ET3 Proposal for 2001:
Influence of Off-axis HHFW on Pressure Peaking in NBI Heated Discharges

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Parallel Session I
ET3 - HHFW and EBW Research

NSTX Research Forum 2001

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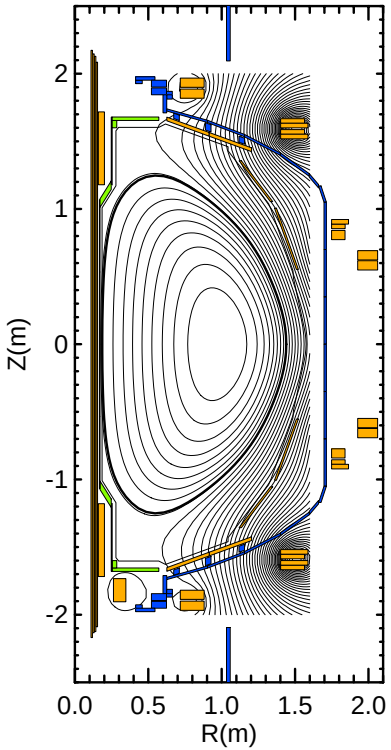
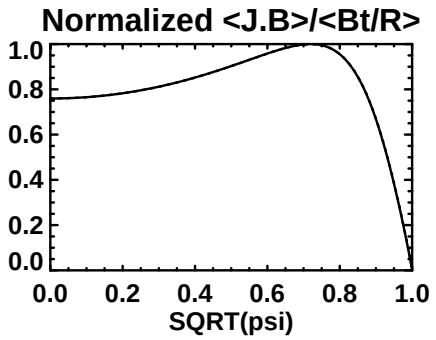
Motivation

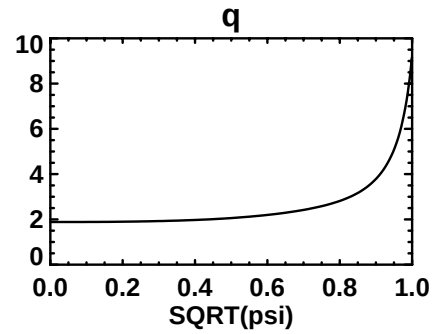
- Stability optimized equilibria have broader p profiles than currently obtained with NBI:
  - NBI $p(0)/\langle p\rangle$ = 2-4 typical
  - Optimal $p(0)/\langle p\rangle$ = 1.7-1.8

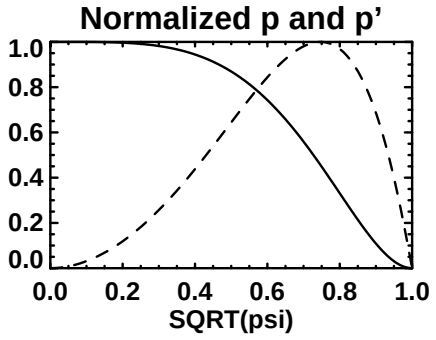
- HHFW has shown efficient heating in He at modest β
  - Higher β target should absorb HHFW strongly off-axis
  - If successfully combined with enhanced early HHFW injection, could result in significant performance improvement.

Simulation









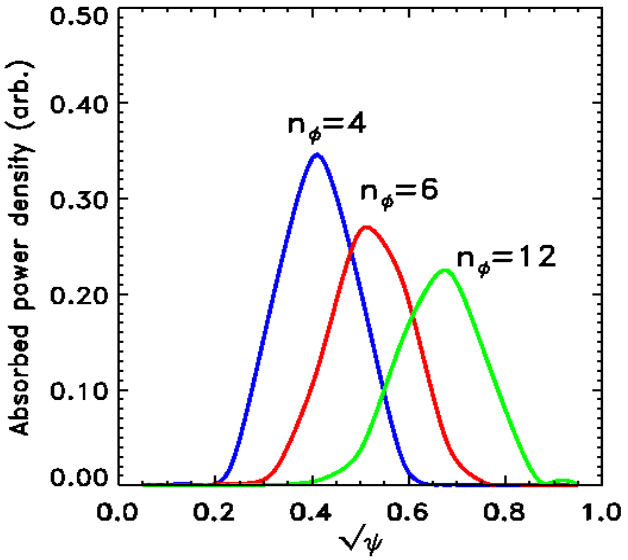
Stable to n=1,2,3 and ballooning w/ plates

Modeling Predictions

(circa 1998, prior to any real data)

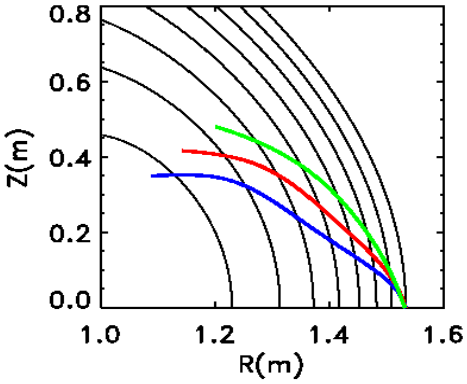
- Electrons alone can absorb all power for r/a > 0.6 at β=30% for n_ϕ > 12
- Ion absorption not detrimental if heated ions are confined.
  - But, ion heating would probably limit control of deposition profile, since resonances are fixed in space
- Observing any change in pressure peaking during NBI would be a milestone.

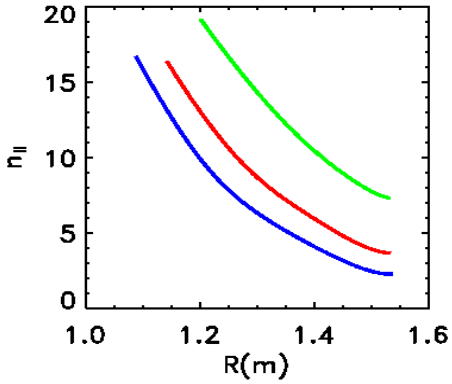
Power deposition profiles shifted off-axis



Cold-ion ray tracing on β=30% equilibrium

Large B_P causes large poloidally directed wave power flow





Strong $n_{||}$ upshift enhances damping

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Elements of XP

- Determine if HHFW can increase stored energy of NBI heated discharges not already near β limit.
  - May only work in Helium
    - Are D_2 NBI shots better HHFW targets than D_2 ohmic shots?
- If HHFW can heat, is the pressure profile broader for the slowest phasings? (n_ϕ = 12-24)
  - If so, try faster phasing, i.e. do a strap phasing scan
  - If not, re-think theory (and do phasing scan anyway :)
- This XP might come before an ion-absorption XP, or could piggy-back on other similar XPs.

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