NCC Spectral Modeling Using 2x6 n = 3 Even and Odd Coil Options

T. E. Evans (GA)

NSTX-U NCC Working Group Meeting

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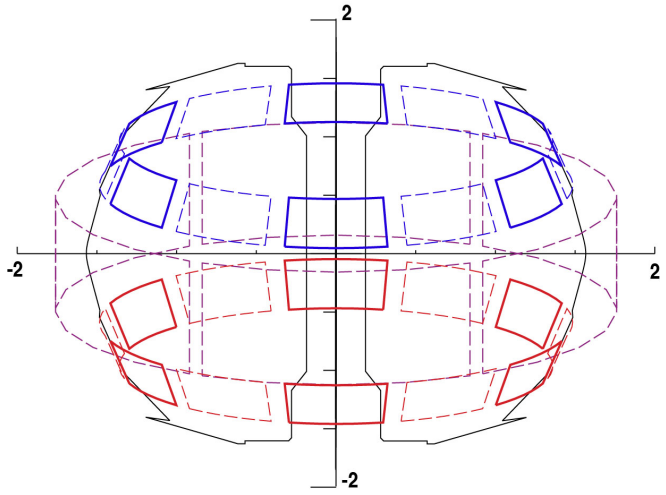
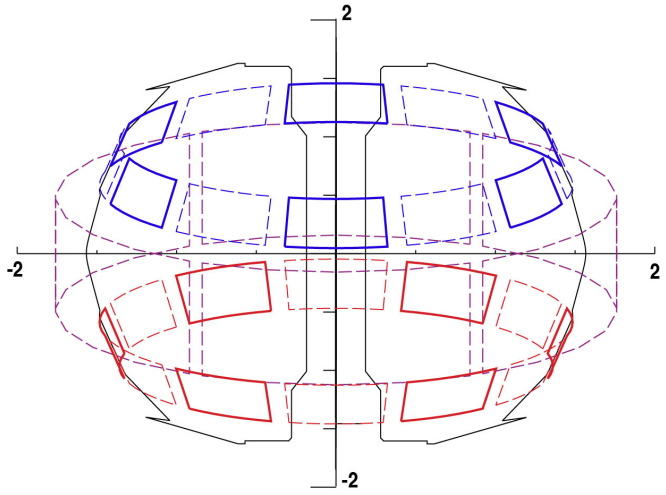


