RMP ELM Control Experiments remaining in CY08

- 2008-03-05 1.0 day Effect of RMP ELM Suppression on Pedestal Particle Transport
  - Scheduled for: Friday, April 4th
  - Lead to write MP: Moyer
- 2008-03-06 1.0 day Effect of RMP ELM Suppression on Pedestal Particle Sources and Sinks
  - Scheduled for: Thursday, June 5th
  - Lead to write MP: Evans
- 2008-03-07 1.0 day Search for Magnetic Structure Patterns on Surfaces due to RMP and Effect of Q-Variation
  - Scheduled for Monday, April 14th
  - Lead to write MP: Oliver Schmitz

Considerations for run plan

- Evans run day will address global particle balance issues; not a focus of this experiment, but obviously can obtain good information
- Possible explanations for pedestal changes due to increased transport:
  - Increased neoclassical transport in response to RMP
    - proposed by CS Chang and Gunyoung Park based on XGC0 modeling
    - Neoclassical transport isn't small out of equilibrium
    - Timescale? Some multiple of bounce time - is this too fast?
    - Inherently transient: might explain initial (fast) drop, but why doesn't the pedestal recover once the equilibrium is re-established and neoclassical is presumably small again?
    - Is the final equilibrium in the presense of the RMP like the ion root in stellarators? Higher neoclassical transport in steady-state but still "H-mode" like?
  - Increased turbulent transport across outer region of discharge ($0.7 < \rho < 1$)
    - Evidence for increased density fluctuation levels in this region aqt ion scales; some at intermediate scales; electron scales?
    - Significant changes to E x B shear in this region; is the explanation that the Er shear regulation of the turbulence is reduced and transport recurs.
    - Indications for transport? Radial correlation length changes? Cross-phases or fluxes (e.g. from BES data)?
    - Increase agrees roughly with what's needed in a quasi-linear estimate for density change
    - Need to quantify the associated transport changes - e.g. with modeling by TGLF?
  - Increased intermittent boundary transport (near separatrix in steep gradient region):
    - Evidence for this at moderate collisionality, and in many cases at low collisionality
    - Point measurements confirm increased transport fluxes but how to quantify over the flux surface?
- Most likely explanation: contributions from all these?

(Draft) Primary goals for run plan

- Primary goal: compete scan of density fluctuation amplitude $\tilde{n}_{rms}$ versus I-coil current and/or $\delta b_r^{m,n}$(ped)
  - measure when and where fluctuations and E x B shearing rate are changing and how this scales with RMP amplitude
    - Step I-Coil current after ELM suppression to isolate this dependence from the initial response to the RMP (separate anomalous transport from neoclassical transport?)
  - Working with XGC Group (Chang, Park) to identify ways to quantify neoclassical transport
    - At I-coil on, neoclassical rates can be very large since the RMP pushes the plasma away from equilibrium;
    - rates may persist if final state is a strongly perturbed ideal 3D equilibrium similar to IPEC results
  - Consider off-resonance q95: is the pump-out due to those last ELMs or to changes in anomalous transport?
  - ν^* scan at fixed parity and RMP amplitude to vary relative weighting of anomalous transport vs. intermittent transport?
  - Vary I_p and B_T at fixed q95 for turbulence scaling?
  - Can a ρ^* scan isolate MHD effects from microturbulence (higher
  - * tends to stabilize MHD modes but not turbulence)?

Additional considerations for run plan

- Quantitative correlation of fluctuation amplitude with E x B shearing rate
  - Impact of zonal flow damping on fluctuation levels and transport
  - Vary rotation in a controlled manner
    - use feedback to fix at different levels?
  - Provides input to turbulence modeling (e.g. GYRO?)
- Does RMP change/weaken particle pinch?
  - can we use impurity puffs (e.g. helium) to measure pinch velocity vs. RMP amplitude?
    - How do these impurity pinch velocities relate to working ion transport?
- Changing the pumping efficiency: can we learn something be doing more of this?
  - Pull strike point away from the pump

We are seeking input on prioritizing these goals (and any new ones):
Run day is clearly “over-subscribed”