Contribution ID: **283** Type: **Poster**

TCV heating and divertor upgrades

Friday 26 October 2018 14:00 (20 minutes)

The range and the reactor relevance of the TCV experiments are being enhanced by two sets of major upgrades. The first set includes the installation of neutral beam injection (NBI) and new Electron Cyclotron (EC) power sources, to heat the ions and vary the electron to ion temperature ratio, in plasmas with ITER relevant β values. A 15-30keV, 1MW, 2s tangential NBI system is operational on TCV since 2015. A second beam at 1MW, ~50keV, also tangential but opposite to the first beam, is foreseen to approach β limits, vary the applied momentum input and investigate suprathermal ion physics. For the EC power, two 0.75MW gyrotrons at the 2nd harmonic have been installed. The next step consists of two 1MW dual frequency gyrotrons (2nd and 3rd harmonics), one of which is being commissioned. The heating upgrades will raise the total heating power for high-density plasmas from 1.25 MW to 5.25 MW. The main element of the second set is an in-vessel structure to form a divertor chamber of variable closure, to reach relatively high neutral density and impurity compression and access reactor relevant divertor regimes for conventional or advanced divertor configurations. Graphite gas baffles will be installed to define a divertor and a main chamber region. The first set of baffles consists of 32 tiles on the high-field side (HFS) and 64 tiles on the low-field side (LFS), with geometry chosen on the basis of simulations performed using the SOLPS-ITER and EMC3-Eirene codes. The HFS baffles are expected to be effective for a wide range of divertor configurations, including snowflake and super-X divertors, yet keeping the plasma close to the inner wall for passive stabilization. The LFS tiles'dimensions will be varied to modify the divertor closure. Control of the plasma, neutral and impurity densities, and He compression will be achieved by a combination of toroidally distributed gas injection valves, impurity seeding, and cryo-condensation pumps. Significant developments will be undertaken also in plasma diagnostics, to characterize the divertor plasma, measure power and particle deposition at the strike points, and obtain information on the detachment process. The possibility of installing dedicated divertor coils, made of high temperature superconductors, to expand the range of divertor configurations and improve their control, will be discussed.

Country or International Organization

Switzerland

Paper Number

FIP/P8-6

Author: Prof. FASOLI, Ambrogio (EPFL Swiss Plasma Center)

Co-author: TEAM, TCV (EPFL Swiss Plasma Center)

Presenter: Prof. FASOLI, Ambrogio (EPFL Swiss Plasma Center)

Session Classification: P8 Posters

Track Classification: FIP - Fusion Engineering, Integration and Power Plant Design