



# **ALIST Work Plan for FY03**

**(Issues to be addressed)**

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Presented at ALPS Meeting  
Princeton, NJ  
November 6-8, 2002**





# Outline

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- **Flow considerations**
- **Constraints Imposed by NSTX Geometry**
- **Suggested Tasks**



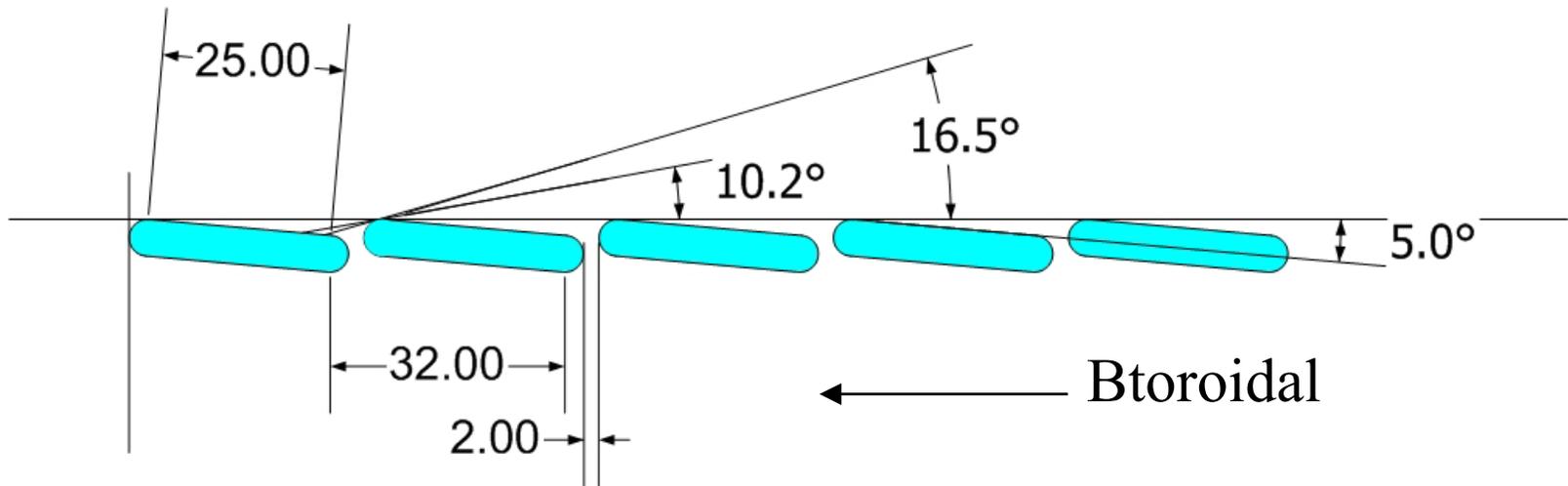
# Flow Considerations

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- An angled slab type flow configuration will minimize the heat flux peaking factor
  - The peaking factor for the design shown is 1.2-1.4 depending on the location in the divertor.
- For a coverage of 1 m toroidal extent (about 1/6 of the machine) about 32 slabs are needed (30 mm wide)
- The total flow rate through 32 nozzles (5 mm thick, 2mm) is 740 gallons/min. (47 l/s, 19 l/s)
  - A 6 in. Supply pipe is flowing at 2.5 m/s (1 m/s)
  - A 10 in. Drain pipe is flowing at 0.9 m/s (0.38 m/s)

# Slab Flow Scheme Near Nozzle

NSTX Divertor Flow Scheme  
View Looking in from large Major Radius  
Slabs are 5 mm thick



