Type-I ELM energy density measurements in the COMPASS divertor using a new system of probes

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A new system of probes [1] was recently installed in the divertor of the COMPASS tokamak in order to investigate the electron temperature T_e and the parallel heat flux $q_{||}$ with high spatial and temporal resolution. The set of probes, with spatial resolution ~3.5 mm, consists of two arrays of rooftop-shaped Langmuir probes (LPs) used to measure the floating potential and the ion saturation current density and one array of ball-pen probes (BPPs) used to measure the plasma potential. The floating BPPs and LPs yield the electron temperature T_e [2]. In combination with ion saturation current measurements from LPs we also obtain the parallel heat flux $q_{||}$ with microsecond temporal resolution. The ELM energy density $\varepsilon_{||}$ is calculated as the integral of the parallel heat flux over the duration of a single ELM event. The Type-I ELM energy density was studied during a set of NBI-assisted ELMy H-mode discharges. The resulting peak values of $\varepsilon_{||}$ in the range of 10-40 kJ/m^2 [1] are in good agreement with the predictions of model [3] and experimental data from JET, AUG and MAST [3].

[1] J. Adamek et al. Nucl. Fusion 57 (2017) 116017.

[2] J. Adamek et al. Rev. Sci. Instrum. 87 (2016) 043510.

[3] T. Eich et al. Nuclear Materials and Energy 12 (2017) 84–90.