



NSTX/NSTX-U Theory, Modeling and Analysis Results & Overview of New MAST Physics in Anticipation of First Results from MAST UPGRADE

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NSTX(-U) and MAST research address urgent issues for fusion science, ITER and next-step devices

- Core transport & turbulence studied over an extended range of β
 - Electrostatic and electromagnetic effects drive strong favorable v_* scaling
 - Multi-scale effects (low- & high-k) must be considered
- Energetic particle effects and instabilities studied in portions of parameter space expected for α -burning plasmas
 - Low and high frequency modes can have profound effect on EP distribution
 - Predictive models and phase-space engineering techniques being developed
- L-H and H-mode physics
 - Zonal flow to turbulence energy flow prior to L-H inconsistent with predator-prey
- SOL turbulence studies address processes controlling heat flux width
 - Filamentary structures/turbulence
 - Heat flux mitigation through innovative divertor designs