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Electron Transport and the Critical Gradient W. HORTON, J.-H. KIM, J. PRATT, J.C. PEREZ, IFS, UT-Austin, T. HOANG, Euratom, CEA, France — New experiments on Tore Supra with upgraded, higher power radio frequency heating systems with total powers up to 10 MW give new data points on the core temperature and temperature profiles versus injected power. The talk will review the evidence for the two space scales on which electron transport occurs: from (i) the large scale trapped electron modes (TEM-ITG) and (ii) the small scale electron temperature gradient (ETG) turbulence. Joint IFS - Tore Supra transport analysis for electron power balance gives a database for discharges driven by Fast Wave Electron Heating in for $\tau_E \leq 100$ ms. The wide range of RF heating powers from near Ohmic 1 MW to above 10 MW produce an order of magnitude increase in the radial thermal flux. High resolution electron temperature data and true steady state conditions in TS allow give well defined electron thermal diffusivities for the classical circular cross section, large aspect ratio ($R/a = 2.2$ m/ 0.7 m) tokamak. The heat flux versus the temperature gradient relationship is presented and compared with standard theoretical models for the thermal flux $q_e(T_e)$. The extrapolation to zero heat flux of the flux-versus-gradient data yields a well-defined critical electron temperature gradient. Histograms of the anomalous thermal diffusivities before and after being normalized to the theoretical models are constructed to evaluate the quantitatively the prediction. Work supported by Dept. of Energy and the CEA-Cadarache

Wendell Horton
Institute for Fusion Studies, UT-Austin

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