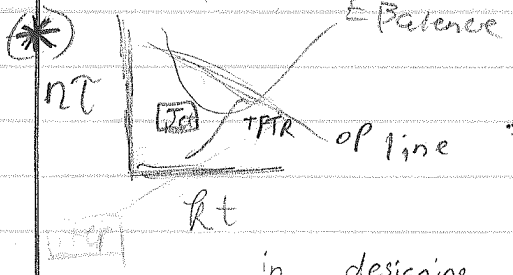
421 Notes 4/8

(*)



Today's Topics
- Q's on test - none

in designing iter they wanted $B_{ext} = B_{int}$

1 ① stability
- m=0 ±1 modes
if $\beta < .05$ then stabalized vs

$\beta < 0.05$

- E x B drift is Bad, must eliminate the E field to stabalize against the drift.

- Safety factor $q = \frac{1}{A_s}\frac{B_t}{B_0}$

want $q(a) > 1$ $q(a) > 2.5$

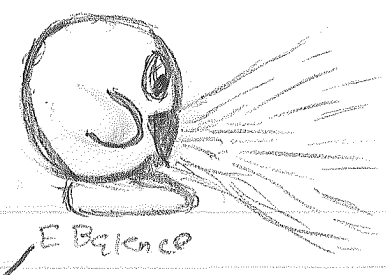
2 "important points"
(1) Put magnetic field in Plasma
(2) Sheered the electric field

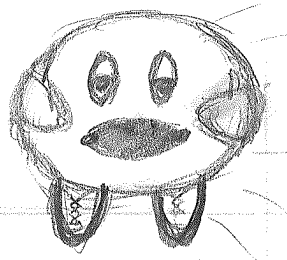
- problems not addressed
  - turbulence due to micro instabilities (not covered)
  * changes transport somehow.

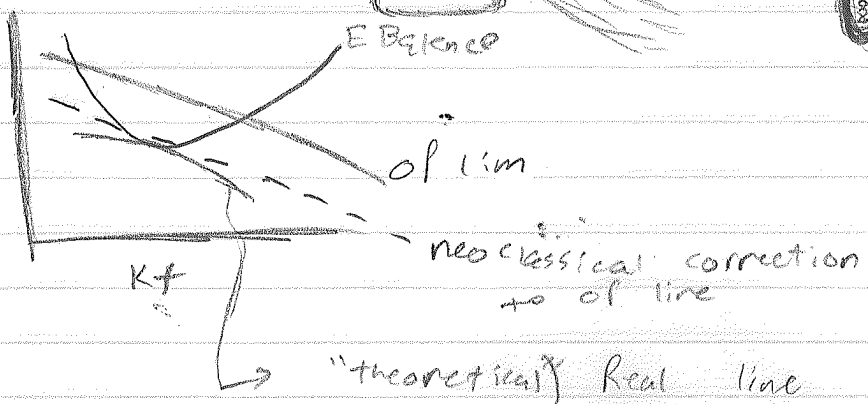
2 find an operating point $n\tau \sim Kt$ (see *)

- Banana orbit due to mirror trapping
→ $\Delta x \sim r_{Banana}$ 3~4 X's larger r_g.

neo classical: $(n\tau) \sim f(KT)$







- these lines are basically an upper limit to the ideas

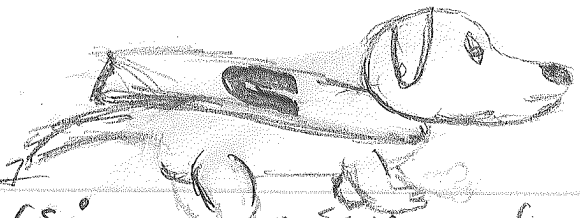
- Possible improvements:
  GA: DIII - using Profile (Density vs position)
  (K+ vs position)
  to suppress anomalus transport.
  - Reducing wall effect + ~~heat~~ Better heat load handeling
  - advanced Materials (liquid metal etc) walls

PPPL:
- use eng solutions to reduce center core opening
- we assume long pulses $\frac{d\Psi}{dt}$ (Ing = quasi-steady state)

→ induction current drive → steady state

- under dog lectures coming up.

- the reason why iter is so Big:
  want the minimum surface to volume Ratio (due to Power loss @ surface)
  ((can they find a size that works for Power economicly?)



