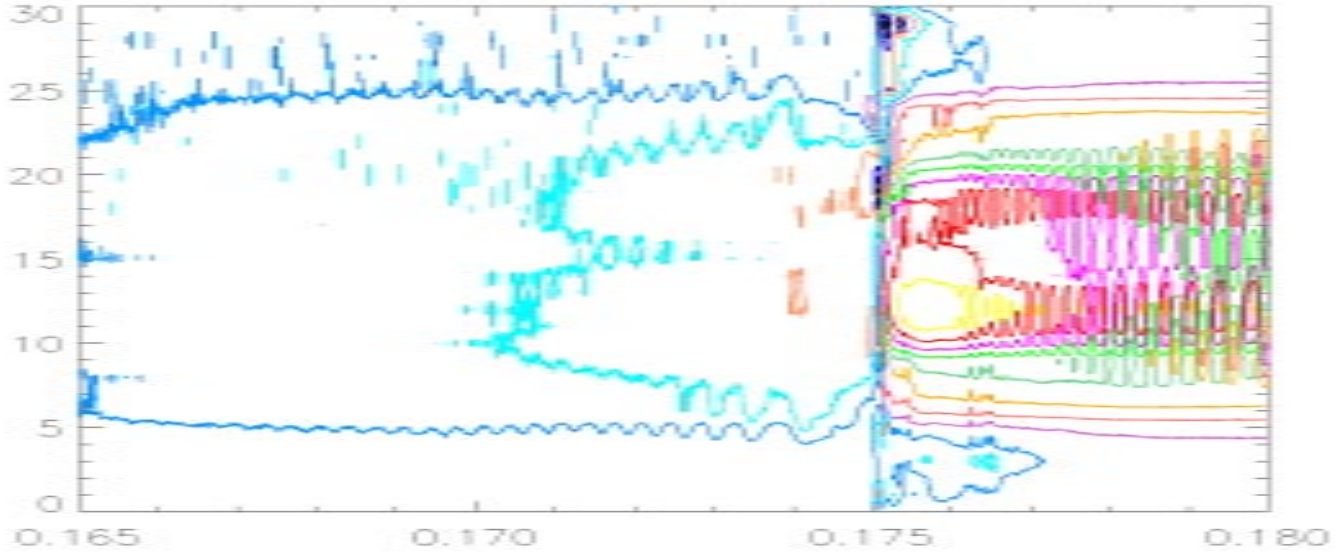
NSTX research forum presentations
J. Manickam, PPPL

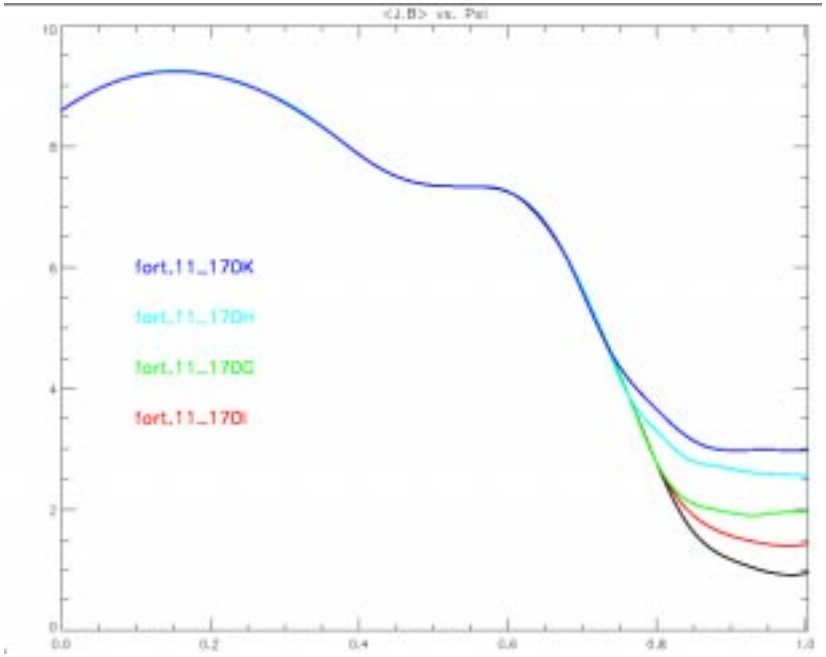
- Pfirsch-Schluter and bootstrap driven kinks
  Manickam, Fredrickson and Okabayashi

