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Electron-scale Temperature Fluctuations in High-Performance Fusion Plasmas

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Title: Electron-scale Temperature Fluctuations in High-Performance Fusion Plasmas

Speaker: Xiang Chen, MSc – Massachusetts Institute of Technology (USA)

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Abstract: Electron scale temperature fluctuations in fusion plasmas are associated with electron-scale electromagnetic drift-wave type turbulence. High-k electron temperature fluctuations might contribute significantly to heat loss in a fusion reactor. However, no direct measurements of high-k electron temperature fluctuations have ever been made in any experiments and thus no validation work involves the electron temperature fluctuations quantity. In this work, we run electron temperature gradient (ETG)-scale nonlinear gyrokinetic simulations of an NSTX H-mode with CGYRO. We will do a synthetic projection of high-k electron temperature from simulation in NSTX which has never been done before. Comparison with high-k electron density fluctuation are made to demonstrate the advantages of predicted electron temperature fluctuations diagnostics and how critical it is for validation of transport models. The impact of electron temperature fluctuations on electron thermal transport are studied to answer the question whether ETG is the dominant turbulence mechanism or not.

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