

ELM suppression with mid-plane coils

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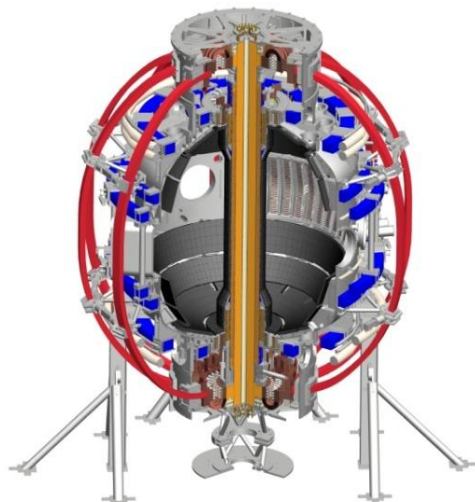
J-W. Ahn¹



J.K. Park², R. Maing², J.M. Canik¹, J. Kim³, T.E. Evans⁴

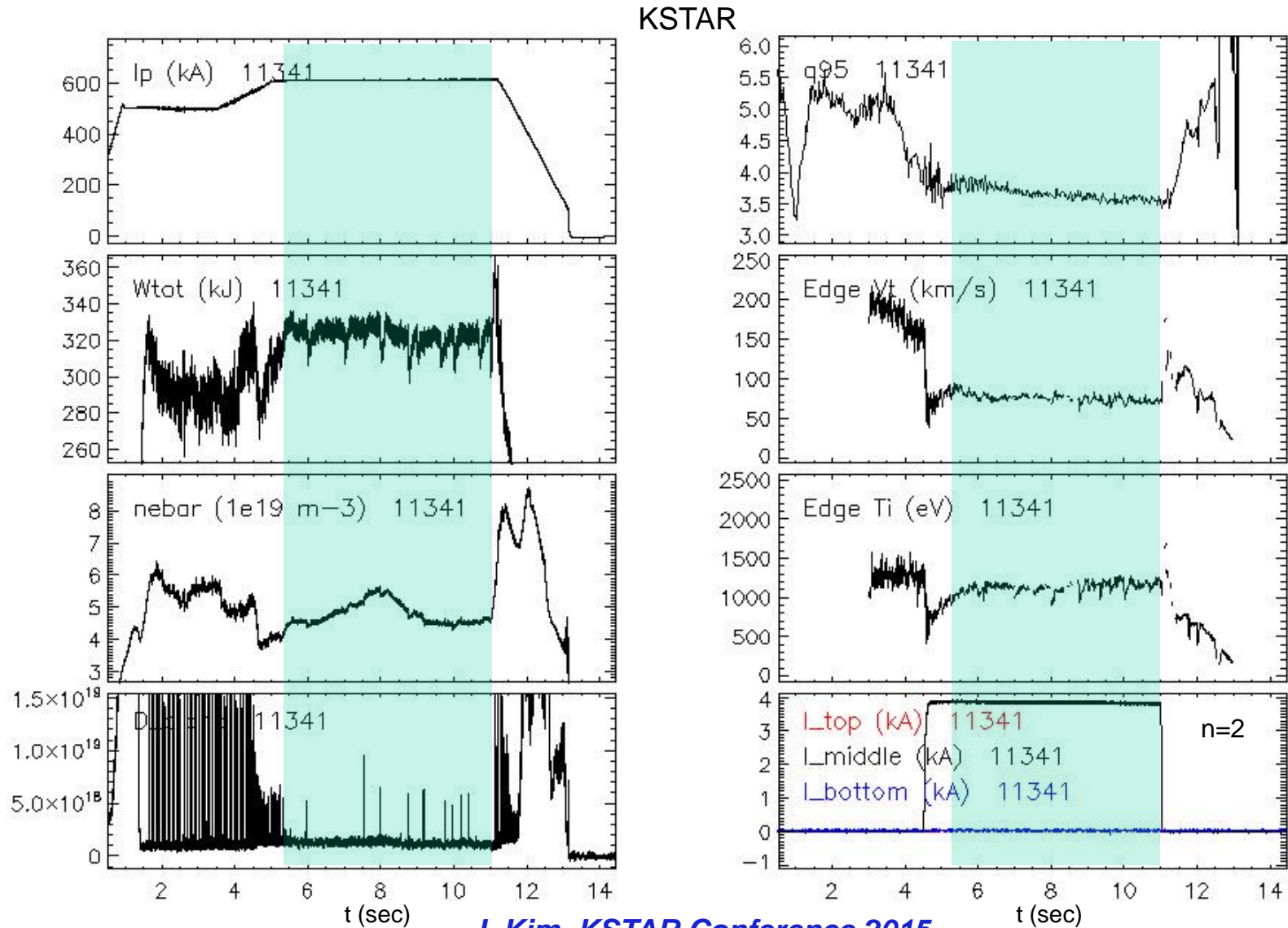
¹ORNL, ²PPPL, ³NFRI, ⁴GA

