

Overview of CHI results on NSTX

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Summary poster presentation by Dennis Mueller (QP1.014, Thursday morning)

Contributors

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43rd APS, DPP, G01.006
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Non inductive current initiation needed for STs



- Demonstrate plasma start-up and edge current drive

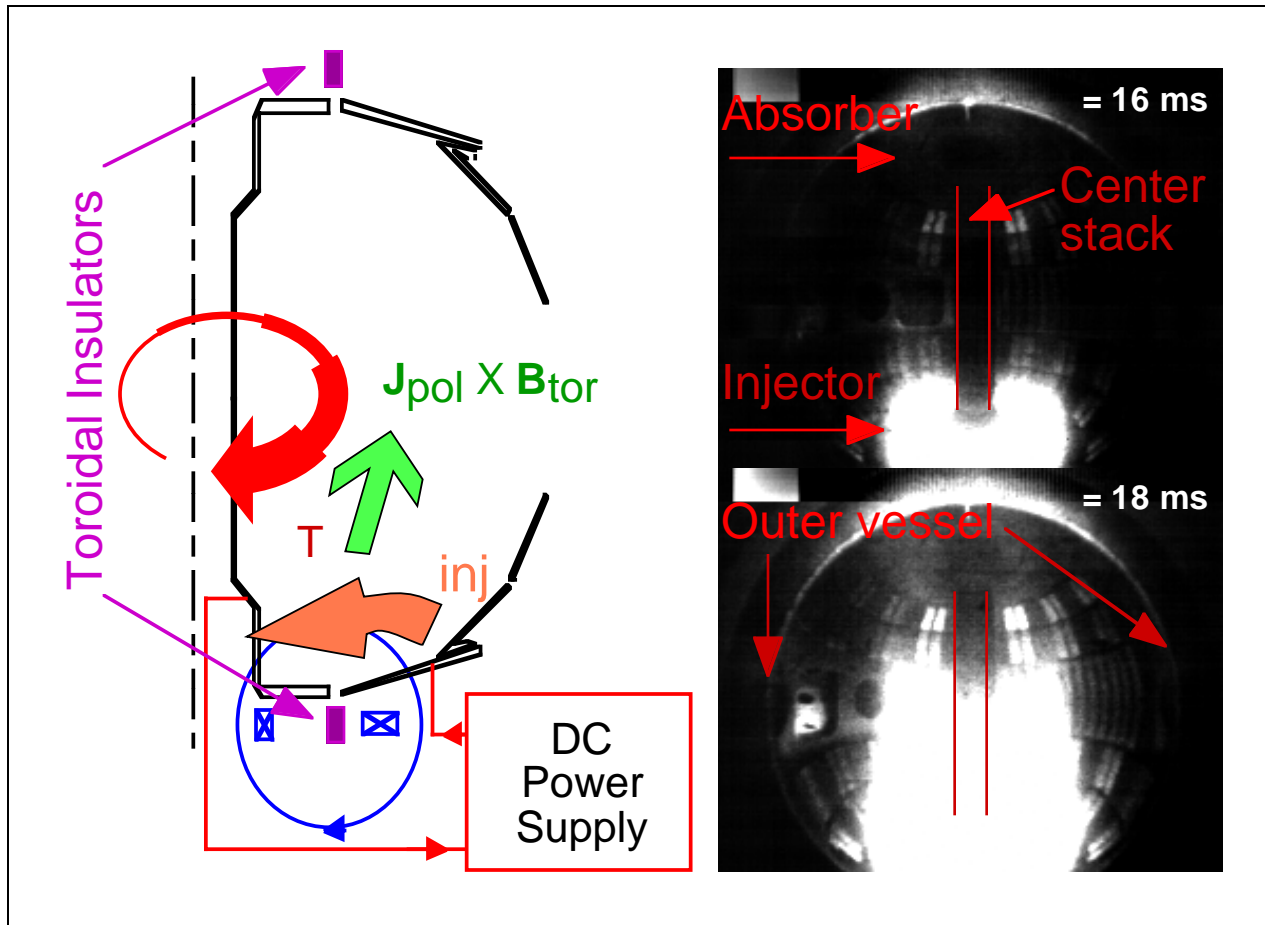
Main issues of the year

- § Mean field flux closure
- § Role of magnetic fluctuations

New capability

- § Improved control to reduce absorber arcs
- § Improved MFIT
- § Ion temperature and rotation velocity

