NSTX-U

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Stabilization of radiatively induced tearing modes (RiTMs) using off-axis-heating

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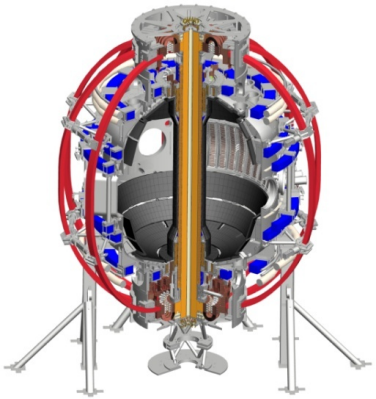

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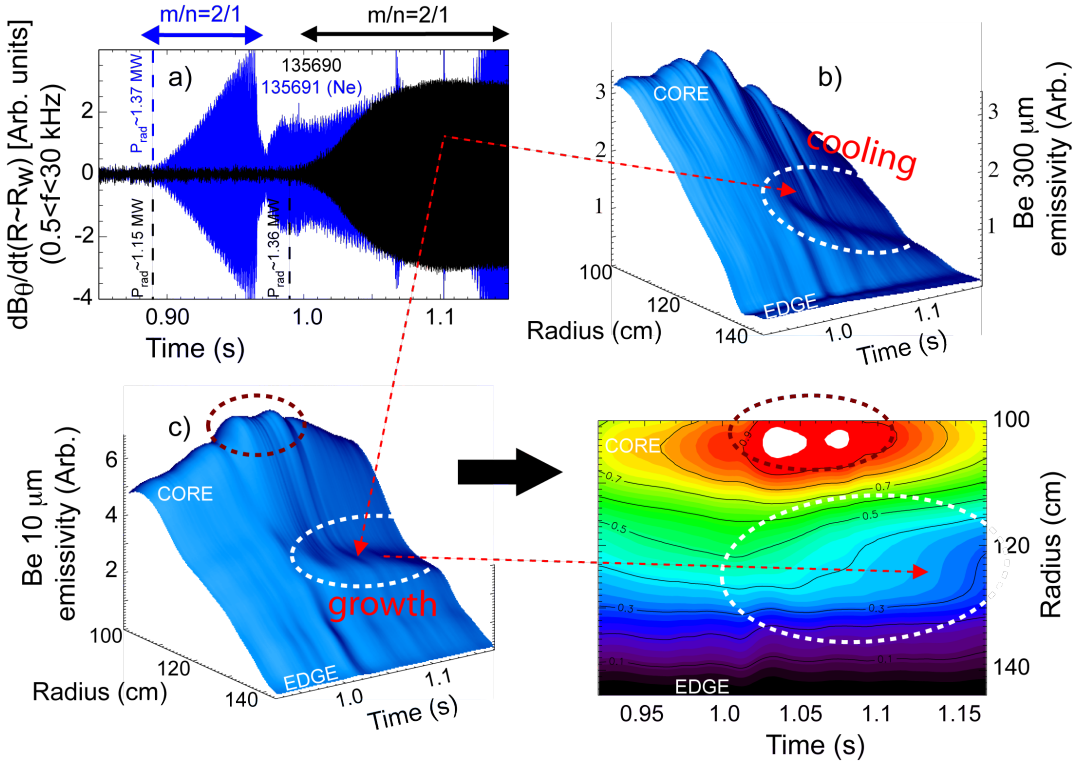
Increasing n_Z resulted in the early appearance of TM activity & enlarged magnetic islands in NSTX