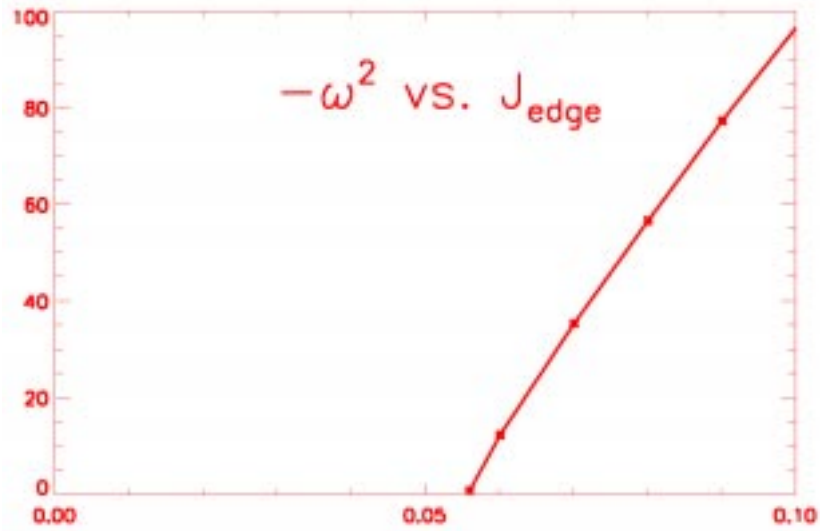
- Coupling of internal mode with external kink
  Manickam, Fredrickson and Okabayashi

- Accessing high beta through compressional heating
  Manickam, Kaye, Jardin, Fredrickson and Mueller

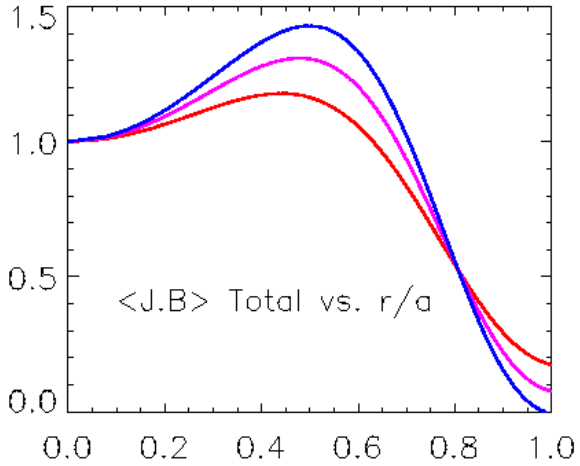
106004 : Contours of SXR(t)-SXR(t=0.16)

