# NCSX Design Point Definition and Planning Meeting

Feb. 10, 1999

## Issues for This Meeting

- PBX-M pin removal.

- Physics status and prospects
  - Performance of C10-like configurations relative to requirements.
  - Prospects for obtaining an acceptable configuration compatible with a C10-like engineering approach.
  - Identification of alternative approaches.

- Decisions affecting NCSX work plan for next few months…
  - Design point for engineering design.
  - Balance of physics concept improvement effort: incremental improvements compatible with a C10-like engineering approach *vs* exploration of radically different configurations.
  - Schedule and scope of next design milestone.

## Summaries of Status & Prospects

### Engineering (1 min.)

- PBX-M pin removal (Reiersen)

### Physics (10 mins. each)

- Transport (Zarnstorff)
- Plasma configurations (Reiman)
- Coil concepts and tools (Hirshman)

### Alternative Configurations (2 mins. each)

- Quasi-omnigenous (Lyon)
- High-iota quasi-axisymmetric (Neilson)
- Tokamak shear (Boozer or Zarnstorff)

# Plan for Feb.-June

## Strawman Design Point for Engineering

- Reference configuration: C76 or C82 at PBX-M dimensions, with B=2 T for 0.2 s flattop.
  - Choose between them before Feb. 23-24 project meeting based on beam and thermal confinement, sheet currents.
  - Both are kink stable but more demanding on coils than C10.
  - Better coils must be an improvement goal.

## Plan for Feb.-June

### Engineering Plans (W. Reiersen, B. Nelson)

- Develop design solutions for helical field coil system (saddle coils + structure).
- Layout machine and peripherals in test cell.
- Update cost and schedule estimates.

### Physics Plans (S. Hirshman, A. Reiman, M. Zarnstorff)

- Design support: assess reconstructed plasmas from engineering.
- Tool improvement, e.g., coil optimization, vertical stability, equilibrium.
- Concept improvement compatible with “C10-like” engineering approach:
  - Plasmas: Expand search domain, e.g. unfreeze R/a and profiles. Aim to satisfy all physics requirements and improve coils.
  - Coils: Improve buildability (reduce current densities, reduce number and complexity, etc.)
- Concept improvement via alternative approaches needs discussion.

## Next Milestone

- Hold during week of June 7-11 (just before EPS).
- Focus:
  - Adequacy of physics basis (knowledge base, tools).
  - Engineering plausibility.
  - Ballpark cost and schedule.
- Reduce emphasis on:
  - Documentation (more time to work).
  - Rigorous physics-engineering consistency (up to a point).
  - Readiness to move immediately thereafter to conceptual design.
- Control expectations in advance
  - Acknowledge slower-than-expected pace.
  - Proactively recognize and deal with issues and “holes” if any.
  - Not a Physics Validation Review.