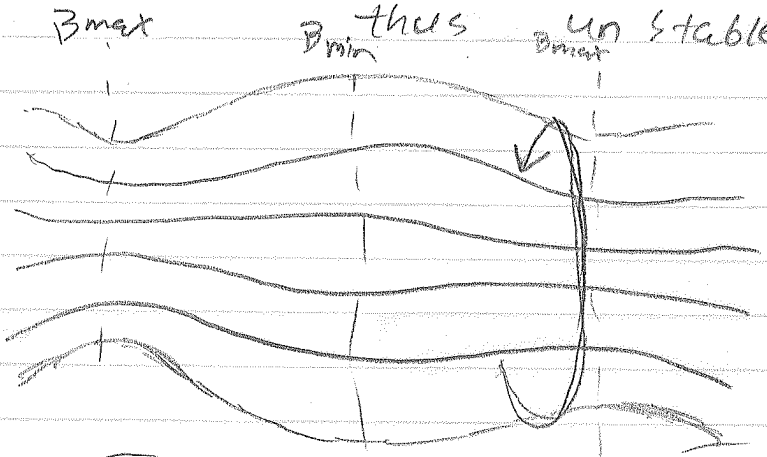
Underdog

- **Mirrors:** scaling of the mirror is independent of size

(wonderful thought, But it's been discarded By most the world)

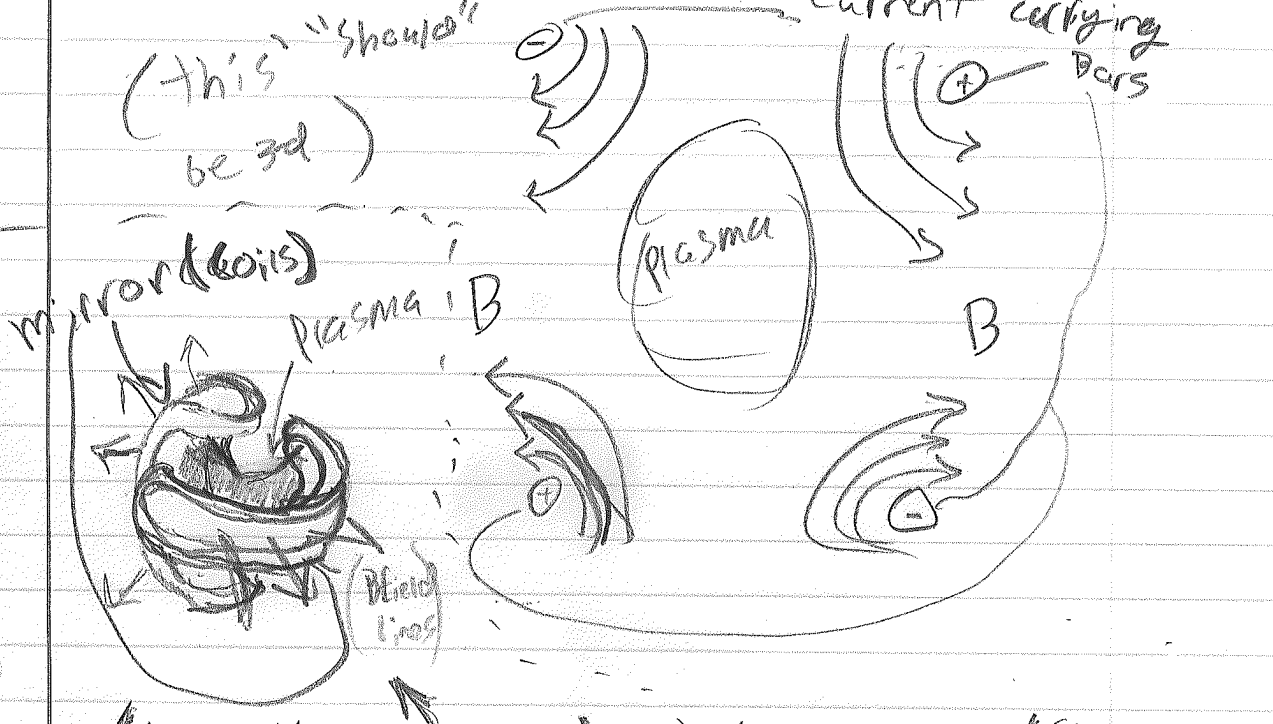
* see Magnetic Mirror in Books

- want lines to go in not out thus un Stable.



(this "should" be 3d)

Current carrying Bars



(Yin-Yang coil configuration) — extreamly Stable (Flow gas in it Becomes Low Temp Plasma, flows out)