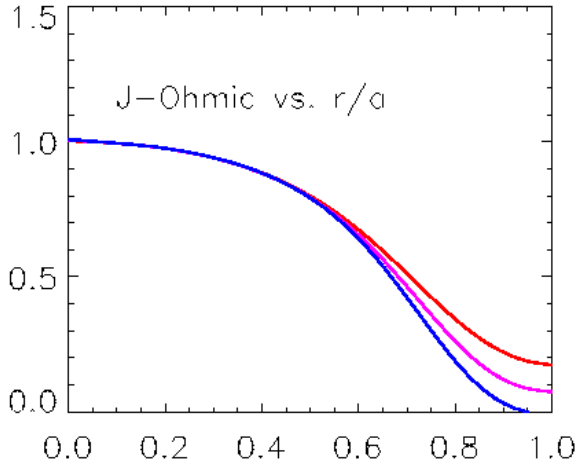




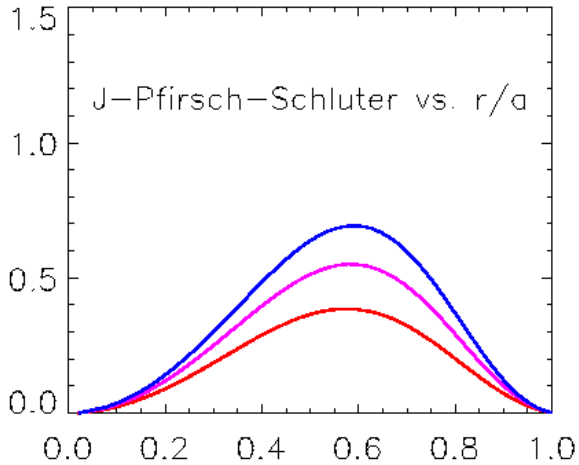


Increasing β changes the current distribution



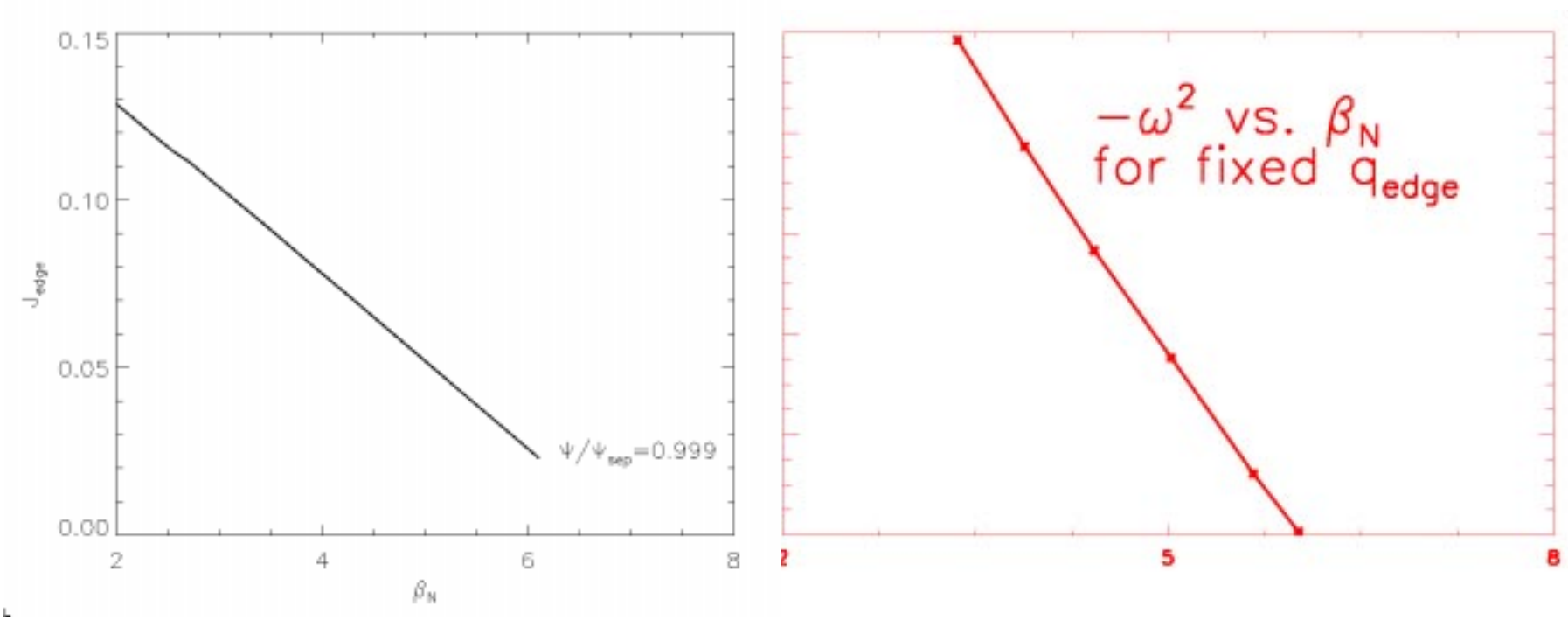


β_N=3.2
β_N=4.8
β_N=6.3
Effect of raising β at fixed I_p
on the current profile
As the Pfirsch−Schluter current
increases the Ohmic current decreases