NSTX-U Research Forum
PPPL
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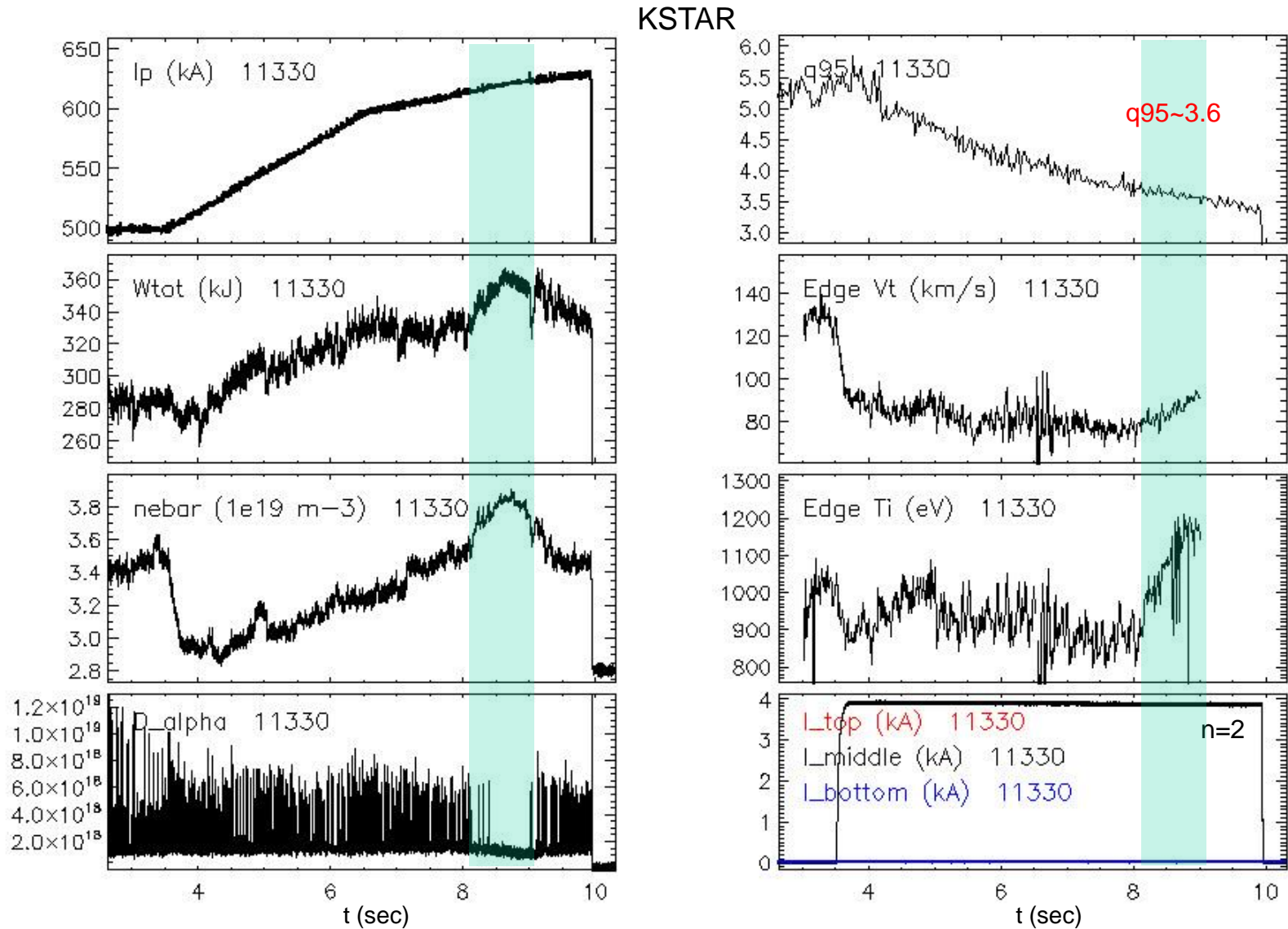
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Successful ELM suppression with n=2 mid-plane coils was demonstrated in KSTAR



