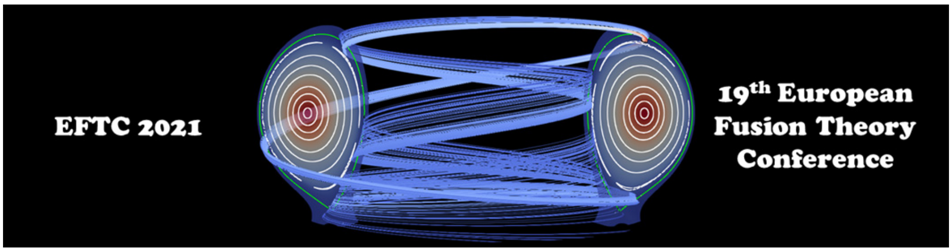

Contribution ID: **27** Type: **Poster**

The impact of the heating mix on L- and H-mode DEMO plasmas

Tuesday 12 October 2021 14:50 (1h 50m)

The development of the EU-DEMO reactor is at the pre-conceptual design phase. At this stage, close attention is paid to the heating mix necessary to fulfill all the plasma requirements: breakdown, ramp-up, L-H transition, burn control, NTM stabilization, sawteeth pacing, radiative instability control and ramp-down. Integrated modeling is an effective tool to compare the impact of dominant electron vs. ion heating on turbulence and plasma kinetic profile evolution. Thus, the ability of a given heating mix to meet the aforementioned requirements can be systematically studied. We have utilized the ASTRA transport code, coupled to the TGLF turbulent transport model for the core region of DEMO in order to compare the plasma response to dominant electron and ion heating mixes representative of ECRH, NBI and ICRF in L- and H-mode plasmas. Suitable boundary conditions are applied at the separatrix via a 0D 2-point model. Initial estimations point to the feasibility of the L-H transition and significant fusion power production even in purely electron-heated plasmas. The L-H transition work has been revisited and extended through the inclusion of Xe and W impurities, an expansion of the scanned parameter space in terms of density and ECRH power, a scan of the ECRH power deposition location and width as well as TGLF-predicted electron density profiles. The inclusion of impurities sets a strict concentration threshold for the L-H transition at high densities, while at low to intermediate Greenwald fraction the L-H transition becomes accessible at much higher impurity concentrations. Simulation in H-mode are performed by modeling the pedestal with scaling laws coupled to the core parameters. The fraction of electron heating and Xe concentration is scanned and we determine its impact on the obained fusion power and separatrix heat fluxes.

Author: Dr SUAREZ LOPEZ, Guillermo (Max Planck Institute for Plasmaphysics)

Co-authors: Dr TARDINI, Giovanni (Max Planck Institute for Plasmaphysics); Dr FABLE, Emiliano (Max Planck Institute for Plasmaphysics); Prof. ZOHM, Hartmut (Max Planck Institute for Plasmaphysics)

Presenter: Dr SUAREZ LOPEZ, Guillermo (Max Planck Institute for Plasmaphysics)

Session Classification: POSTER SESSION

Track Classification: 1. Fusion devices: tokamaks, stellarators, reversed-field pinches, laser-induced ignition and new concepts