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XP 929: Pre-LLD Discharge Development for LLD Commissioning and Characterization

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ETG- Lithium

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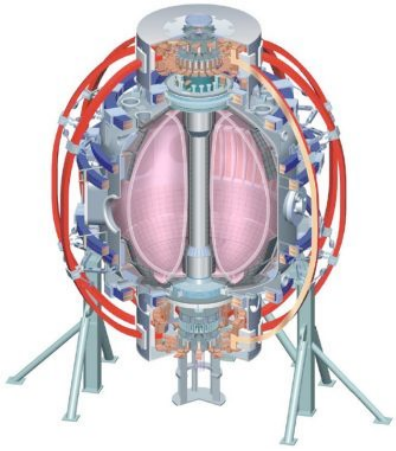

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Pre-LLD Discharge Development Required for LLD 2010 Commissioning and Characterization

- 2010 LLD Commissioning and Characterization XP will obtain preliminary performance data to determine when and how LLD operation can support more extensive experimental studies

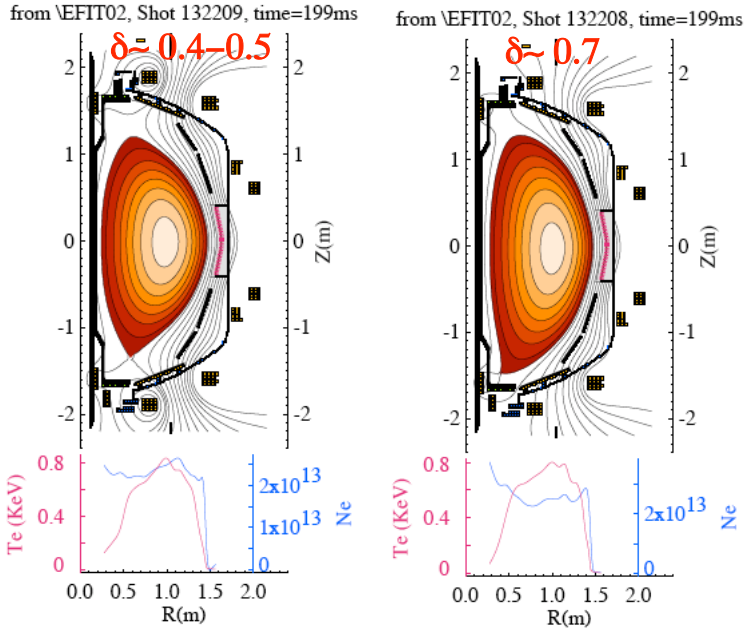
- 2010 LLD Commissioning and Characterization will address
  - Are the LLD control and diagnostic systems functioning properly?
  - Does the LLD exhibit density pumping?
  - If density waveform continues to rise, how is this dependent on:
    - Fueling amount, timing, and location
    - Inner gap
    - Strike-point location
    - Delta
    - Impurities and radiation
    - Power
    - Discharge Startup
  - Is the LLD temperature and power handling consistent with design?

XP929: Develop Low Power H-Modes at Low-δ and High-δ

- Initial operation on LLD will require H-modes with 1-2 MW NBI
  - Power Handling: Thermal analysis indicates for the cases for the strike point on the LLD with peak Li temperature set at 400 °C,
    - LLD can sustain a peak of ~2MW/m^2 for 10s and 4 MW/m^2 for ~3s.
    - Less Li, higher heat transfer (but less Li reduces LiD storage capacity).

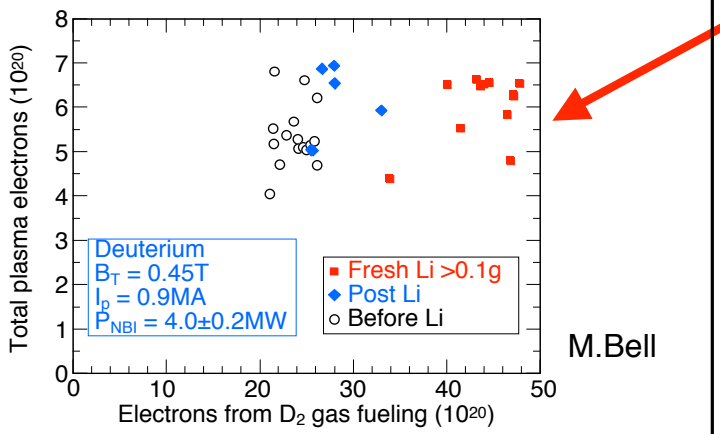
Li thermal conductivity is low. (~ W/m-°K 400 Cu, 150 Mo, 45 Li, 15 SS)

- Strategy: Build on XP923 findings for low power H-modes for δ~0.4-0.5 and δ~0.7 discharges
  - *NBI: 4MW, 3MW, 2MW, 1MW*
  - *I_p: 0.8MA, (132209)*
    I_p: 0.9MA,1(132208)
  - *B_t: 0.44T*

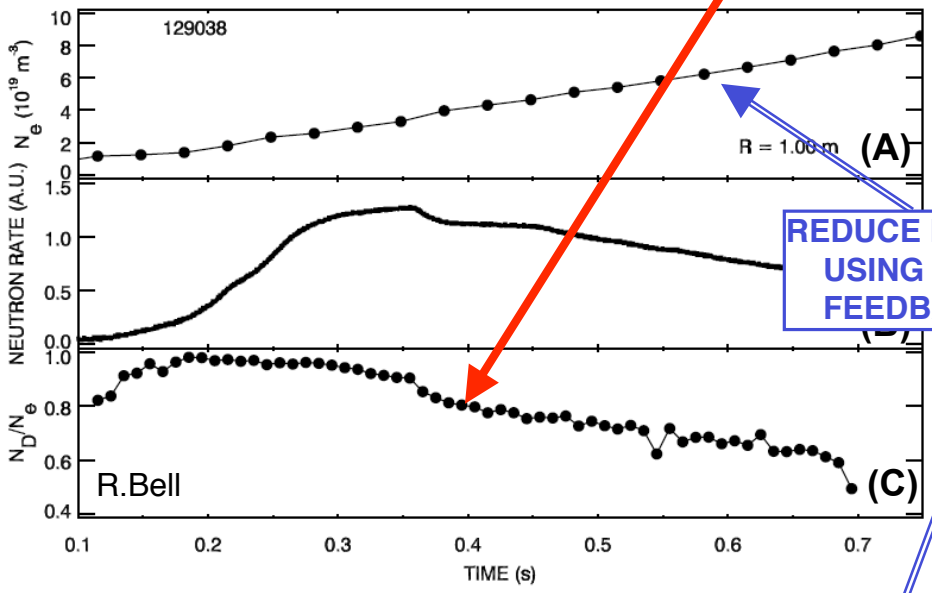


XP929: Develop Low Power H-Mode with Fueling Optimized for Low n_e with $\partial n_e / \partial t = 0$ at Low-δ and High-δ

- ***Lithium Pumps:*** **Large D fueling increases required to maintain density, and discharge stability, -nevertheless, core D decreases**



- **Obtained using pre-programmed gas waveform for density control under conditions of dynamically changing density sources**



- Strategy: Scan fuel sources to optimize fueling efficiency and search for possible conditions yielding Z-influx shielding
  (scan CS Shoulder, CS Mid, LFS)