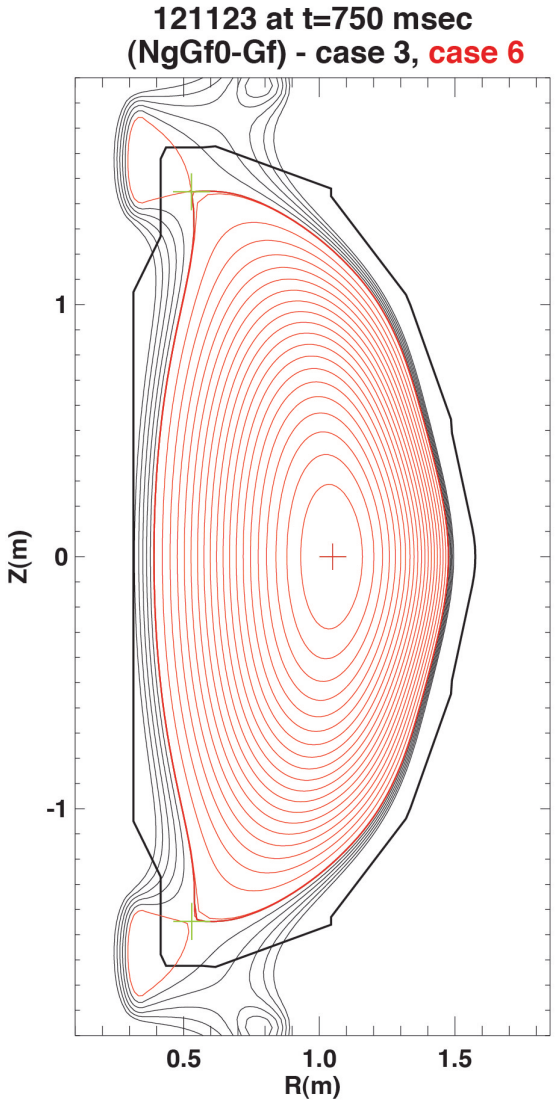
2x6 Even L00 NSTX-U

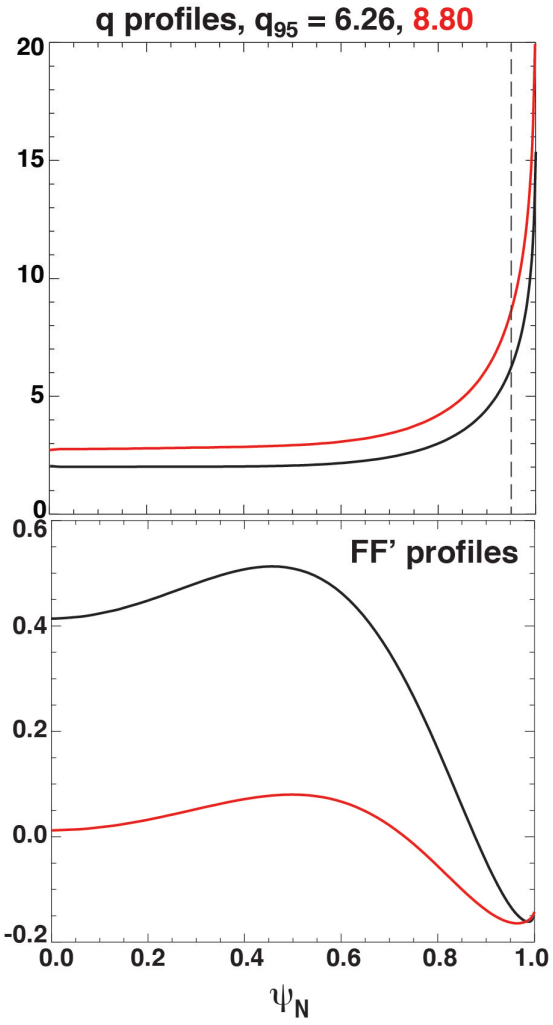


2x6 Odd L30 NSTX-U