J_{edge} vs β_N for fixed q_{edge}=9.8

$-\omega^2$ vs β_N for q_{edge}=9.8

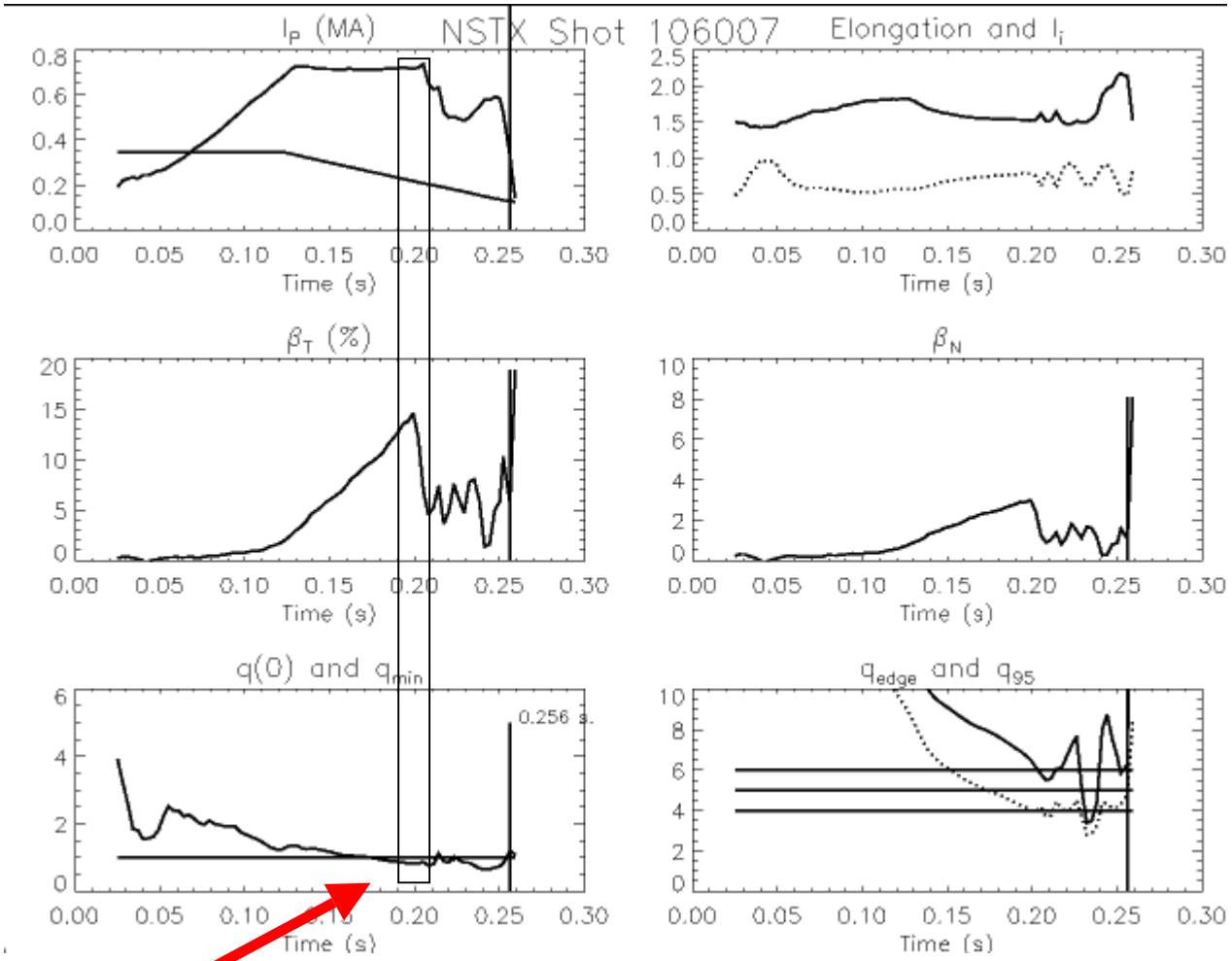


Fixing q_{edge} and increasing the β can lead to stabilization by reducing the edge current

