITER is important for commissioning of various tokamak systems and validation of techniques (e.g. the edge localized modes, disruption mitigation, divertor heat loads and detachment)
- He operation will be of particular interest for the commissioning and validation of H-mode operation, while H operation may become a basis for all other required work.
- ITER non-activation phase scenarios are to be re-developed taking into account the availability of HCD systems and schemes, achievable ranges of plasma density, pedestal parameters, plasma confinement, and anticipated impurity behaviors.
- ITER operation scenarios at intermediate currents and fields (I_p/B_T) are required to elaborate the plan for commissioning of tokamak systems as well as to optimize research paths towards 15MA/5.3T baseline DT H-mode operation.
- A joint research activity under the International Tokamak Physics Activity (ITPA) has been organized.

Outcomes and Perspectives

- Assumptions on the achievable plasma density, He fuel dilution, availability of the ITER HCD systems, edge pedestal conditions and H-mode power threshold, have been updated.
- ITER non-activation phase H/He operation scenarios have been developed by integrating the identified scenario assumptions and updated operational specifications.
- The feasibility of the developed scenarios has been investigated with an emphasis on He H-mode operation at 7.5MA/2.65T.
- Various H/He plasma operations at intermediate currents (7.5-15MA) and fields (2.65-5.3T) have been also studied to provide an updated basis for developing operational paths towards full-current/full-field operations.



7.5MA/2.65T He H-mode operation scenarios developed using CORSICA. Time traces of the plasma current (I_P), auxiliary heating powers (P_{NB}, P_{IC}, P_{EC}), average electron and ion densities (n_e, n_{He}, n_H) and effective charge number are shown.