2014-18 Energetic Particles Research Timeline

FY13 | 14 | 15 | 16 | 17 | 18

5 year plan period → **5 year goal**

Physics

- Investigate *AE dynamics and fast ion transport mechanisms
- Extend fast ion studies to full 1T, 2MA scenarios
- Compare with linear/ nonlinear predictions
- Optimize *AE antenna for efficient coupling to *AE modes
- Characterize F_{nb} w/ 2nd NB line; compare to TRANSP
- Characterize scenarios with NBI +HHFW
- NB, HHFW, antenna as actuators for *AE activity
- Validate reduced models for *AE-induced fast ion transport
- Develop ramp-up scenarios with reduced/optimized *AE activity

5 year goal:

1. Develop predictive tools for projections of *AE-induced transport to FNSF/ITER
2. Assess requirements for fast ion phase space engineering through selective excitation/ suppression of *AE modes

Tools

Diagnostics

- Tangential FIDA; upgraded ssNPA
- fusion source profile
- BES and reflectometers (mode structure)
- consider neutron collimator for high density scenarios
- *AE antenna for damping rate measurements
- upgraded *AE antenna for mode excitation

Theory

- Implement improved F_{nb} description NOVA-K, M3D-K and HYM
- Extend to FNSF/Pilot
- ORBIT, SPIRAL for fast ion response to *AE modes
- Extend simulations to full 1T, 2MA NSTX-U scenarios
- Develop/apply reduced fast ion transport models
- Extend to current ramp-up in FNSF/ Pilot
- 'Halo' model in TRANSP

Facility

- 2nd (more tangential) NB line
- *AE antenna for mode excitation

Plasma Control

- q-profile, rotation control with 2nd NBI