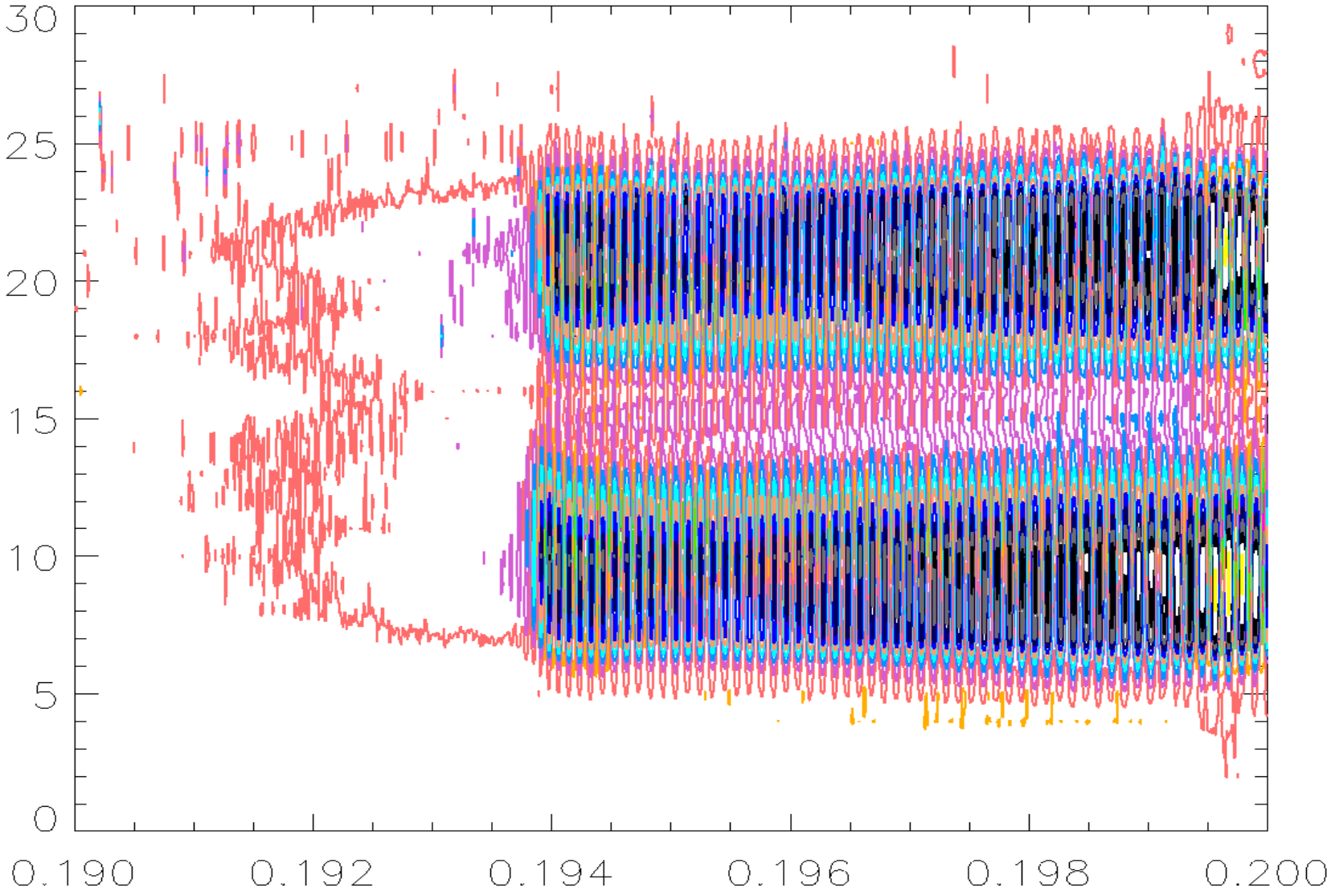
Possible experiments to try

- Repeat 106004 with added heating power to delay onset of kink
- Use H-mode with current ramps
- RF current drive at constant Ip would also redistribute the current

Coupling of internal mode with external kink 106007



106007 : Contours of SXR(t)-SXR(t=0.19)



Possible experiments to try

- Repeat 106007 with reduced current ramp to delay coupling to the external kink-pure internal mode
- Use RF heating to modify pressure profile to change internal drive

