

## Runaway electron diagnostics for the COMPASS tokamak using EC emission

M. Farnik<sup>1,2</sup>, J. Urban<sup>1</sup>, J. Zajac<sup>1</sup>, O. Bogar<sup>1,3</sup>, O. Ficker<sup>1,2</sup>, E. Macusova<sup>1</sup>, J. Mlynar<sup>1,2</sup>,  
J. Cerovsky<sup>1,2</sup>, M. Varavin<sup>1</sup>, V. Weinzettl<sup>1</sup>, M. Hron<sup>1</sup> and the COMPASS team<sup>1</sup>

<sup>1</sup> *Institute of Plasma Physics of the CAS, Prague, Czech Rep.*

<sup>2</sup> *FNSPE, Czech Technical University, Prague, Czech Rep.*

<sup>3</sup> *FMPI, Comenius University in Bratislava, Bratislava, Slovakia*

Electron cyclotron emission measured vertically along the line of a constant magnetic field can yield information about the electron velocity distribution function and its evolution during a discharge [1]. A vertical ECE (V-ECE) diagnostic is available on COMPASS, a compact-sized tokamak operated at IPP Prague. We report on results from this diagnostic during runaway electron (RE) experiments.

The V-ECE diagnostic on COMPASS consists of a 16-channel radiometer E-band horn antenna with a 76.5 - 88.3 GHz frequency range front-end. Simulations using the SPECE ray-tracing code [2] have aided the final diagnostic design and are employed for experimental data interpretation. Realised measurements of extraordinary and ordinary mode (X/O mode) in low-density ( $n_e < 3 \cdot 10^{19} \text{ m}^{-3}$ ) RE experiments will be presented. The detected signal can be attributed to the 3rd harmonic emission from 50 - 140 keV electrons. However, the optical depth is rather low, which complicates the measured data interpretation.

V-ECE measurements in low-density flattop discharges and in discharges with massive gas injections (MGI) of high-Z elements show correlations with other RE diagnostics, such as hard X-rays (HXR), photoneutron detectors and high-speed visible light cameras. Our results seem to be in an agreement with the principles of the primary runaway generation mechanisms.

### References

- [1] K. Kato, I. H. Hutchinson, *Phys. Rev. Lett.* **56**(4) 340-343 (1986)
- [2] D. Farina, *et al.*, *AIP Conf. Proceedings* **988** 128-131 (2010)