

# Is Isolation Between Core and SOL/Divertor Plasma Density Possible?

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1. Core density regulation determines  $Q$  and thermal stability of an ignited plasma
  - Inside pellet launch is viewed as a core density control knob
  - Desired core density fixes  $n_{ped}$  as a function of core  $P, n, B, I_p$  and  $\kappa$
2. DT and radiating impurity gas puffs and divertor pumping determines SOL/divertor density profiles and assures sufficient power radiation, detachment, and helium exhaust.
  - The separatrix density  $n_{sep}$  is adjusted by puffs and pumping to get the desired divertor performance.

# CRITERIA FOR ISOLATION

## 3. Key assumptions (to be checked by experiment)

- Plasma source from core through H-mode transport barrier is small compared gas puff sources in SOL/divertor system.
- Plasma source inside of pedestal via ionization of neutral gas small compared to pellet source.

4. It follows that  $n_{\text{ped}} \gg n_{\text{sep}}$  and H-mode transport barrier isolates core density control from density in SOL/divertor system.

# INSIDE PELLET LAUNCH FOR REACTOR-SCALE FACILITY