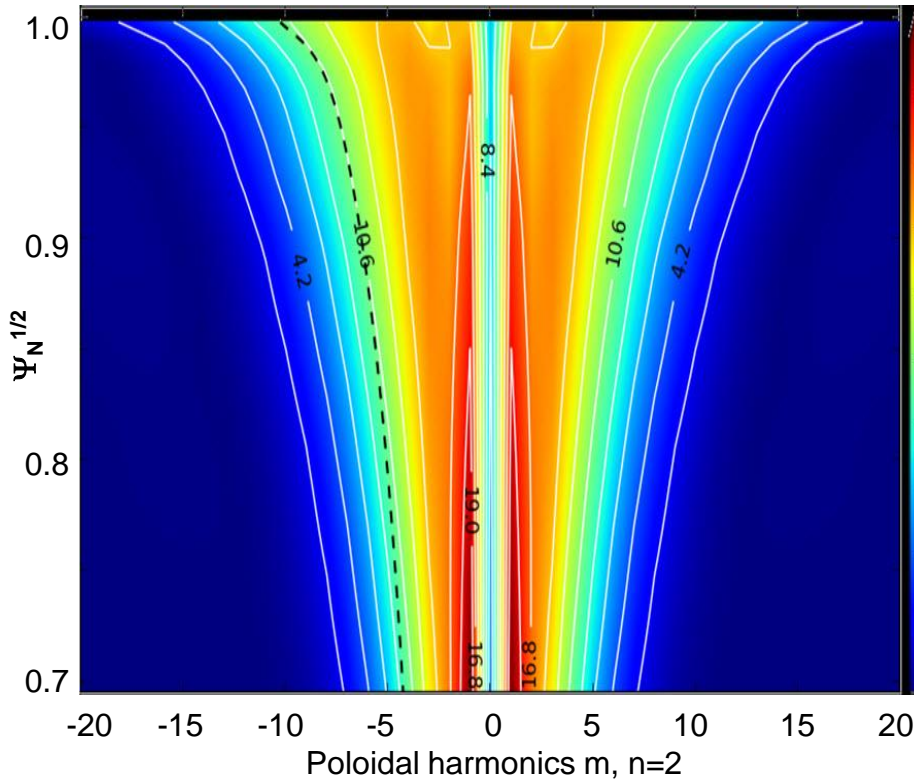
J. Kim, KSTAR Conference 2015

Clear q95 window was identified for ELM suppression

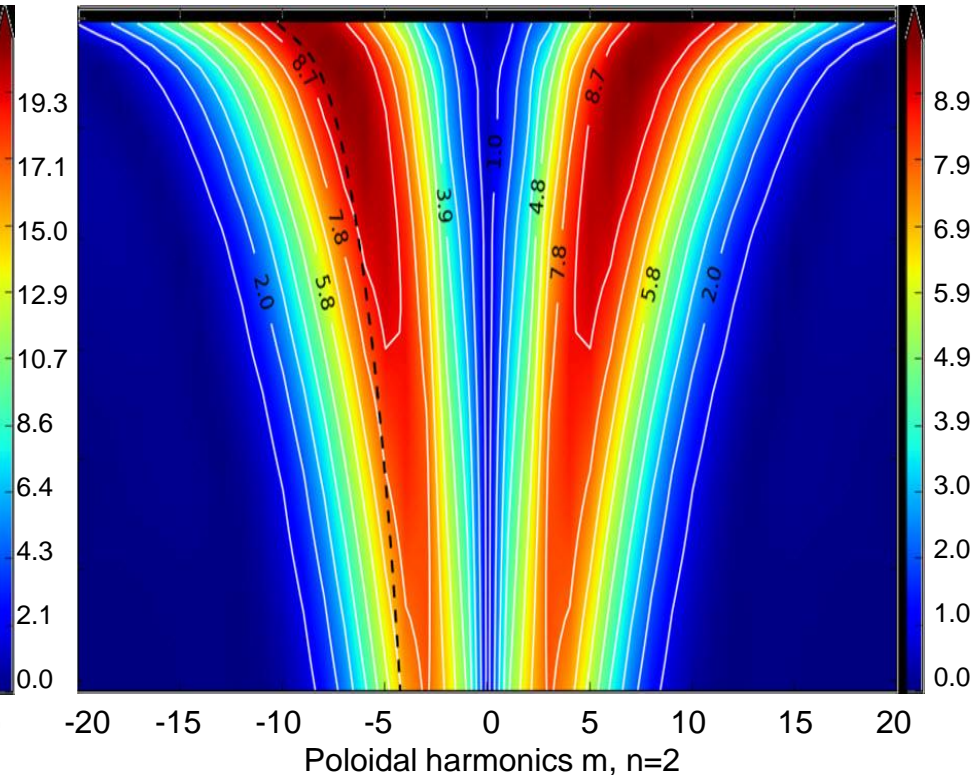