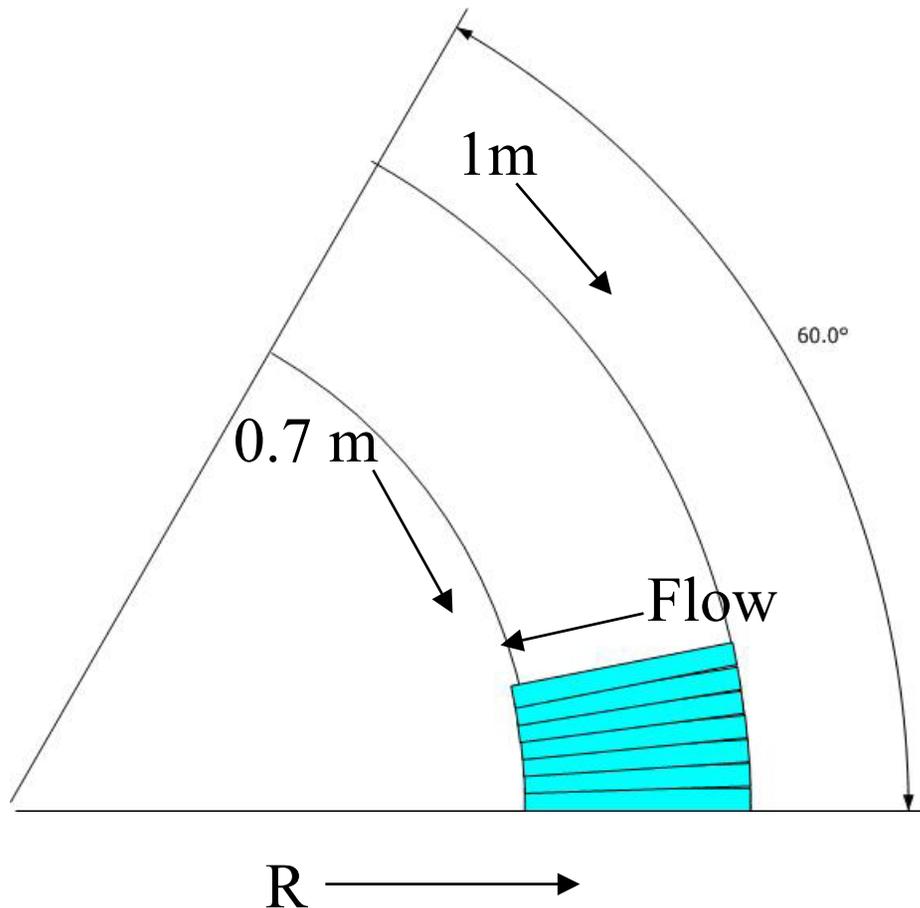


# Geometry Constraints in NSTX

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- The outer edge of the divertor is at about 1.0 m major radius
- The inner edge of the outer divertor is about 0.7 m
- For a 1 m long arc on the outside the arc length on the inside is 0.7 m
- Slab type jets started on the outside with 2 mm separation will overlap before reaching the inside

# Overlap of NSTX Divertor Jets

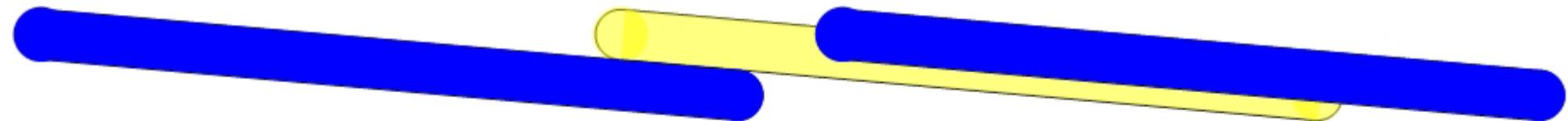


- Because of the difference in major radius between the nozzle and the catcher the streams will overlap before reaching the catcher.
- Experiments are needed to determine the best way of accommodating this.
- Approximately 32 jets are needed to cover 1 m of toroidal extent.

