Abstract Submitted
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Energy Confinement Scaling in the Low Aspect Ratio National Spherical Torus Experiment (NSTX)[1] S.M. KAYE, M.G. BELL, R.E. BELL, E.D. FREDRICKSON, B.P. LEBLANC, Princeton University, Princeton, NJ, K.C. LEE, Univ. of California, Davis CA, S. LYNCH, Dept. of Sociology, Princeton Univ., Princeton NJ, S.A. SABBAGH, Dept. of Applied Physics, Columbia Univ., New York NY, NSTX TEAM — Studies have been conducted to develop an understanding of the parametric dependence of the energy confinement time at low aspect ratio in high power NSTX discharges. Systematic scans of plasma current and heating power indicate parametric trends similar to those observed at higher aspect ratio, but statistical analyses indicate that the NSTX data exhibit a weaker current, but stronger magnetic field, dependence than at higher R/a. While confinement values are enhanced over those given by conventional aspect ratio scalings, there is a great deal of shot-to-shot variability that originates from differences in ELM activity, low frequency magnetic fluctuation levels and plasma shaping. Analyses using standard linear regression, Bayesian and principal component techniques indicate a range of fits to the data for both sets of engineering and physics regressor variables. In particular, the dependence of confinement on β varies from being slightly unfavorable ($\beta^{-0.2}$) to being more strongly favorable ($\beta^{0.4}$).

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