KSTAR Mid-plane coils generate broad poloidal field spectra compared to three rows of coils

KSTAR, $n=2$, mid-plane coils only



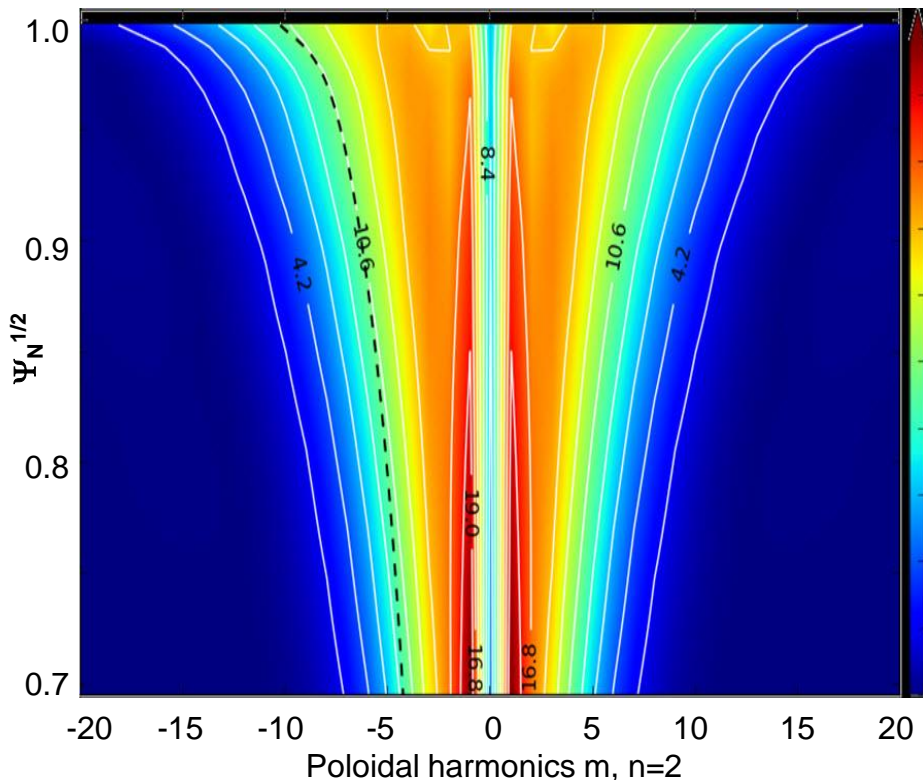
KSTAR, $n=2$, three rows of coils (even)