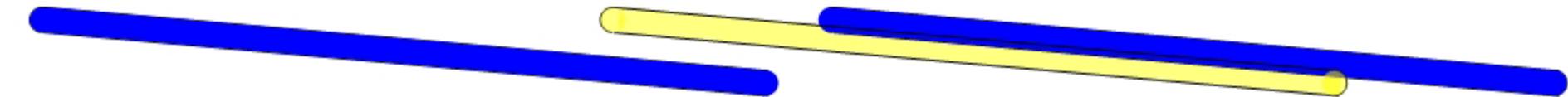


# Thinner Slabs Can Overlap

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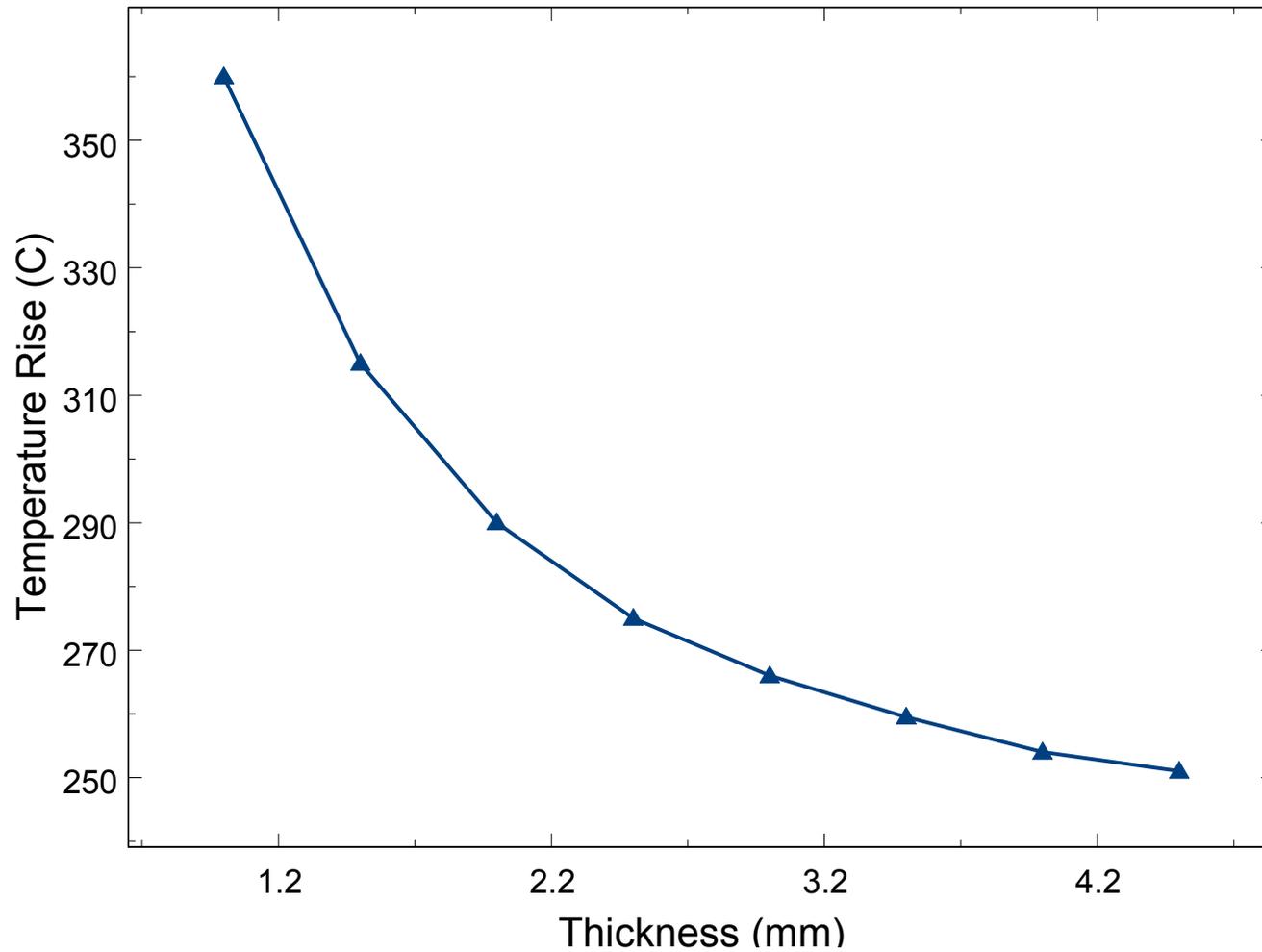


