

# Effects of N-NB energy in ITER H-mode plasmas

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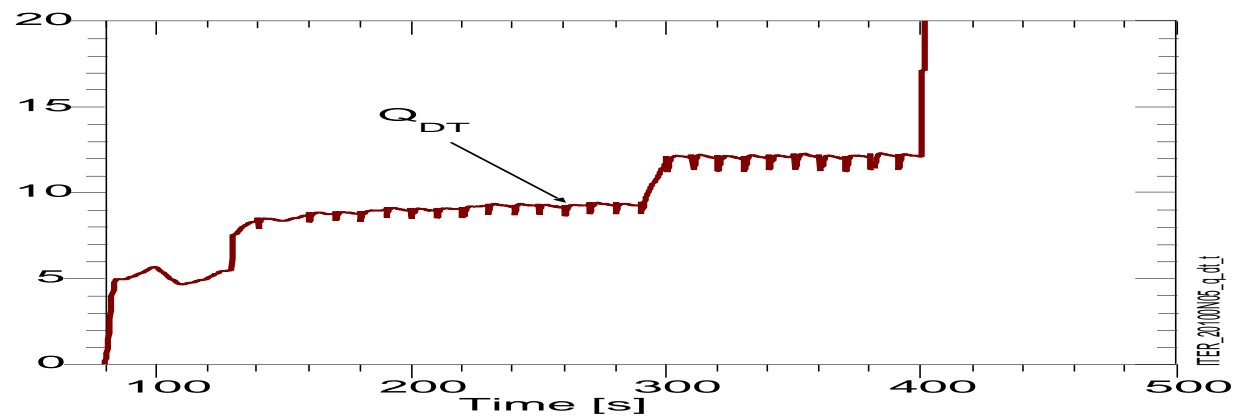
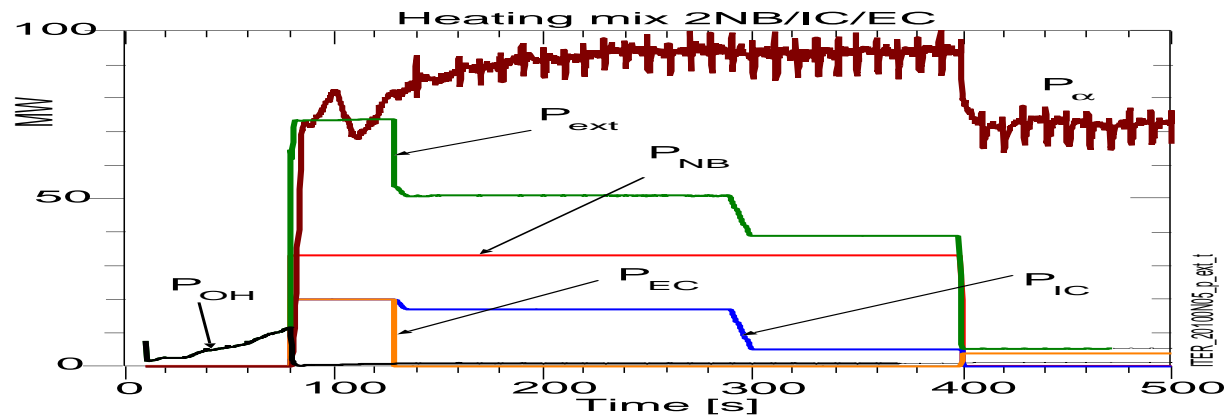
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- Proposals to reduce the N-NB energy in ITER H-mode plasmas
  - Larger total beam torque from shifted deposition at lower beam voltage
  - Predict slightly higher flow shear in baseline H-mode plasmas
  - Predict lower beam current drive
- No advantage foreseen if 1MeV is obtainable:
  - Engineering indicates that  $I_{grid} \simeq \text{constant}$  so  $P_{NB} \propto E_{inj}$
  - Decrease in  $P_{NB}$  offsets potential gains

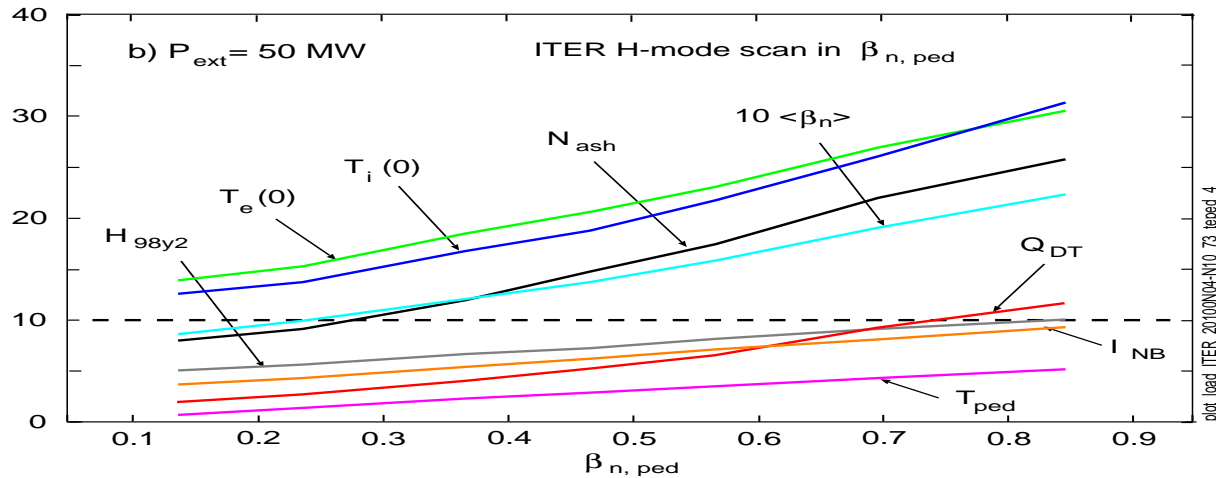
## Start with PTRANSP predictions of baseline DT plasmas

