Discussion for 0.5 Day Scoping XP: Density Modulation with SGI

- **Primary goal:**
  - Can SGI be effectively used to modulate electron density for perturbative particle transport measurements?
    - > Scan SGI parameters (gas injection pulse height, interval, width)
    - > Can perturbation be measured with profile reflectometers (penetrates to core)?
    - > L-mode target should be priority
    - > Useful portion of discharge may be short - single pulse OK? Min. pulse interval?
- **Secondary goals:**
  - Want some initial idea of difficulties for H-mode
    - > Requires much higher gas injection rate
    - > Perturbation may not propagate well beyond barrier
  - Can fixed-frequency reflectometers alone be used to monitor density perturbations?
    - > Collect initial data for this case
    - > May be necessary for H-mode
    - > Look at L-mode shots to determine uncertainty (effect of turbulence, finite # of spatial pts, etc.)
- **Other issues that need to be considered later:**
  - Compatibility of targets with other diagnostics
    - > BES, high-k, CHERS, MSE, SXR, etc.
  - AE-mode activity
    - > What level is tolerable for turbulence measurements?
  - Fine-tuning of SGI parameters
    - > Repetition rate needs to be low enough to avoid stair-stepping
    - > Gas injection interferes with certain diagnostics (e.g. CHERS) -> want low repetition rate
    - > Want higher repetition rate if discharge conditions are changing

Discussion for 0.5 Day Scoping XP: Density Modulation with SGI (continued)

- **Possible run plan:**
  - 10-14 shots, divided into L- and H-mode sections with L-mode as priority.
- **L-mode (10 shots):**
  - Requirements for reflectometers:
    - > Peaked density profile with n_{e0}=3-4x10^{13} cm^{-3}
    - > Avoid MHD activity
    - > If conditions are similar to 2008, shots similar to those from XP-819
  - SGI scan:
    - > Fix pulse width to minimum (10 ms, 2-3 ms rise/fall)
    - > Main knob: pulse height
    - > Secondary knob: pulse interval
  - Other considerations:
    - > May be difficult to keep out of H-mode (may need to play with B_t, etc.)
    - > If significant Li in machine, may be difficult to get appropriate density
- **H-mode (4 shots):**
  - Requirements for reflectometers
    - > Peaked density profile with n_{e0}=7-8x10^{13} cm^{-3}
    - > Target TBD. Want ELM-free or long ELM-free periods. Small ELMs may be OK.
  - SGI scan:
    - > Main knob: pulse height
    - > May need to increase pulse width to increase gas
  - Other considerations:
    - > Expected to be more difficult than H-mode. Will most likely require more shots.