Co-axial electrodes inject helicity



Expect reconnection processes to convert open flux to closed surfaces

Up to 390 kA produced



- Produced at 14 times current multiplication in 330 ms long discharges

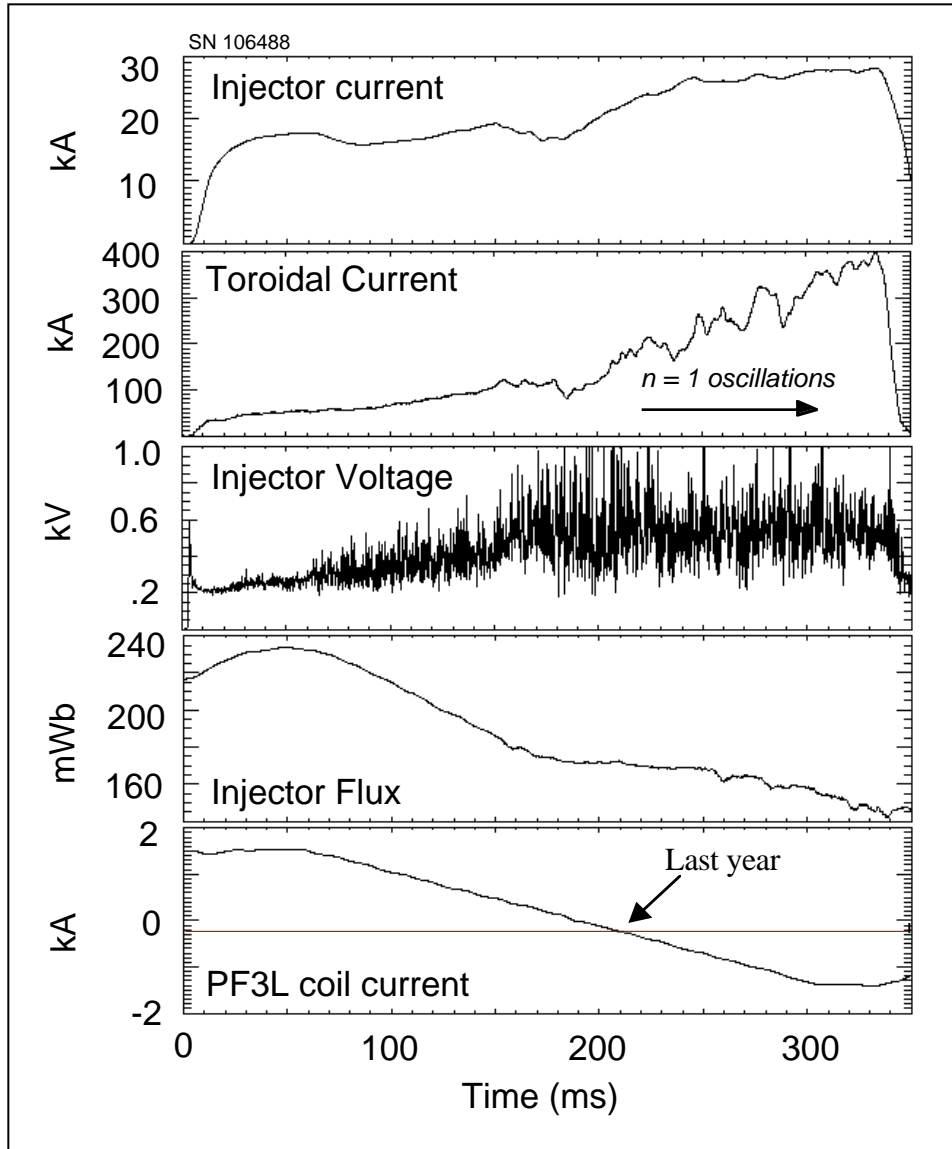
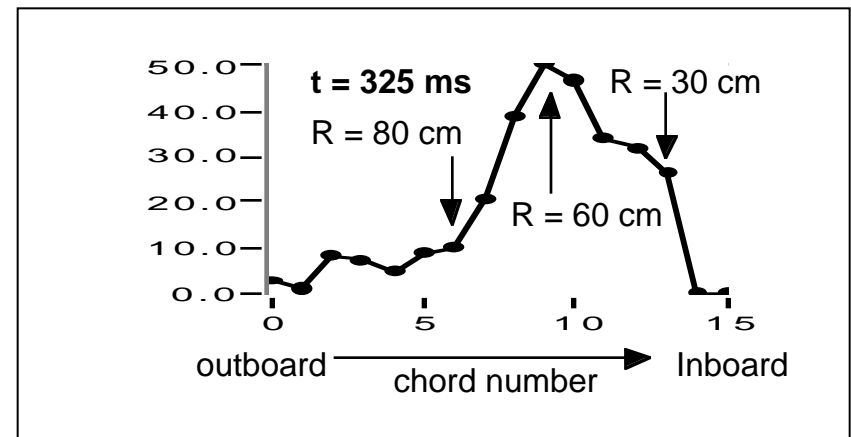
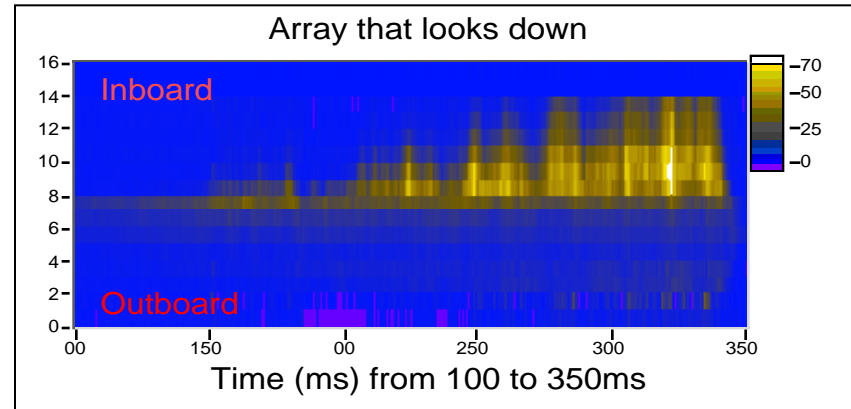
Accompanying observations

