Physics of steady-state electron internal transport barriers on TCV

O. Sauter, R. Behn, A. Bottino, Y. Camenen, S. Coda, E. Fable, T.P. Goodman, M.A.Henderson, An. Martynov, P. Nikkola, G. Zhuang, C. Zucca and the TCV team

olivier.sauter@epfl.ch
CRPP – EPFL
EPFL - Lausanne , Switzerland
Association EURATOM – Confédération Suisse

Electron internal transport barriers (eITBs) are routinely obtained on TCV without requiring any inductive current. The current density profile is fully sustained with electron cyclotron waves and bootstrap current density. These scenarios are therefore ideal for testing the physics of electron transport in true steady-state. It has been shown previously that the degree of confinement improvement is directly linked to the degree of the reversal of the q profile [1]. Both electron cyclotron current drive (ECCD) and/or a positive/negative ohmic current density are used to probe the dependence of transport on the current profile. It is also shown that particle transport is significantly affected solely by modifying the current profile, leading to density internal transport barriers strongly coupled to electron temperature gradients.

The physics properties of these steady-state electron internal transport barrier scenarios are discussed. The formation of eITBs [2] and the role of a high bootstrap fraction in the performance and control of these scenarios are also described.

[1] O. Sauter et al, Phys. Rev. Lett. **94** (2005) 105002.
[2] M. A. Henderson et al, Phys. Rev. Lett. **93** (2004) 215001.