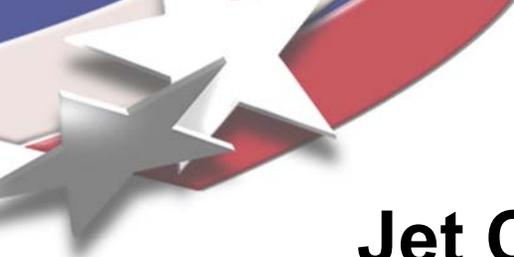
2 mm Thick



1 mm Thick

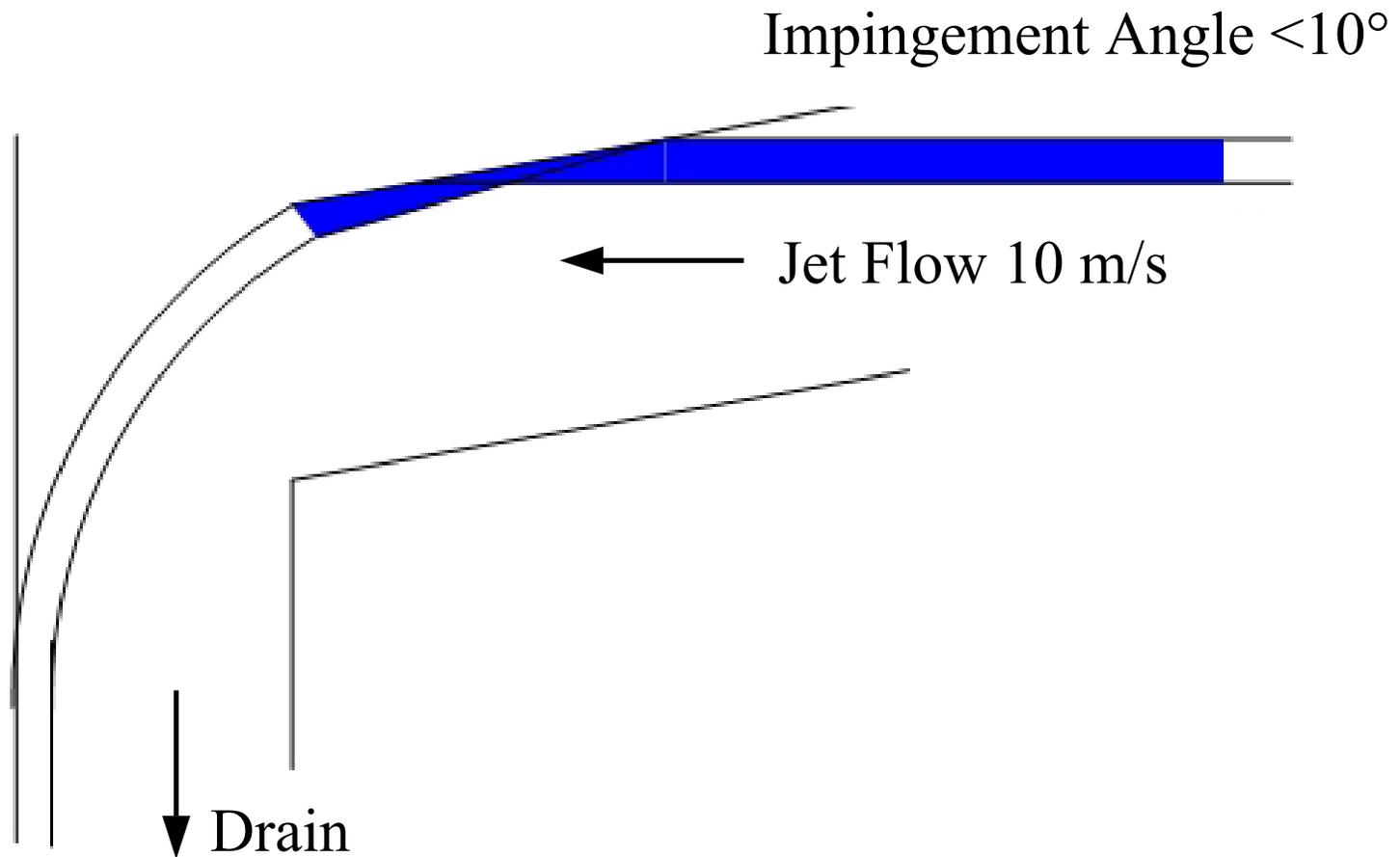
# Thinner Slabs Greater T Rise





# Jet Catcher Design Requirements

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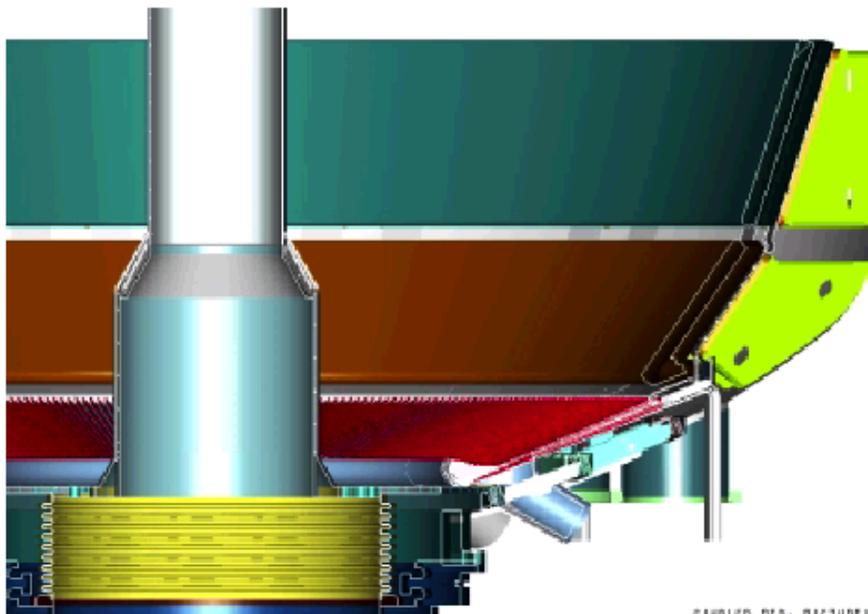


## Proposed tasks for FY03

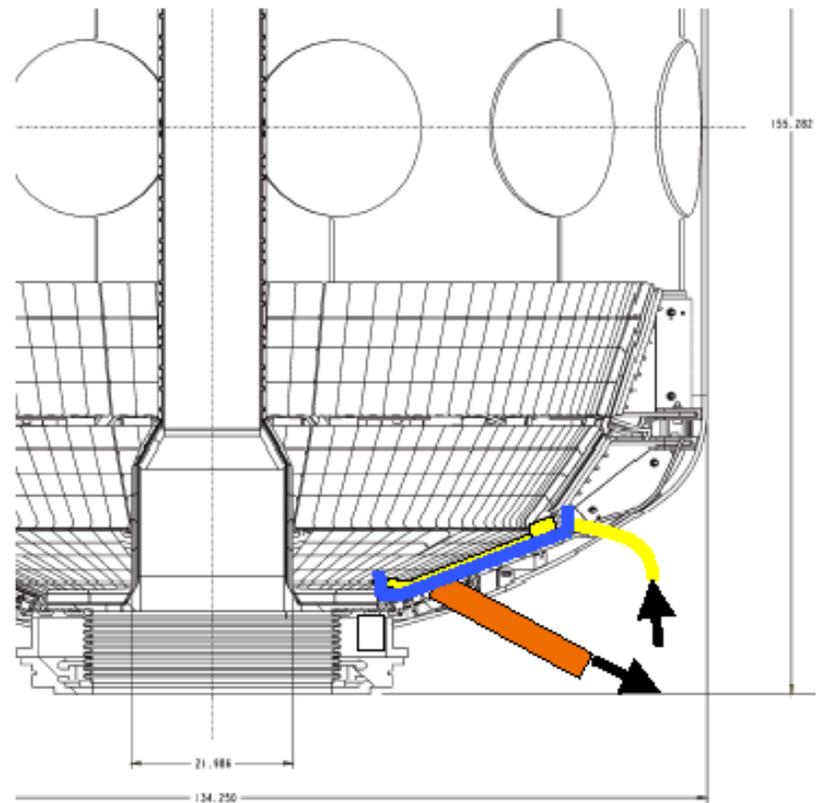
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- **Assume outer lower divertor plate on NSTX is the design objective**
  - 1 m toroidal extent at  $R = 1.0$  m with catcher at  $R = 0.7$  m (Just outside CHI slot)
- **Design and test close packed slab type nozzles suitable for NSTX (30 mm wide, 2 mm thick, 2 mm spacing)**
  - Concentrate on in vessel components for Jan PAC meeting
- **Gather input from nozzle design effort**

