

2014-18 Macroscopic Stability Research Timeline

FY13 14 15 16 17 18

5 year plan period 5 year goal

Physics

Thrust #1

Optimize shaping, RWM/TM control (n≥1), internal mode control, validate RMW kinetic physics

Optimize and combine rotation (profile) and β-feedback control to improve macroscopic stability

Thrust #2

Optimize error field correction (n≥1), dynamic correction, and study NTV physics in reduced v*

Understand non-resonant error field and NTV effects, utilize 3D field to improve stability control

Thrust #3

Study halo currents, disruption precursors, and test MGI or other mitigation techniques

Investigate disruption loads, avoidance scenarios and couple to mitigation techniques

Provide FSNF/Pilot projection, Integrate MS control to improve RWM/TM/ELM/ internal mode stability, disruption avoidance, with disruption mitigation protection

Tools

Diagnostics

Real-time velocity measurement, Toroidally displaced MESXR, Expanded shunt tile measurement Real-time MPTS and MSE, X-ray imaging spectrometer, Internal dB measurement from MSE

Theory

Utilize and upgrade EFIT, IPEC, MISK, POCA, VALEN, MARS-K, NTV, DEGAS codes

Verify and validate GPEC, M3D-C1 for stability, 3D field, disruption

Facility

NCC

Plasma Control RWM state-space control (n≥1), internal mode control, error field control

Utilize 3D field for rotation (profile) and β-feedback control, to improve RWM/TM/internal mode stability Integrate MS control with disruption avoidance and mitigation