Testing advanced divertors on NSTX

- **Propose to test divertors that optimize divertor geometry factors _near the target plate_ using 2nd X-pt near (but behind) the plate**
  - → Optimizes:
    - Flux expansion near the plate
    - The distribution of line length to region close to the plate
    - Flaring of field lines near the plate
  - → All of these should facilitate detachment near the plate, and assist in keeping the cold, radiating region close to the plate (and away from the H-mode barrier where it can degrade confinement)
  - → Qualitatively similar configurations possible on ITER, so merits examination on NSTX-U to clarify basic physics (though ITER geometry not as favorable as NSTX-U because ITER design didn't envisage this, and ITER is _much_ less flexible)

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- *Vary the relevant geometrical parameters (flaring, line length distribution and flux expansion) by varying the 2nd X-pt distance from plate*

  → Changes the field line flaring (visually and as measured by metrics such as DI)

  → Find how changing flaring near plate affects in addition to heat flux:

    - Detachment density
    - Migration of the radiating region as detachment progresses
    - Amount of confinement degradation as degree of detachment is increased (Confinement = pedestal pressure, total thermal energy and/or H-factor)

DI ≈ 6

DI ≈ 3

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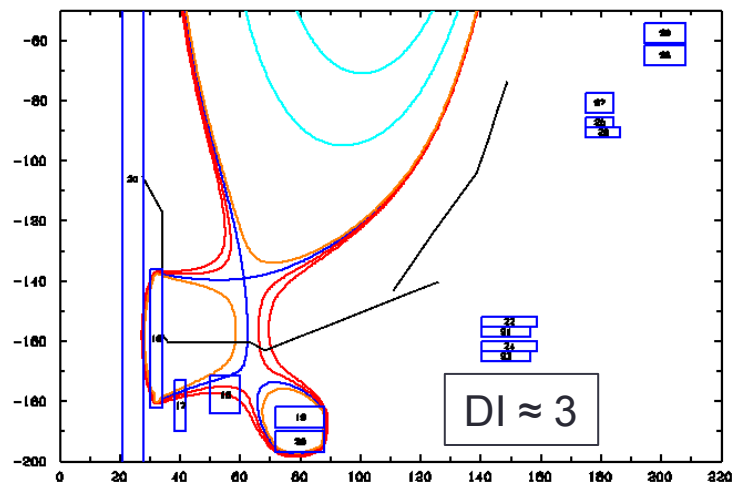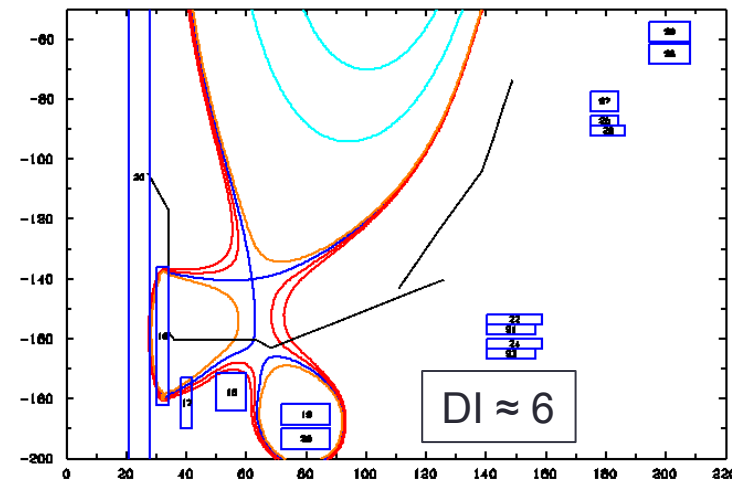
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- ***Tme permitting, would also like to test:***
  - → varying the length of the divertor throat (distance of the core X-pt from the plate)
    - While keeping flux expansion (or DI) constant (if possible?)
  - → differences between puffing in divertor region vs other locations for flared geometries
  - → Find how these variations change the properties of interest:
    - Detachment density, radiation migration, confinement degradation, *as well as* the target plate heat flux

- ***SOLPS simulations will be run***
  - → To help interpret the data
  - → Perhaps to assist in experimental design

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