Abstract Submitted
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Electron Temperature Estimate in C-2 FRC Using Neural Network SCOTT AEFSKY, ERIK TRASK, Tri Alpha Energy, Inc., DAVID LEINWEBER, NICOLAS BRODY, Tri Alpha Energy, Inc, BIHE DENG, KAN ZHAI, Tri Alpha Energy, Inc., THE TAE TEAM — The electron temperature (T_e) of the plasma inside the C-2 Experiment [1] is measured using a Thomson Scattering (TS) diagnostic. The high energy required for the TS laser pulses limits the number of measurements that can be taken during the lifetime of the C-2 plasma; typically, 2 measurements are made by the TS system during each discharge. In order to get an estimate of the temporal evolution of average T_e inside the separatrix throughout a shot, a novel method has been developed using Neural Networks. Using other diagnostic measurements, which are known to be dependent on T_e, we train a neural network to produce an empirical mapping from these diagnostics to the TS-measured T_e. We tested this network on TS pulses which were excluded from the neural network training, and we consistently get values for T_e within 10 eV of the TS measurements, agreeing within the error of the TS diagnostic. This allows us to confidently produce a trace for each shot with estimates of the average T_e at a rate of 500 kHz. Further work has been done to use a similar technique to estimate a radial T_e profile. While not yet as successful as the average T_e estimate, this has shown great promise.

[1] M. Tuszewski et al., Phys. Rev. Lett. 108, 255008 (2012)

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