Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

The SOL as a Turbulence-Driven Boundary Layer: Implications for Heat Load Scalings[1] PATRICK H. DIAMOND, University of California, San Diego, CHRISTOPHER MCDEVITT, University of Florida, YUSUKE KOSUGA, Kyushu University, ZHIBIN B. GUO, Peking University — Present day SOL scalings can be explained by a simple model linking the SOL width to magnetic drifts. The question, then, is if this scaling trend will persist. To this end, it is natural to model the SOL as a *lossy thermal boundary layer* (BL) which is driven by core heat flux, and which balances drift transport, turbulent transport and parallel losses. A puzzle here is that the SOL is turbulent but also remarkably stable — with FLR, line-tying and drift excursion (analogous to finite banana width) acting to weaken or quench the usual suspects for turbulence generation. The logical deduction is that SOL turbulence originates *inside* the separatrix and subsequently enters the SOL by "turbulence spreading". Thus, the SOL BL is seen to be driven by *both* a flux of turbulence intensity as well as heat, both emanating from the core. Note that these are in principle *independent*, thus constituting two separate control parameters for the SOL. Also, since the turbulence flux is determined by pedestal dynamics and turbulence, it can introduce the appearance of "nonlocality" to SOL transport. Spreading effects on the SOL width are under study and will be discussed.

[1]Research supported by the U.S. Department of Energy, Office of Science, Office of Fusion Energy Sciences, under Award Number DE-FG02-04ER54738.

Patrick Diamond
University of California, San Diego

Date submitted: 22 Jun 2020 Electronic form version 1.4