

P4.1028 Instabilities and fast ion confinement on the TCV tokamak

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See full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P4.1028.pdf>

A newly installed 1 MW 25 keV NBI (2016) combined with the ECH-ECCD system allow the TCV machine [1] to join the on-going worldwide (DIII-D, AUG, TJ-II, etc.) research for studying wave fast ion interaction phenomena of interest for burning plasmas, an important point for ITER and DEMO. Alfvén modes were observed on the TCV [2,3] during the 2017/18 EUROfusion MST1 campaign, in the presence of simultaneous off-axis sub-Alfvénic NBI ($v_A/3 < v_{\text{beam}} < v_A$) and off-axis ECRH. No beam-driven instabilities were observed without ECH. The properties of EM fluctuations (AEs and GAMs) are studied using the Mirnov signals and soft-X emission. The impact of EM fluctuation on the plasma performance and on fast ions has been identified by comparing the neutron rates, total plasma energy (DML), fast ion D- (FIDA) spectra and CX NPA signals with integrated modelling. ASTRA and TRANSP codes are used for transport modelling of plasma heating, fast ion CX losses and current drive. TRANSP/NUBEAM and FIDASIM codes have been implemented at TCV to calculate synthetic FIDA and NPA measurements. A high edge neutral density consistent with CX losses of the order of 25% is required to explain the experimental results [2,3], but a FIDA and NPA signal deficit remains in the case of NBH & ECRH, possibly suggesting additional to neo-classical anomalous fast ion losses [3]. The paper presents the recent status of the data analysis and the strategy for continuation of experimental work, in particular with installation of new diagnostics, availability of new numerical tools and installation of the second high energy (50-60 keV) neutral beam [1].

1. S.Coda, et al., 27th IAEA Fusion Energy Conference (FEC 2018), Gandhinagar, India, OV/5-2 2. B.Geiger, et al., Plasma Phys. Control. Fusion 59 (2017) 115002 3. B.Geiger, et al., 27th IAEA Fusion Energy Conference (FEC 2018), Gandhinagar, India, EX/P8-24 * See the author list H. Meyer et al 2017 Nucl. Fusion 57 102014

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