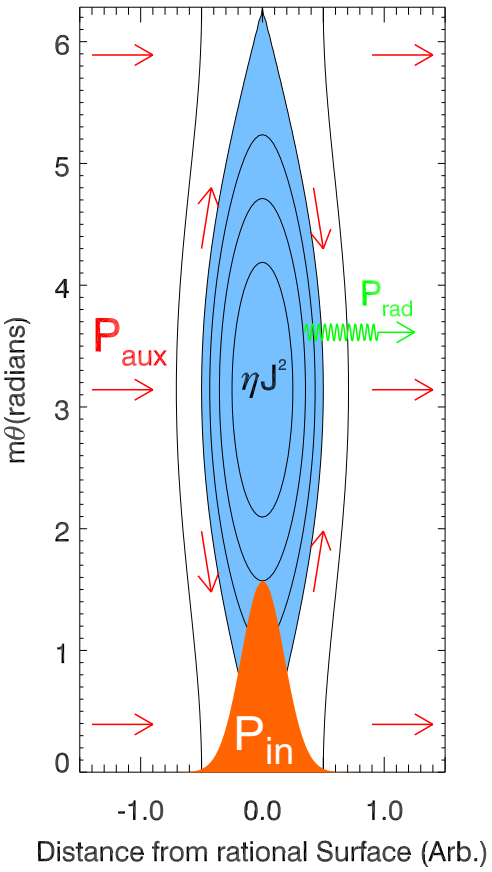
- Impurity radiation can cool magnetic islands causing TMs to grow faster ($d\omega/dt \sim \omega$) and larger in comparison to the impurity-free cases.
- Impact of P_{rad} vs Z_{eff}.
- The phenomena has been coined as radiation-induced tearing modes (RiTMs).
- Ne-experiments in NSTX.
- The onset criterion for these radiation driven islands has been determined to be consistent with the empirical scaling of the Greenwald density limit.

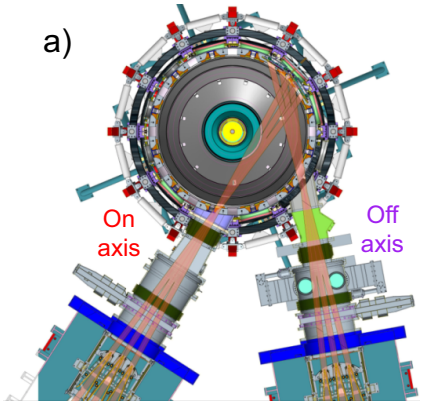


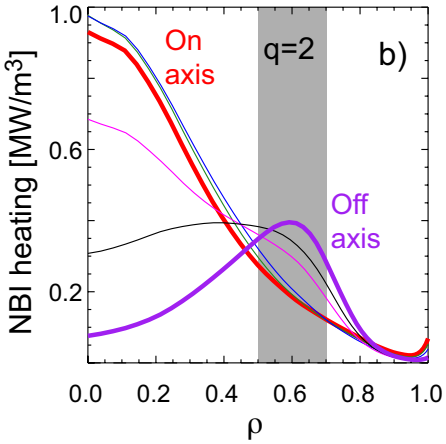
[1] L. Delgado-Aparicio, et al., NF, 51, 083047, (2011)
[2] D. A. Gates and L. Delgado-Aparicio, PRL, 108, 165004, (2012).
[3] D. A. Gates, L. Delgado-Aparicio and R. White, NF, 53, 063008, (2013)
[4] D. P. Brennan, L. Delgado-Aparicio, D. A. Gates and R. White, submitted to PRL, (2014).
[5] D. P. Brennan, C. Liu, D. A .Gates, L. Delgado-Aparicio and R. White, to be submitted to Physics of Plasmas, (2015).
[6] R. B. White, D. Gates, D. Brennan, Phys. Plasmas, in-print, (2015).
[7] L. Delgado-Aparicio and D. A. Gates, to be submitted to Phys. Plasmas, (2015).
[8] M. Greenwald, et al., PPCF, 44, R27, (2002).

Off-axis NBI heating can change power balance @ q=2 avoiding the formation of RiTMs near the density limit

- To avoid the mode-onset we seek to adjust power balance by applying off-axis heating power density.
- This technique could potentially be used in future STs for avoidance of density limit MHD.
- Impact operation with high-Z PFCs.
- Will provide valuable data for the JRT2015 ("Quantify impact of broadened *J* & *p* profiles on confinement and stability") and NSTX-U MS-TSG thrust #2.
- Request one day of experiments w/ and w/o Ne-puffs and changing the off-axis NBI power for stabilization. No-Lithium!







- Key diagnostics are: CHERS, MPTS, MSE, USXR, magnetics suite and the new ME-SXR and AXUV-based "bolometer" systems.