- Evidence for good $n=1$ oscillations deemed necessary for flux closure (B.A. Nelson's presentation, GO1.007)
- Consistently encouraging MFIT reconstructions (M.J. Schaffer's presentation, QP1.015, Thursday morning)
- Evidence for higher temperature from SXR's (D. Stutman)
- Ion temperature and plasma rotation (M.Nagata, R.Bell, V. Soukhanovskii)

Obtained 390kA with a current multiplication of 14



Soft x-ray profiles ($E > 100$ eV)



PF3L coil current controls flux foot print width

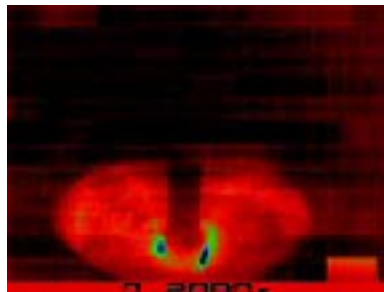


$t = 200 \text{ ms}$

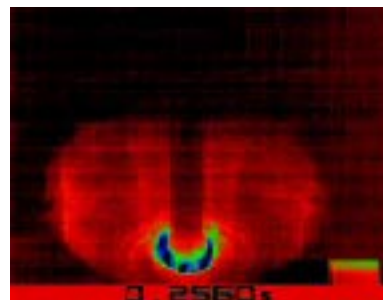
$t = 256 \text{ ms}$

SN 106488

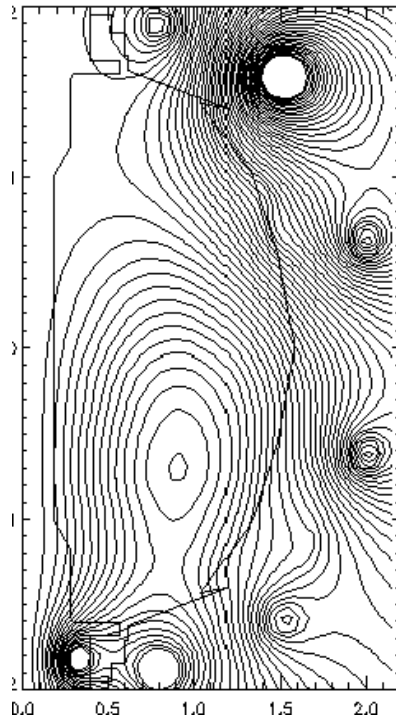
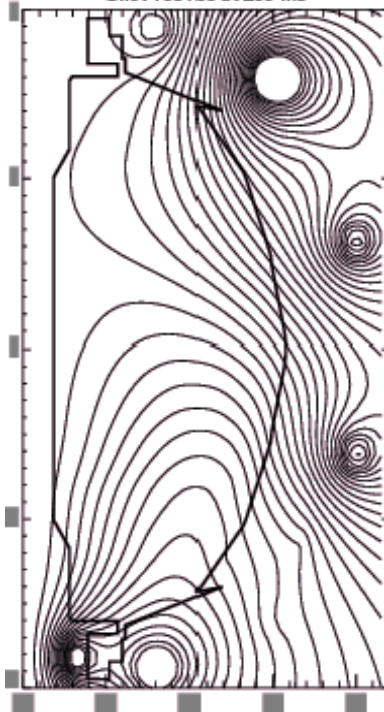
$t = 334 \text{ ms}$



