NCSX
Operating Points & Transport Summary

M. Zarnstorff

PPPL

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Spread Sheet Optimizaions

min power for 4% beta (H->H)

	QAS3-c82		
R/a	3.43	3.43	3.43
R (m)	1.45	1.45	1.45
<a> (m)	0.42	0.42	0.42
B(T) edge	1.00	1.20	1.40
P(MW)	5.9	5.5	6.3
Pabs (MW)	3.6	3.6	4.3
n (10^19/m^3)	7.90	10.20	12.00
tauE = 2.3*ISS95 (s)	0.034	0.046	0.051
tauE-I-neo (s)	0.061	0.090	0.124
tauE assumed	0.031	0.045	0.051
To (2<T>) (keV)	1.25	1.41	1.62
n R / T^2	7.30	7.40	6.60

Zeff=2 assumed
Includes 10% beam-beta
Density constrained to be below Sudo limit
τ_E = min(2.3xISS95, τ_E-neo/2)
NB Orbit-loss calculations by D. Spong

Spread Sheet Optimizaions

min power for 4% beta (H->H)

	QAS3-c85		
R/a	3.48	3.48	3.48
R (m)	1.45	1.45	1.45
<a> (m)	0.42	0.42	0.42
B(T) edge	1.00	1.20	1.40
P(MW)	6.3	5.6	6.4
Pabs (MW)	3.6	3.6	4.3
n (10^19/m^3)	7.93	10.16	12.02
tauE = 2.3*ISS95 (s)	0.034	0.046	0.051
tauE-I-neo (s)	0.061	0.090	0.124
tauE assumed	0.031	0.045	0.051
To (2<T>) (keV)	1.25	1.41	1.62
n R / T^2	7.30	7.41	6.63

Zeff=2 assumed
Includes 10% beam-beta
Density constrained to be below Sudo limit
τ_E = min(2.3xISS95, τ_E-neo/2)
NB Orbit-loss calculations by D. Spong

Available Power

- Present NBI beam lines:
  D: 6 MW @ 50 keV
  H: 4.5 MW @ 50 keV

- With cryopanel upgrade:
  D: 7 MW
  H: 5.3 MW $\Rightarrow$ marginal, need 5.5 MW
  Including beam-beta

- ICRH:
  6 MW

  can be deposited on electrons via HD mode conversion, but requires inside launch.

  High harmonic has too low absorption in low β target plasma

  W-7AS: ICRF coupling efficiency ~90%
  Heating efficiency ~90%
  $\Rightarrow$Overall efficiency: ~80%

$\Rightarrow$ would need 5.1 MW

Plans: Near Term

Feb. Team Mtng.

for Transport work:

- Develop module for optimizing fast-ion confinement
- initially using fast Monte-Carlo calc.
  (Zatz, White) under development

- Calculate self-consistent Er and transport for c82, c85
- using Lin's code (Mynick, Lewandowski, Lin)
- iterate transport solution via Transp (Zarnstorff)
  as done for c10

- Understand discrepancies in bootstrap calculation
  - DKES calculation?
  - Analytic understanding?

- Modify Lin's code to routinely calculate self-consistent solutions code (Lin, Lewandowski?, Mynick)
  longer term

- ICRF & ECRF heating scenario evaluation
  - antenna requirements
  - startup scenarios
  (Majeski, Rasmussen, Batchelor)

Configuration Requirement Plans

- develop conducting wall/eddy-current limits

- due to configuration evolution => islands
- due to kink-stability & disruptivity testing goals
- with MHD and engineering groups
  (4 - 6 weeks)

- develop space requirements for particle/power handling

- localized limiters
- possible future divertors
- refine requirements after receiving candidate coils
  (ORNL, UCSD...)

<u>After candidate coils:</u> <u>robustness</u>

- configuration testing

- vacuum, low-beta, high beta, w/ & w/o CD
- how to use coils to get needed physics qualityfor each reference configuration.

- flexibility testing

- range of current and pressure profiles
- startup evolution
- range of shapes accessible for physics studies
- auxiliary coil (e.g. PF) and power supply requirements

- collaboration of all groups