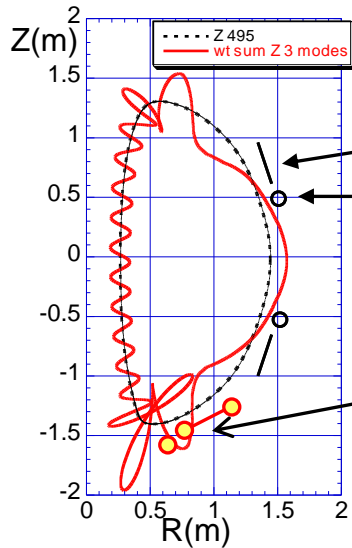


# NSTX-U extended RWM sensor calculations are underway

$n = 1$  ideal eigenfunction for fiducial plasma

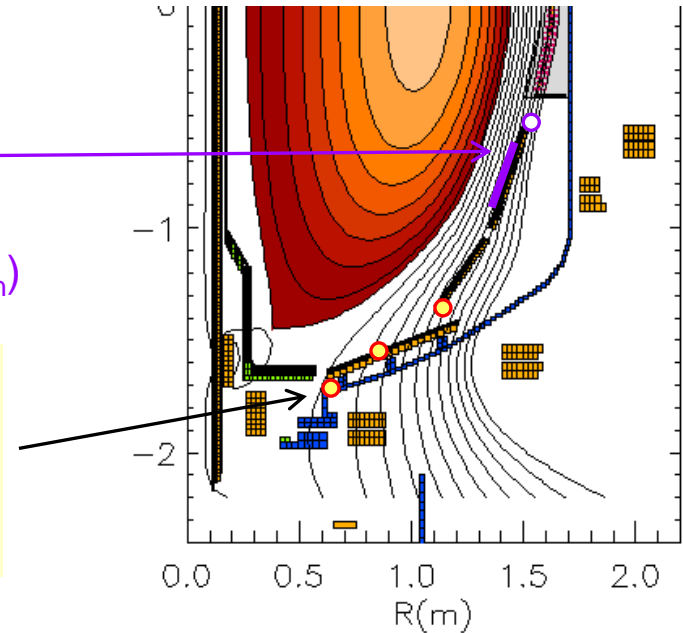


Present sensor locations

$B_R$  sensors (nominally normal,  $B_{norm}$ )

$B_p$  sensors (nominally tangential,  $B_{tan}$ )

New sensor locations discussed (schematic) (includes possible locations in THIS range (+ one position above midplane))



Extended RWM magnetics calculations initiated based on group meeting

1. Add divertor plate detail to VALEN model
2. Determine the change in measured mode amplitude in the sensors placed at various poloidal positions moving toward the divertor
  - Examine potential  $B_{tan}$  and  $B_{norm}$  sensors at increased |poloidal angle| off midplane, plot field amplitude vs.  $R$ , or poloidal angle; consider sensor positions mirrored above the midplane
3. Redo above calculation with the plasma shifted down in  $Z$  (-5 cm, -10 cm)
  - Determine field amplitude vs.  $R$ , or poloidal angle, at different plasma  $Z$  position.

# NSTX-U partial NCC coil – initial considerations taken in total point to a preferred placement of coils

## ❑ Partial NCC coil considerations

- ❑ Partial NCC is VERY IMPORTANT, as it appears in the BASE budget
- ❑ Many key physics studies can be performed with the partial NCC (vs. full NCC)

## ❑ Considerations / configurations for suggested partial NCC set (12 or 6)

- ❑ **RWM**: want  $n = 1, 2$  field toroidal propagation, compliment  $n = 3$  phases from RWM coil
- ❑ **EFC**: (same considerations as RWM),
- ❑ **ELM**: symmetric placement gives greatest flexibility, but might desire higher- $n$
- ❑ **NTV**: symmetric placement / higher- $n$  both allow important physics studies
- ❑ **ITER / JT-60SA**: symmetric coil set is most ITER-like (although lower- $n$ ), best to support ITER physics; partial set can support JT-60SA
- ❑ **NSTX-U cryopump**: any issues of NCC placement on 2<sup>ndary</sup> passive plates?
- ❑ Short-term conclusion: **Symmetric placement to start** (perform higher- $n$  w/full NCC)
  - **Best: 12 new coils: 6 above / 6 below midplane, placed in front of every other passive plate**
  - **2<sup>nd</sup> best: 6 new coils: 6 above or below midplane, placed in front of every other passive plate**
  - **Possible: 12 new coils, either above / below midplane, placed in front of each passive plate**

## ❑ Ramifications for NCC section of 5Y Plan: section needed mods anyway

- ❑ Physics program needs to be strong w/o the NCC, but strongly compelling with the NCC
- ❑ With partial NCC in BASE budget, easier to integrate NCC in the physics deliverables
- ❑ Partial NCC provides a logical bridge to the full NCC / further physics deliverables

# NSTX-U partial NCC coil – initial discussion and planned calculations

## Partial NCC coil RWM calculations planned (aimed in time for PAC)

1. Re-run RWM active control calculations at the best gain from past analysis for a few partial coil options (coils in front of primary passive plates first)
  - 12 coils, positioned 6 above the midplane, 6 below the midplane
  - 6 coils, positioned above the midplane
2. The second set of runs would be with coils in front of the secondary passive plates
  - 12 coils, positioned 6 above the midplane, 6 below the midplane
  - 6 coils, positioned above the midplane