- GLF23 for temperatures
- Step down  $P_{ext}$  to increase  $Q_{DT}$



# Predictions of baseline DT plasmas

- Scan in pedestal pressure  $\beta_{n,ped}$

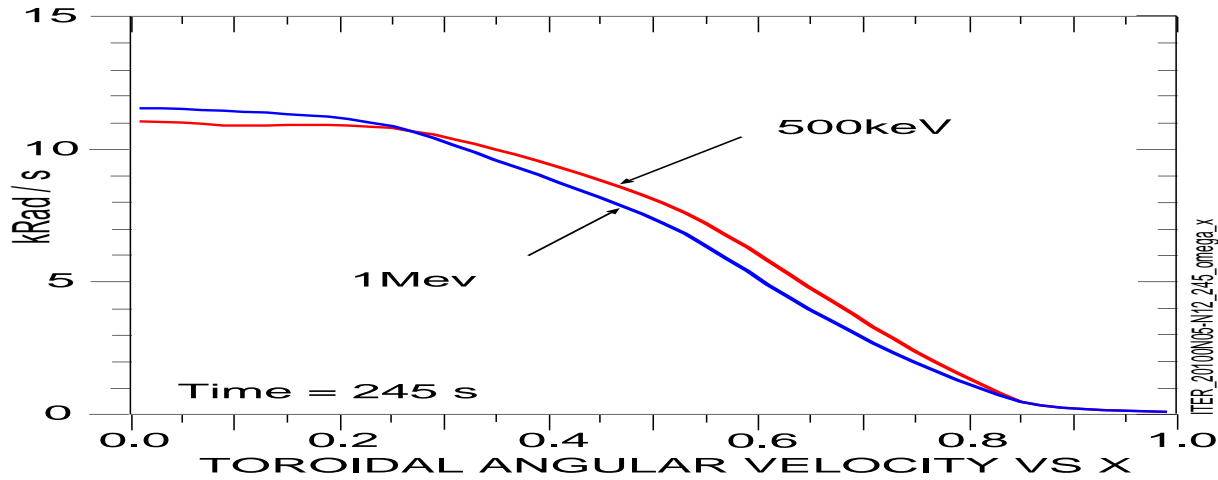


- $Q_{DT}$  limited to  $\simeq 10$  by three bounds:

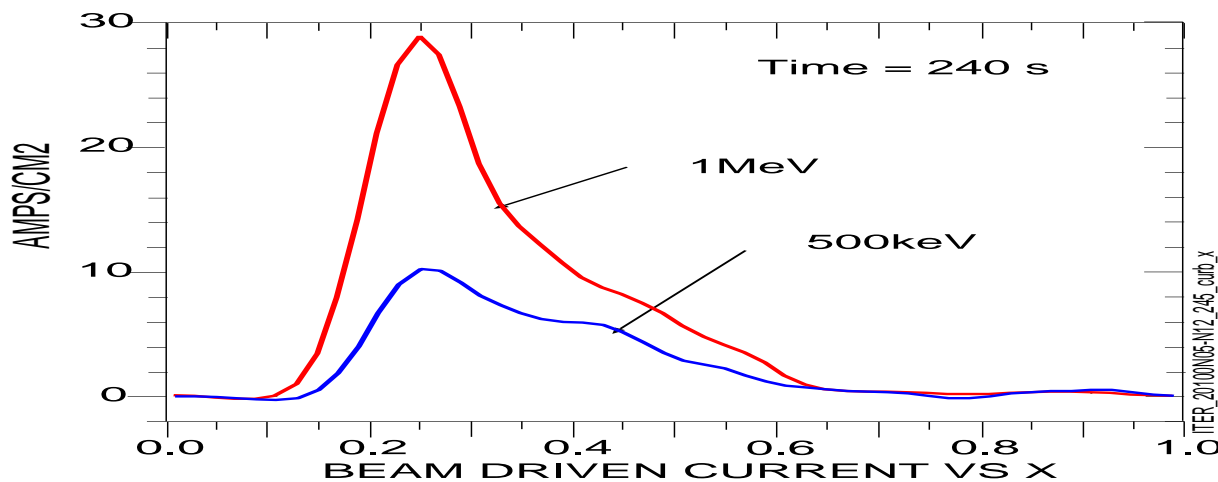
- $\beta_{n,ped} < 0.8$
- $\beta_n < 1.8$
- $\beta_{fast}(0) < 0.01$  to avoid excessive (5%) alpha losses

