Topic E	Requested: ☐ Oral ☒ Poster	Panel suggestion: ☐ Oral ☐ Poster

Kinetic Effects in the DIII–D Divertor*

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High temperature electrons diffusing across the separatrix near the midplane can propagate to the divertor without collision and produce a high energy tail in the electron distribution function near the separatrix. This high energy tail may increase parallel heat conduction and enhance radiation losses in the cold divertor plasma over that expected from the measured bulk electron temperature.[1] Comparing the heat flux computed from Langmuir probe measurements ($\gamma n C_s T_e$, where γ is the sheath transmission factor) with that measured directly by infrared cameras, allows us to estimate the magnitude of the high energy tail. Floating potential measurements from probes along the horizontal target plate and vertically above the floor also give an indication of energy and spatial distribution. Directional temperature measurements using a reciprocating probe in the divertor can also be used to indicate the presence and spatial location of assymetries in the distribution function which would be characteristic of a non-thermal population.

A Fokker-Planck kinetic model,[2] which includes coulomb and plasma-neutrals collisions is used to estimate the size of the high energy tail. It predicts the spatial distribution of these non-thermal particles to be maximum near the separatrix and to exist at typical densities and power levels for the DIII–D scrape-off layer plasma. Increasing collisionality in the divertor through operation at higher densities will be shown to influence the population of non-thermal particles that reach the target plates. We will also compare theoretical predictions of spatial profiles of radiation, and plasma and energy fluxes onto the plate with observations from DIII–D.

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1A.W. Leonard *et al.*, Phys. Rev. Lett., 78 4769 (1997).
2O. Batishchev *et al.*, Phys of Plasma, 4, 1672 (1997).