Compressional heating-1

$q \sim a^2/R^2 \ * I_T/I_P$

Flux conserving

$\rightarrow a^2/R \sim$ constant

Assume adiabatic heating

$> pV \sim$ constant

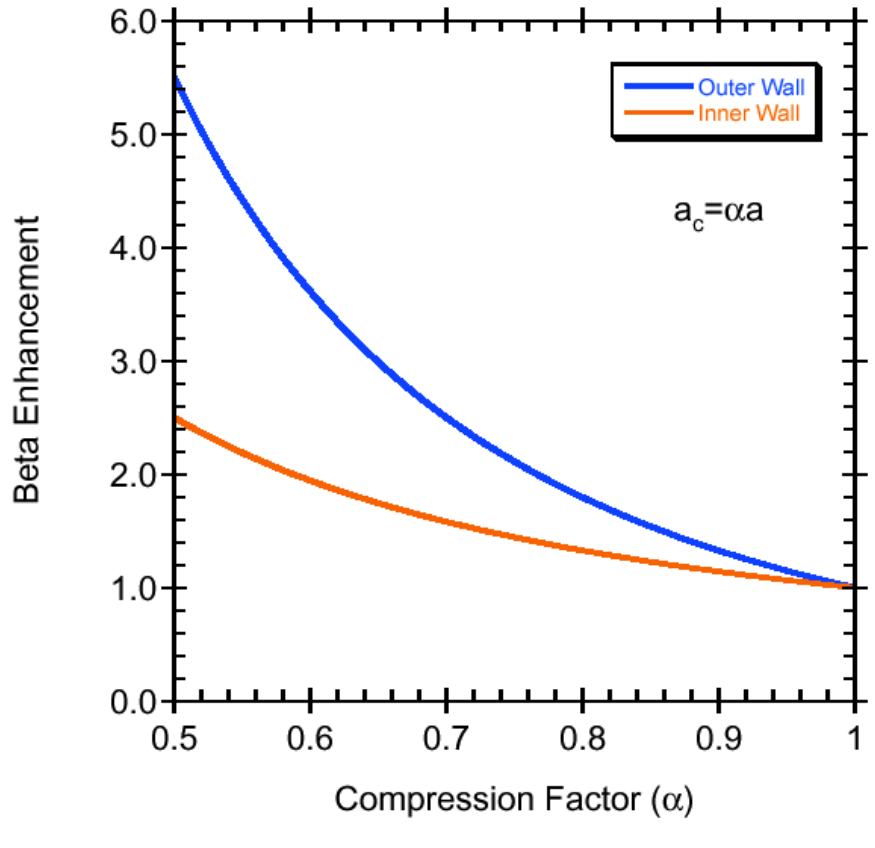
$V \sim R^2$

$B \sim 1/R$

$\beta \sim p/B^2 \sim$ const

Compressional heating-2

If flux is not conserved, depending on the relative rates of current and thermal diffusion β can go up.



Possible experiments to try

- Develop scenarios using TSC
- Compress the plasma against the outer wall