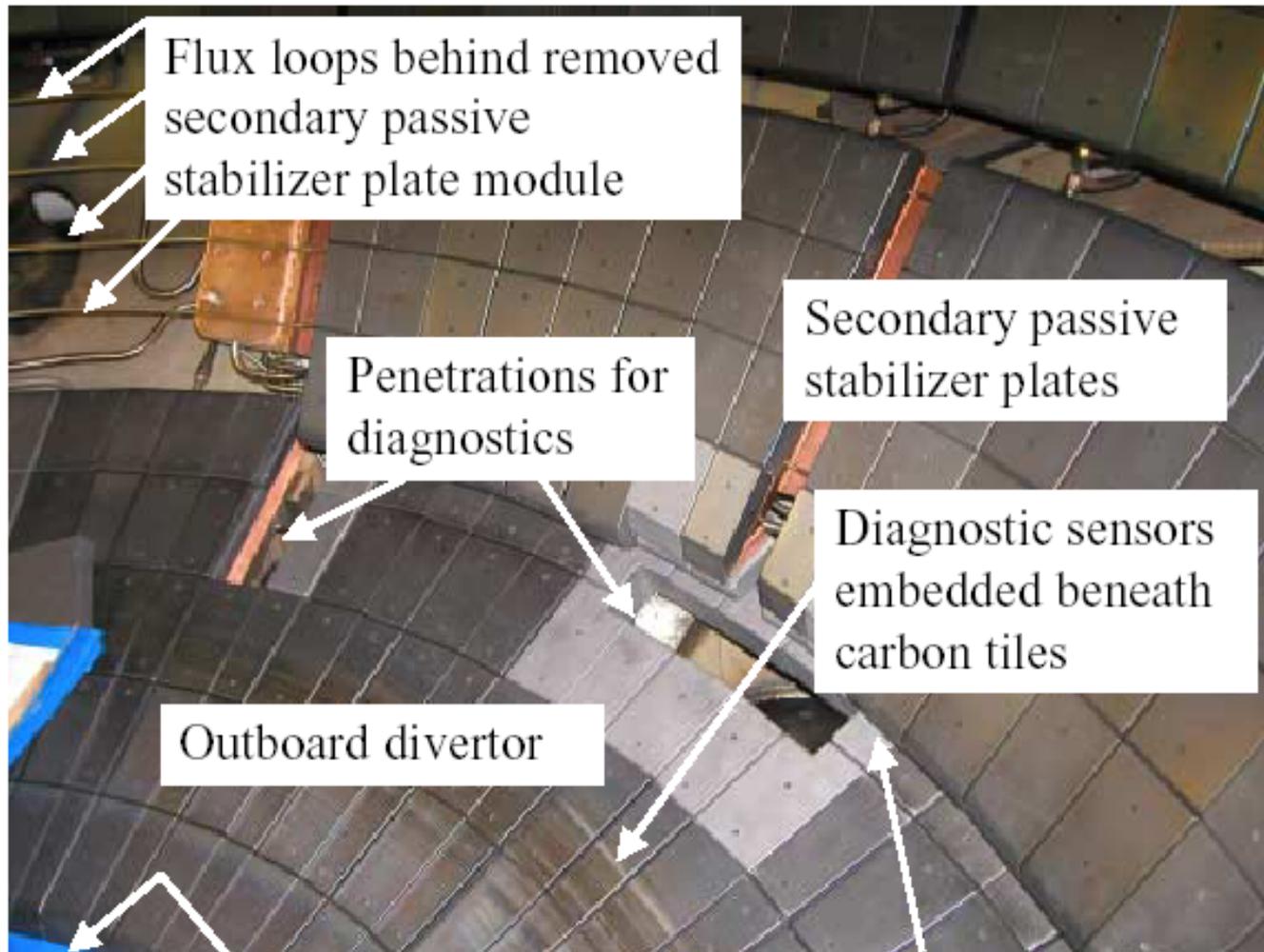
# NSTX Module Sketches (ORNL)



SIMPLIFD REF: PICTURE1



# NSTX Divertor Region





# FY03 Work Plan

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- **Design group will have periodic conference calls to track progress and settle issues (suggest monthly)**
- **Create list of key issues and work plan to address**
- **Volunteers to work on design group**