

Theory/NSTX-U Partnership

Amitava Bhattacharjee

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Support Summary

- Theory Support from NSTX-U ~ 4.7 FTEs
- Enabled partially by FY13 supplementary funding (carryover into FY14 ~ \$0.93M)
- Apportionment between tasks is to be set by Head, Theory Department in consultation with J. Menard, S. Kaye, and M. Ono

Research Areas

Macroscopic equilibrium and stability including energetic particles

- E. Belova: CAE coupling studies with GAE and KAW using the HYM code (including fully kinetic ions and drift-kinetic electrons), and their effects on energy fluxes and electron transport. (0.5 FTE)
- G.-Y. Fu: Nonlinear multi-mode TAE studies leading to avalanche production using the M3D-K code. (0.5 FTE)
- N. Gorelenkov: Extension of quasi-linear model to calculate spatio-temporal diffusion of fast ions. (0.25 FTE plus one graduate student).

Research Areas

- A. Boozer/J.-K. Park: Interaction of non-axisymmetric magnetic fields (resonant and non-resonant)
- T. Evans/N. Ferraro/S. Jardin + postdoc: RMP studies

Disruption Studies

- S. Jardin: Beta-limit disruptions using M3D-C1 (0.4 FTE)
- D. Brennan (independently funded): Nonlinear evolution of 2/1 islands including energetic particles and flow drive using PEST-III and NIMROD (synergistic with DIII-D studies)
- J. Breslau : Disruption studies using M3D (0.25 FTE)

CHI

- F. Ebrahimi (independently funded) w/R. Raman

Another 0.4 FTE yet to be apportioned.

Research Areas

Transport and Confinement

- Micro-tearing turbulence in NSTX-U

Implementation of electromagnetic effects in GTS and XGC-1

E. Startsev: GTS in core (0.5 FTE), S. Ethier (0.2 FTE)

C.-S. Chang/S. Ku: XGC in edge using full f (0.5 FTE)

W. Wang (with Y. Ren/W. Guttenfelder): Comparative studies of NSTX-U and DIII-D on effects of collisionality (0.5 FTE)

- Inferring turbulence properties from GPI studies using DEGAS 2 (D. Stotler w/S. Zweben, 0.5 FTE)

Research Areas

RF Physics

- E. Valeo (with N. Bertelli, P. Bonoli, C. Phillips): RF physics on NSTX-U: (i) Power flow into energetic ions is in disagreement with AORS/GENRAY predictions even though the two codes are in agreement (ii) Coupling of TRANSP/NUBEAM with TORIC (0.2 FTE)

Next Steps

- Imperative that we have significant results to show for this partnership by the time of the next NSTX-U PAC meeting (low-hanging fruit) in Spring, 2014, and by the end of FY14
- Sharper definition of problems, solution strategies, and deliverables
- NSTX-U TSG leaders in Theory Department should call regular meetings of the TSGs (at least once a month, preferably once in two weeks) to discuss and monitor progress.