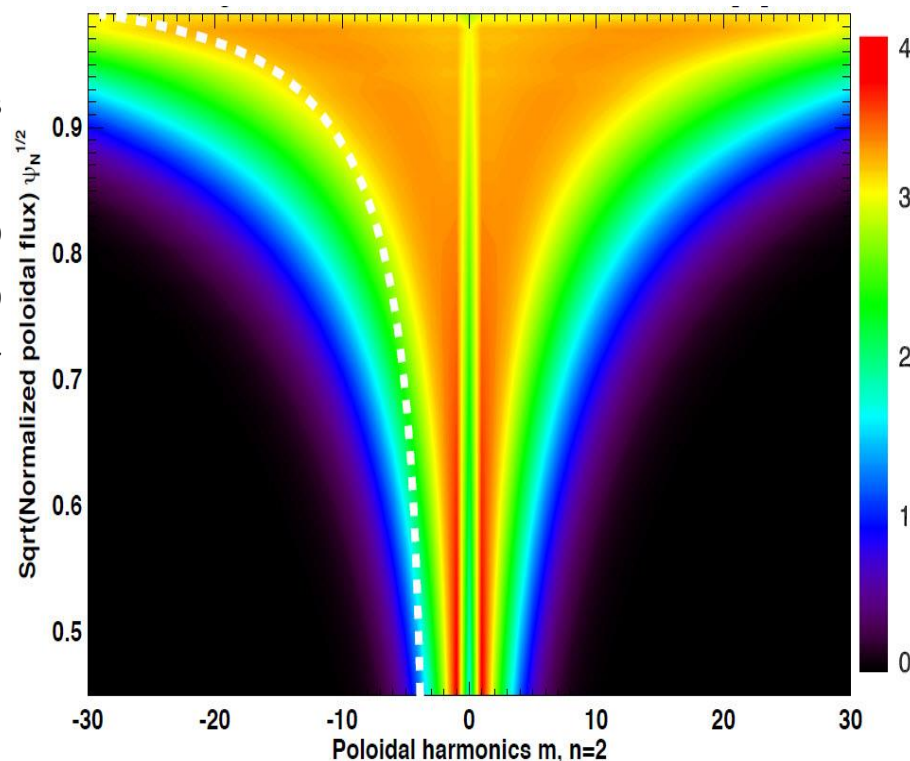
- Poloidal field spectra from mid-plane coils alone do not show a band of maximum strength, but rather a broad field distribution.

Poloidal field spectra from mid-plane coils alone are similar for both KSTAR and NSTX