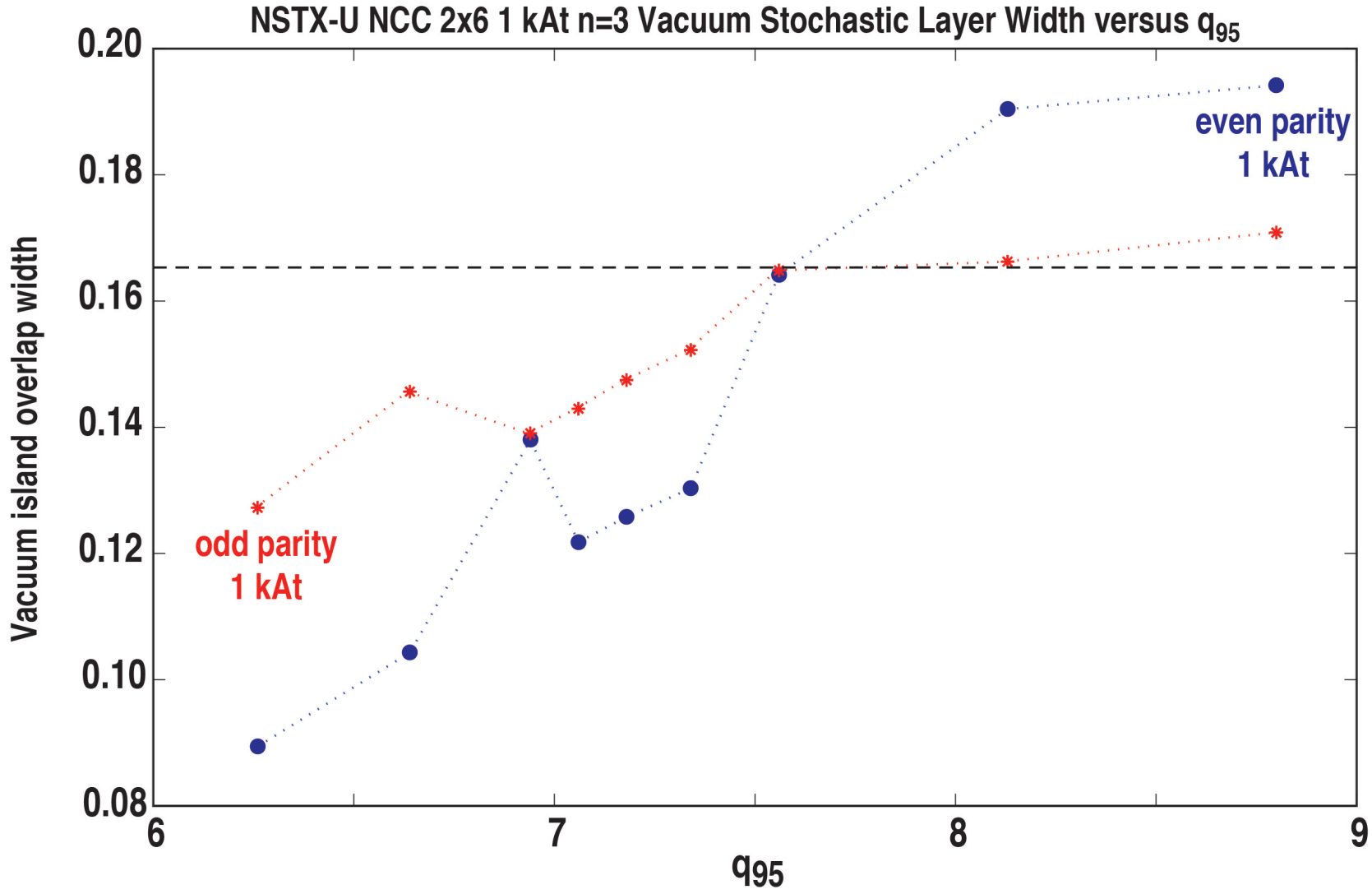
Identical NSTX-U Fixed Boundary Equilibria Used Over a Range of FF' and q Profiles

