

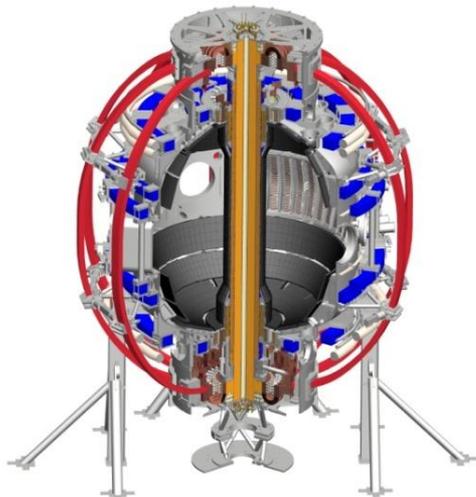
Impact of 3-D fields on pedestal profiles under varying wall conditions and collisionality

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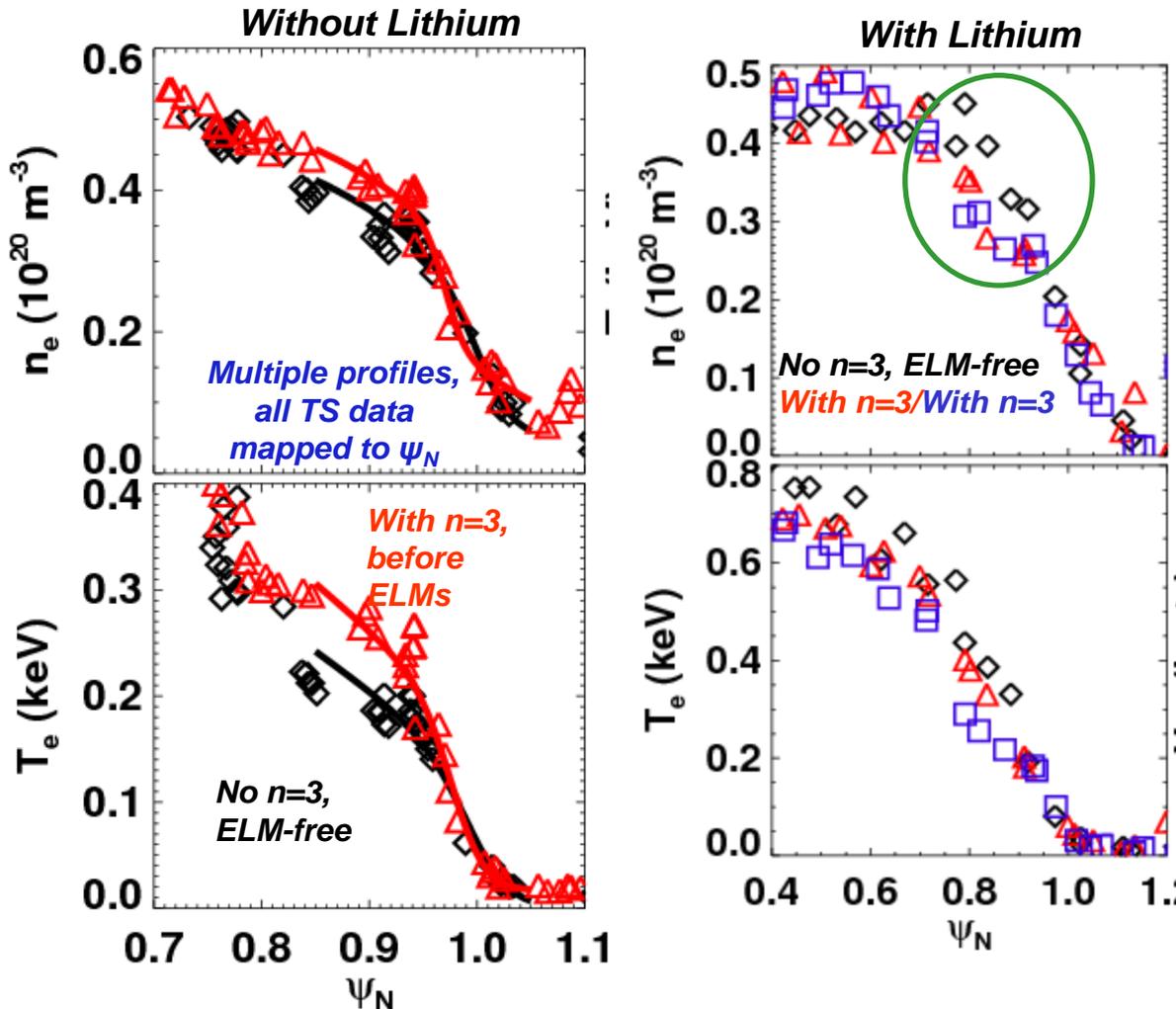
**NSTX-U Research Forum
Princeton, NJ
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Pedestal profiles show varying response to n=3 field application with/without lithium