KSTAR, $n=2$, mid-plane coils only

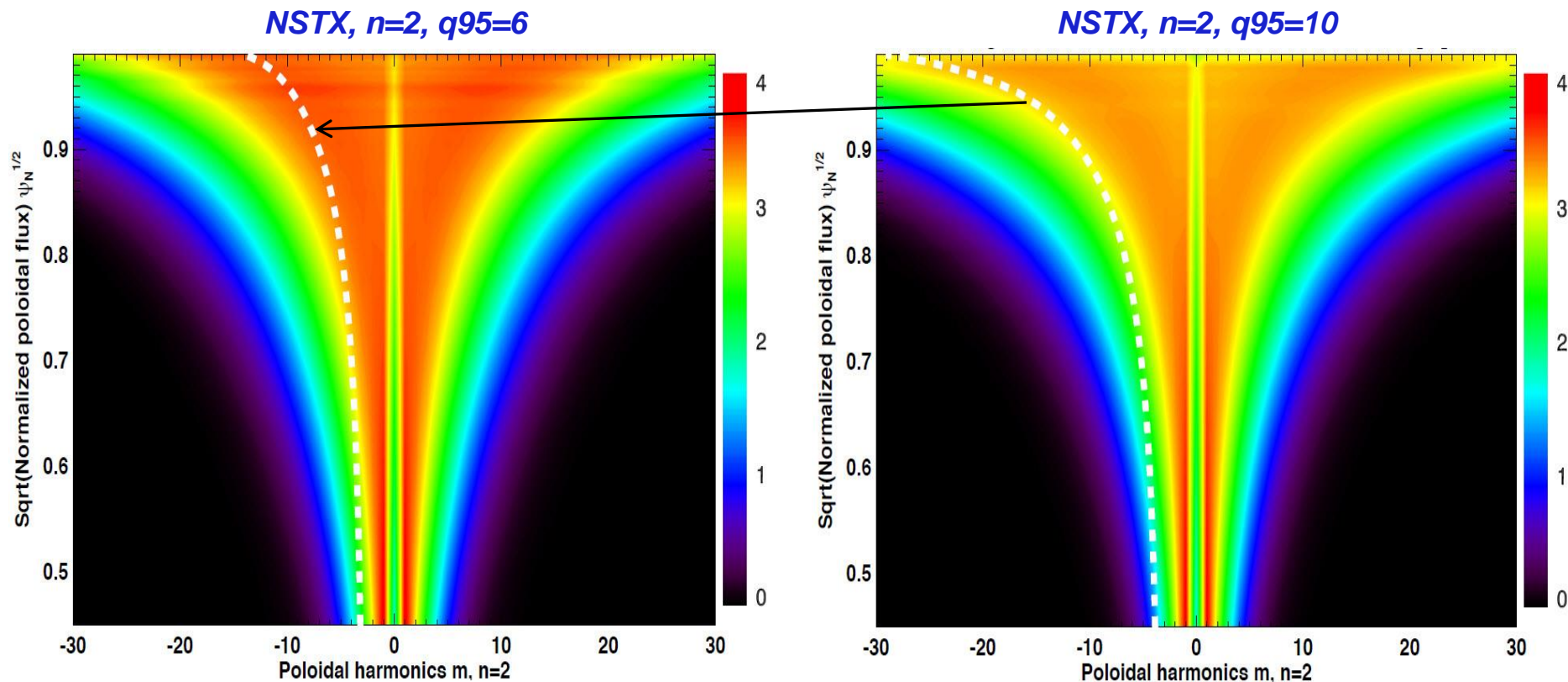


NSTX, $n=2$, $q_{95}=10$



- Broad nature of spectra from mid-plane coils is the same for both KSTAR and NSTX

Lower q95 is expected to raise resonant components in NSTX-U



- Lower q95 moves $q=m/n$ surface toward stronger resonant components
- KSTAR ELM suppression with mid-plane coils was also possible by lowering q95 in the direction toward maximum resonant components

Experimental plan

- Good target shot with low q_{95}
 - Higher aspect ratio in NSTX-U favorable for lower q_{95}
 - Wider range of I_p , B_t scan
- $n=2$ and/or $n=3$?
 - Poloidal field spectra with actual NSTX-U equilibrium necessary to estimate best 3D effects
 - $n=2$ produced better alignment than $n=3$ for NSTX plasmas
- Lower collisionality
 - Higher NBI power to raise $T_{e,ped}$ should lower collisionality in NSTX-U. ELM suppression usually observed in low collisionality regime