



IAEA FEC 2014

Contribution ID: 124

Type: **Poster**

Progress in Snowflake Divertor Studies on TCV

Wednesday 15 October 2014 08:30 (4 hours)

Dissipating the energy emitted from a fusion reactor remains critical to achieving a commercially viable design with acceptable machine lifetime. Using the extreme shaping capability of TCV together with an 'open-vessel' design, the Snowflake (SF) configuration divertor was first demonstrated on TCV. Although a nearly 'exact' SF configuration was obtained, most of this work concentrated on SF configurations with a clear separation between the X-points (which may however vary during ELMs). This paper reports on the range of experiments performed over the last years on TCV, designed to understand the processes involved in power distribution between the four legs of a SF-divertor configuration by comparing the geometrical characteristics with measured power depositions. To date, these experiments are mostly performed at relatively low power density and particle density where the distribution to the divertor is expected to be dominated by transport parallel to the magnetic field lines and should be consistent with present divertor theory. Initial analysis of L-mode discharges indicated an enhanced transport into the private flux region and a reduction of peak heat. This enhanced transport, although relatively small, cannot be explained by the modified field line geometry alone and likely requires an additional or enhanced cross-field transport channel. A first attempt to model the configuration by matching the power and particle profiles at the primary strike points was unable to explain the observed power to the secondary strike points. This work was extended to both the L-mode and H-mode plasma confinement regimes. During ELM activity, up to ~20% of the exhausted energy was redistributed to the additional SPs and the peak heat flux to the inner primary was SP reduced by a factor of 2-3. Further avenues for progress, including an upgrade to the diagnostic array with the installation of a reciprocating probe and improved IR cameras, are in hand and, using the experience gained with SF configurations, research on other divertor geometries is under consideration. The need to find a working solution for fusion reactor exhaust and these highly encouraging TCV results demonstrate that this work in alternative divertor concepts is providing vital experimental and theoretical research information.

Country or International Organisation

Switzerland

Paper Number

EX/P3-56

Author: Dr DUVAL, Basil (Ecole Polytechnique Fédérale de Lausanne –Centre des Recherches en Physique des Plasmas(CRPP), Association Euratom-Confédération Suisse(EPFL) CH-1015 Lausanne, Switzerland)

Co-authors: Dr LABIT, Benoit (EPFL/CRPP); Mr CANAL, Gustavo (EPFL/CRPP); Dr REIMERDES, Holger (Ecole Polytechnique Fédérale de Lausanne (EPFL), Centre de Recherches en Physique des Plasmas); Dr LUNT, Tilmann (IPP Garching); Dr VIJVERS, Wouter (CRPP)

Presenter: Dr DUVAL, Basil (Ecole Polytechnique Fédérale de Lausanne –Centre des Recherches en Physique des Plasmas(CRPP), Association Euratom-Confédération Suisse(EPFL) CH-1015 Lausanne, Switzerland)

Session Classification: Poster 3