Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Testing H-mode pedestal transport models through predictive simulations NIGEL DASILVA, Rensselaer Polytechnic Institute, WALTER GUTTENFELDER, Princeton Plasma Physics Laboratory — A number of theoretical transport and stability mechanisms are predicted to impact the structure of the tokamak pedestal – the boundary region with steep temperature and density gradients that provide good energy confinement. While collisional diffusion provides a minimum for transport, various turbulent mechanisms and MHD instabilities limit the total temperature, density, and pressure gradients by allowing relatively efficient particle and energy transport. We are particularly interested in these microinstabilities since unraveling their role in setting these gradients remains a key research area for predicting fusion performance. This work focuses on predicting temperature and density gradients in the pedestal through modeling multiple transport mechanisms to test if they can adequately explain experimental observations. This is accomplished by numerically solving several coupled, time-dependent transport equations using simplified transport models based on first-principles simulations. Key results will be to clarify and illustrate how the nonlinear mechanisms interact to determine the pedestal structure, including how the pedestal density and temperature evolve depending on relative source rates or following various transient perturbations.

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Date submitted: 26 Jun 2020 Electronic form version 1.4