2014-18 Transport and Turbulence Research Timeline

FY13 | 14 | 15 | 16 | 17 | 18

Physics

5 year plan period → 5 year goal

(Thrust 1) Neoclassical

- Assess neoclassical models for ion thermal and particle/impurity transport in low ν_*/ASC regimes

(Thrust 1) Low-k

- Correlate transport & low-k: Ip, BT, ν scaling, perturb. momentum (NBI, RMP) & impurity (ME-SXR, gas puff)
- Correlate transport & low-k: Full range Ip, Bt, ν scaling, 2nd NBI, NCC (q, flow profile) perturb. impurity (laser blow-off)
- Correlate polarimetry and χ_e for high β/ν microtearing regimes
- Validate measurements with simulations & synthetic diagnostics

(Thrust 1) High-k

- Correlate χ_e with high-k turbulence (identify ETG)

(Thrust 1) *AE

- Measure *AE mode structure (BES, refl.)
- Correlate *AE and χ_e over I_p, B_T, P_{NBI}; identify range of applicability

(Thrust 2) Model development

- Establish 0D confinement scalings (BT, Ip ν_*)
- Project 0D performance of FNSF/Pilot
- Initial validation of TGLF: 0D scaling & profile predictions
- Revise TGLF as required
- Validate TGLF with GK sims
- Integrate *AE models, pedestal BC's

5 year goal

- Identify mechanisms responsible for thermal, momentum, and particle/impurity transport
- Establish and validate reduced transport models (0D and 1D)

Tools

Diagnostics

- New FIR high-k_θ scattering system
- Laser-blow off (impurity injection)

Theory

- Synthetic diagnostics
- Development of XGC1-em GTS-em, Gkeyll

Facility

- cyropump

Plasma Parameter and Control

- Higher B_T, I_p
- Full range of B_T, I_p
- q, flow profile control with 2nd NBI
- NCC (flow profile)