Profiles compiled from several shots:
 Black before, colors after n=3 (but before ELMs)



Without lithium

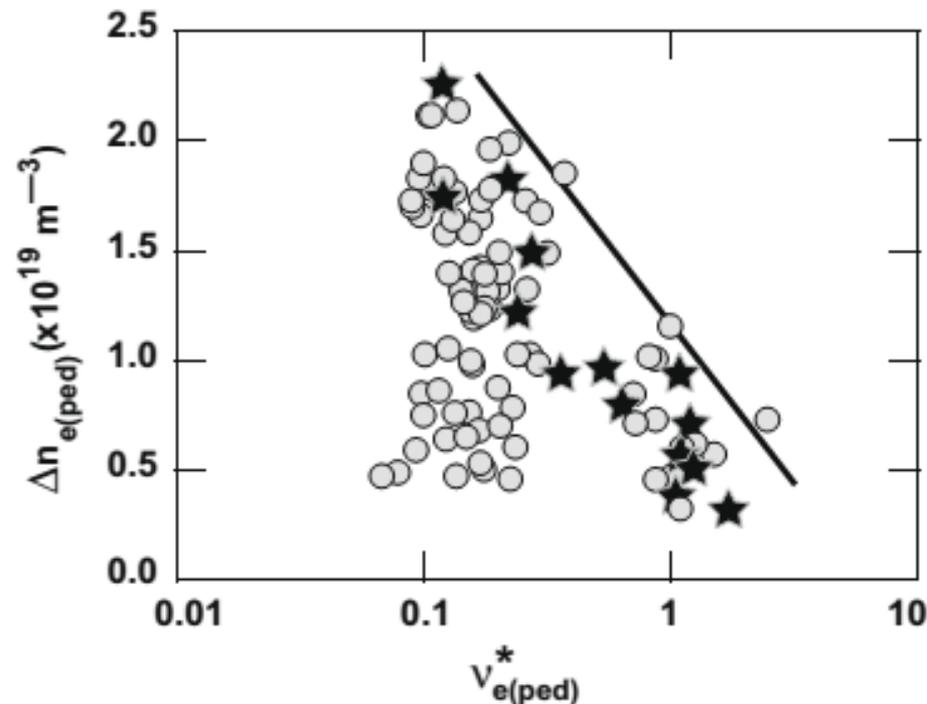
- **No strong change in density (natural rise same as control shot)**
- **T_e , pressure gradient increases after n=3 field is applied**

With lithium

- **Flattening in n_e seen from $\psi_N \sim 0.8-0.9$**
- **Also seen in $T_e \rightarrow$ island?**

Response of profiles to 3D fields with/without lithium will be revisited, extended to low v^*

- Lower-triangularity shape would connect to DIII-D results
 - Most NSTX data at $\delta \sim 0.7-0.8$, DIII-D $\delta \sim 0.25-0.55$
 - NSTX typically runs near peeling boundary, DIII-D near junction of peeling/ballooning boundaries
 - Reduce δ (to ~ 0.4 ?) to get close to DIII-D in stability space
- Measure profile changes for multiple power levels
 - Intuitively expect to change proximity to stability limits-some evidence exists that it does
 - β_N varied \rightarrow changes response to RMPs in DIII-D
 - Rotation varied \rightarrow expected to play important role in shielding
- Reduced collisionality expected to change impact of 3D fields both empirically and theoretically
 - Density pumpout largest at low v^* at DIII-D
 - ‘ $1/v$ ’ electron flux (Canik NF '12)



Unterberg, JNM '09

Run plan

- Ideally run with low triangularity ($\delta \sim 0.4$?)
 - Use High-Z/cryo characterization shapes?
 - Maybe not essential: just run in same shape as pedestal $I_p/B_t/P$ scans
- Measure pedestal profiles without and with $n=3$ fields applied
 - Field strength tweaked to trigger ELMs ~ 50 ms after application
 - $n=3$ 100ms on, 200 off, 100 on again
 - Multiple shots for ELM synching (if necessary), maximize profile data
- Four scenarios desired:
 - No lithium, $P_{\text{NBI}}=3$ MW, No lithium, 5 MW
 - Yes lithium, 3 MW, Yes lithium, 5 MW
- Repeat at reduced collisionality
 - Repeat one more time, but at parameters than produce lowest v^*
 - Most interesting piece, but maybe premature to define for now
 - Depends on results of $I_p/B_t/P_{\text{NBI}}$ scans and success of Particle Control TF
 - Be prepared to run if low v^* becomes available easily