- **Nine cases examined:**
  - q_{95} scanned from 6.26 (case 3) to 8.80 (case 6)
- **Vacuum island overlap widths calculated for each q_{95} using n =3:**
  - 2x6 even parity 1 kAt
  - 2x6 odd parity 1 kAt
  - 2x6 even parity 2 kAt
  - 2x6 odd parity 2 kAt

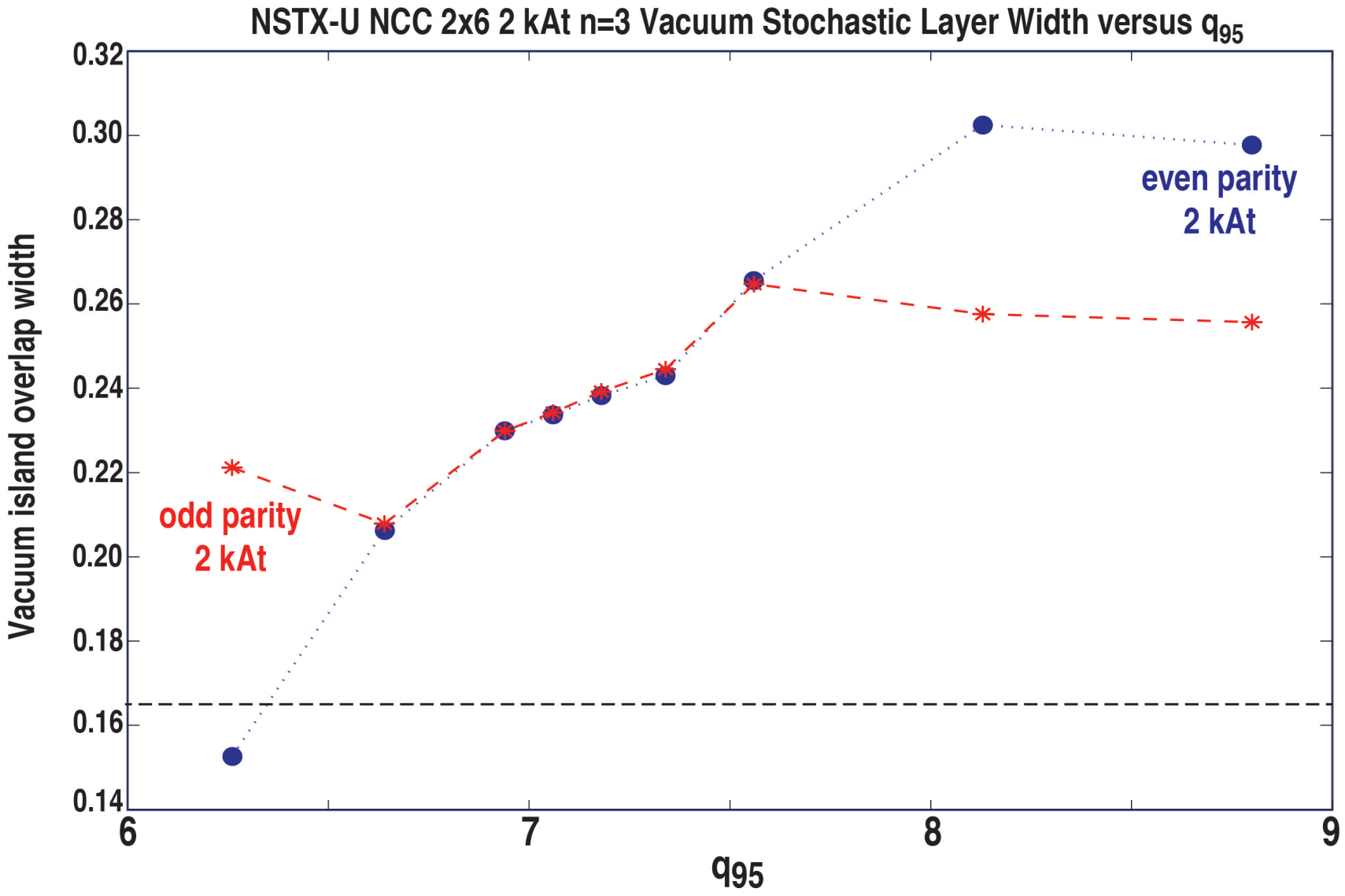




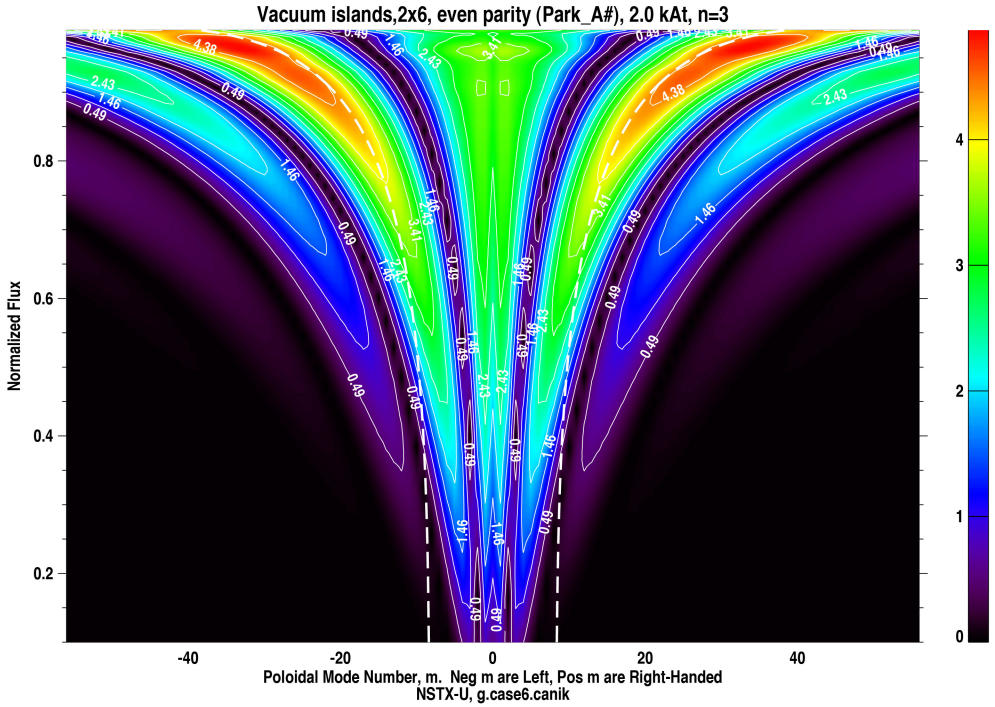
Odd and Evan Parity Vacuum Island Overlap Width (VIOW) using 1 kAt n = 3 Fields Exceeds 16.5% with $7.5 \leq q_{95} \leq 8.8$