# Compare predictions of $Q_{DT}$ and NBCD

- Slightly flatter rotation and heating profiles

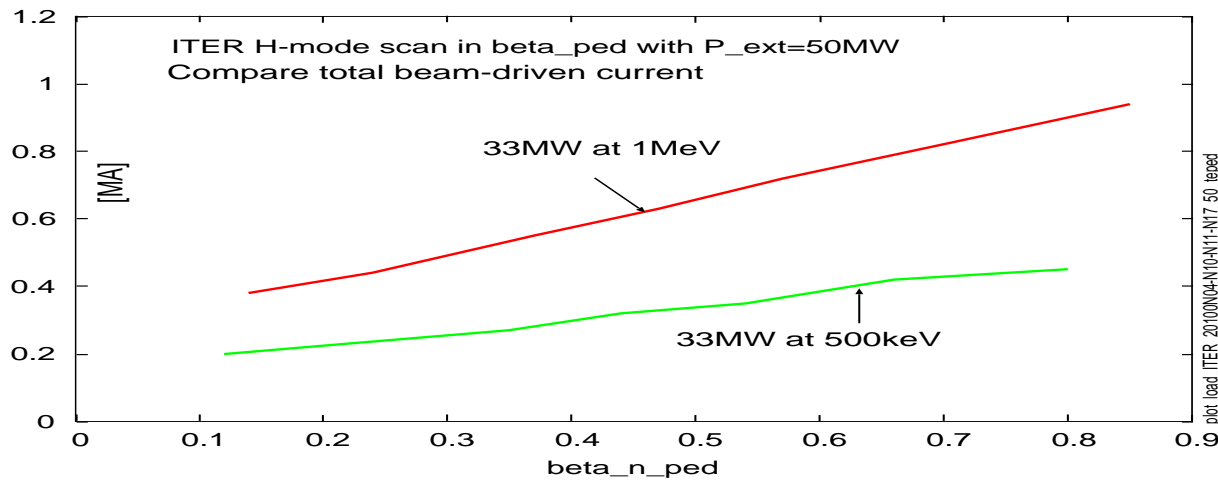
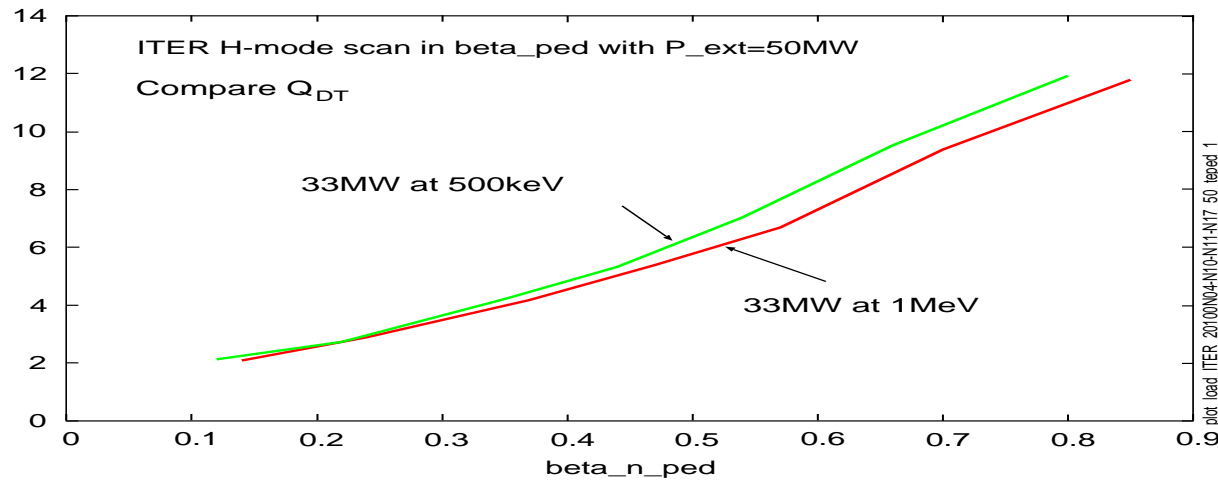


- Similar current drive shapes



# Predictions of baseline DT plasmas if NNBI voltage is 500V

- Find  $Q_{DT}$  slightly higher with 0.5MV (and  $P_{NB}=33\text{MW}$ )
- Find  $Q_{DT} \propto (\beta_{n,ped})^{1.0}$



## Conclusion

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- Lowering NNBI voltage to 500V has no advantages for the H-mode