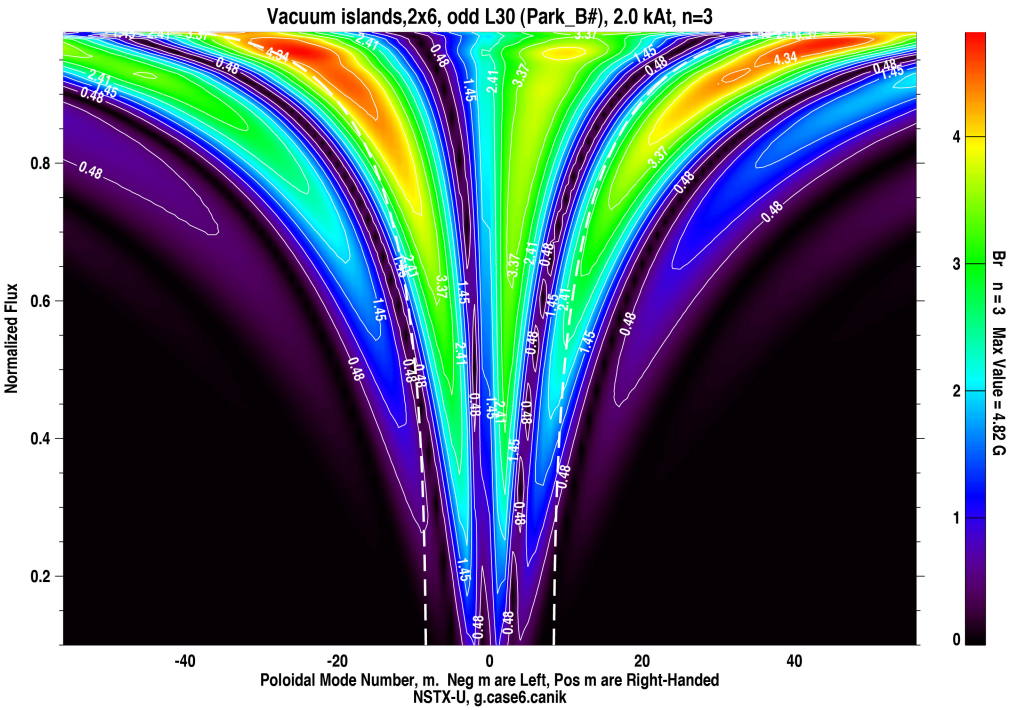
Odd Parity Exceeds 16.5% VIOW with $6.26 \leq q_{95} \leq 8.8$ using 2 kAt n = 3 Fields; Even Parity is below 16.5% at $q_{95} = 6.26$



Odd Parity q_{95} = 8.80 Spectrum is Strongly Left-Right Asymmetric Compared to Even Parity Spectrum

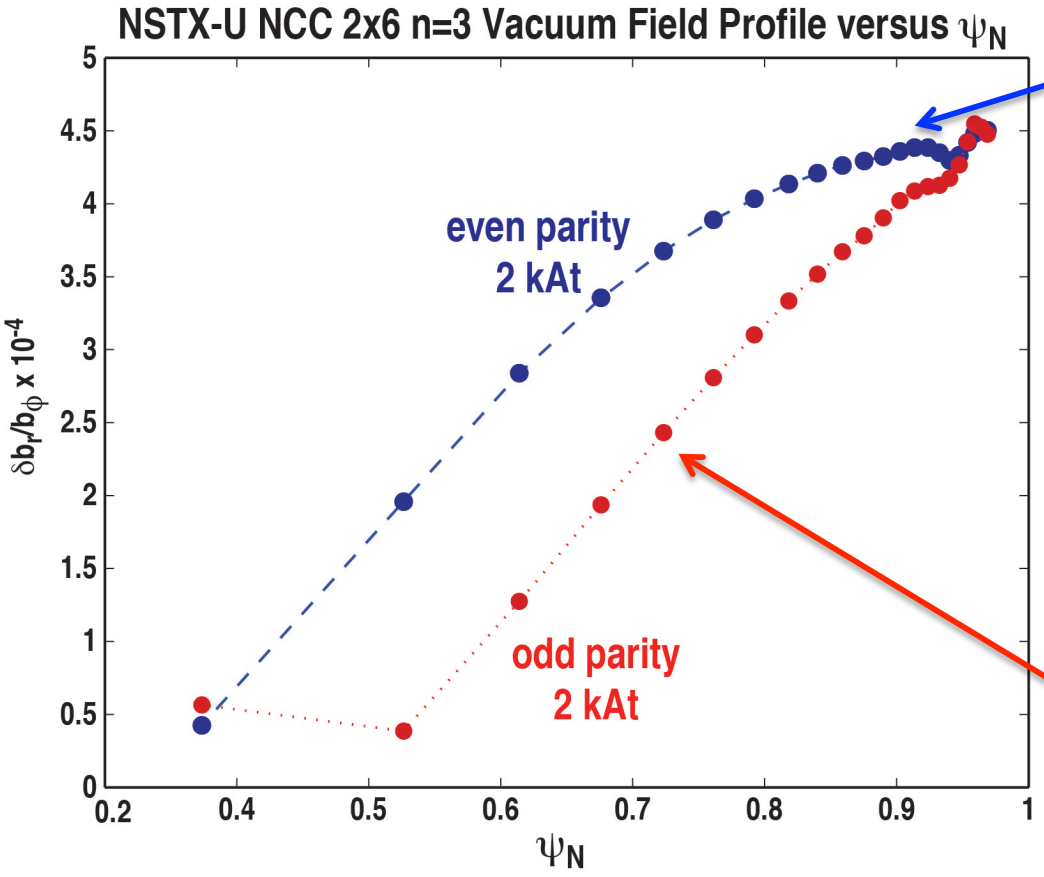


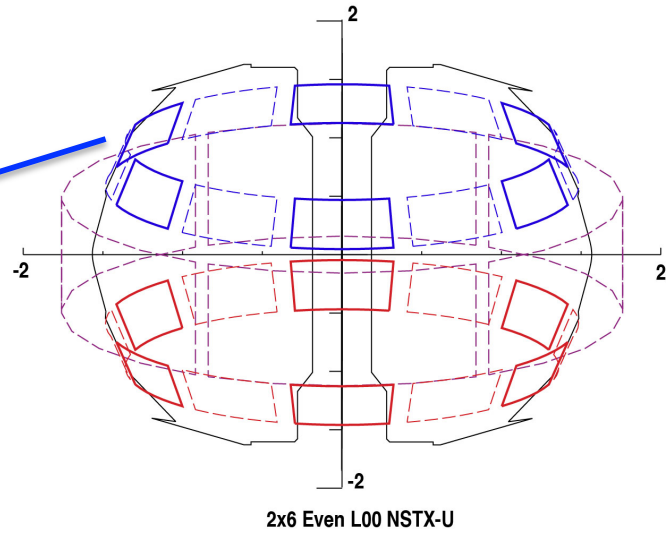
Even Parity



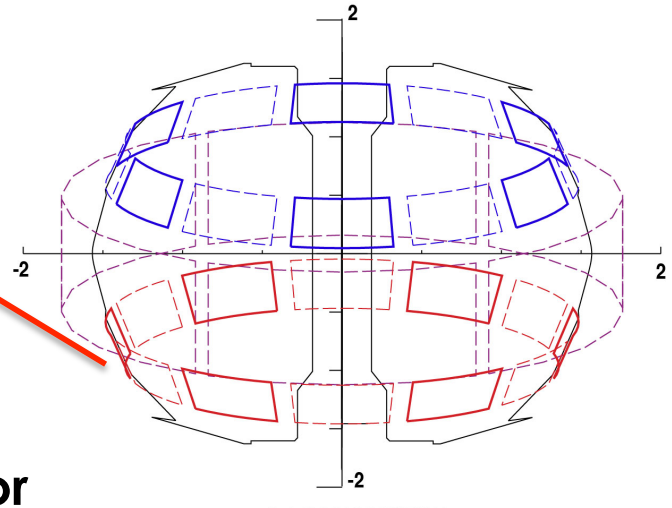
Odd Parity

$\delta b_r \geq 4 \times 10^{-4}\, b\phi$ Across the Pedestal ($0.9 \leq \psi_N \leq 1.0$) in Both Odd and Even Parity Configurations with 2 kAt n = 3 Fields





2x6 Even L00 NSTX-U



2x6 Odd L30 NSTX-U

- **Pedestal $\delta b_r \geq 4 \times 10^{-4}\, b_\phi$ typically needed for ELM suppression in DIII-D**

Comments

- **2 kAt capability required to obtain minimum VIOW and pedestal $\delta b_r \geq 4 \times 10^{-4}\, b_\phi$**
  - Odd parity (lower row shifted by 30°) is slightly better than even parity
  - VIOW generally increases with q_{95}
  - Core perturbation is about a factor of 3 smaller with odd parity
- **M3D-C^1 simulations are underway using equilibrium file g.142301C94_2MA_bN5.5_q6.9**
  - TRIP3D-SURFMN code is unable to read this equilibrium file
    - Developing an alternative approach