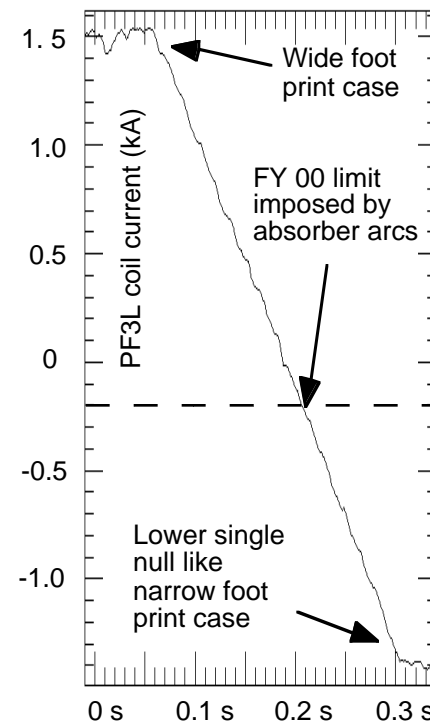
Shot 106488 at 200 ms



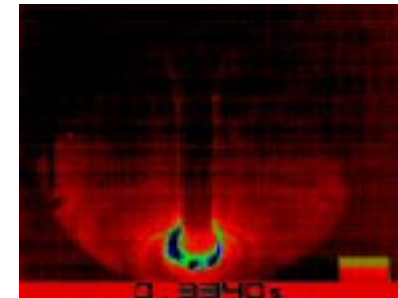
Shot 106488 at 256 ms



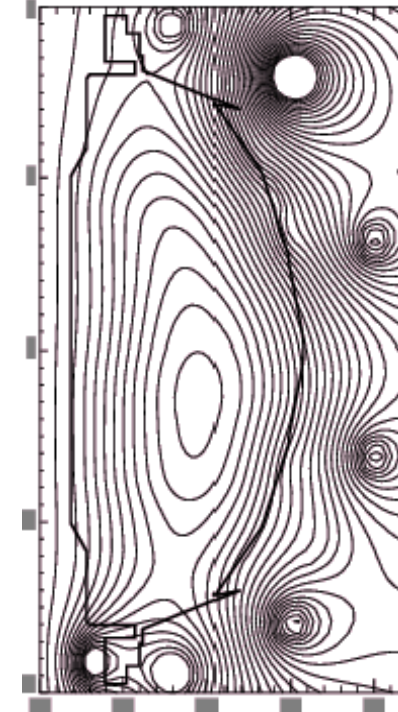
Fast camera fish eye images:
R. Maqueda (LANL)



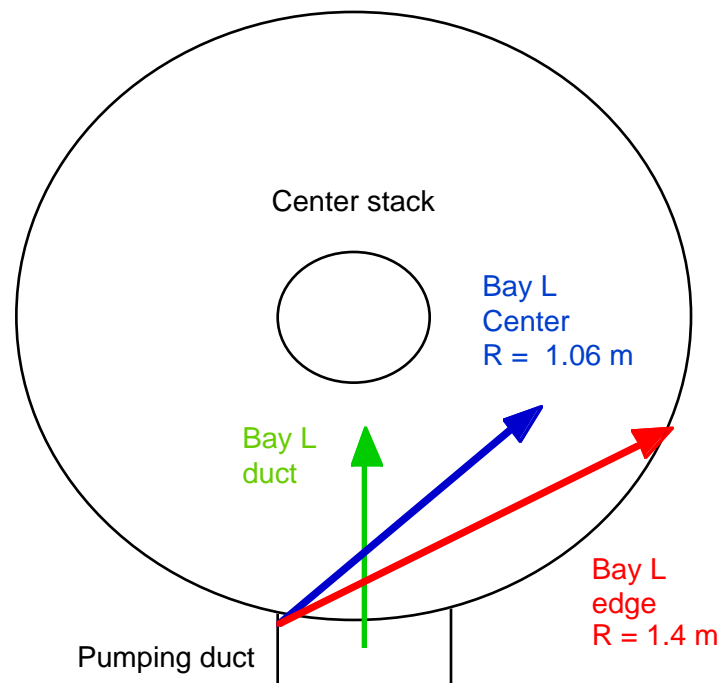
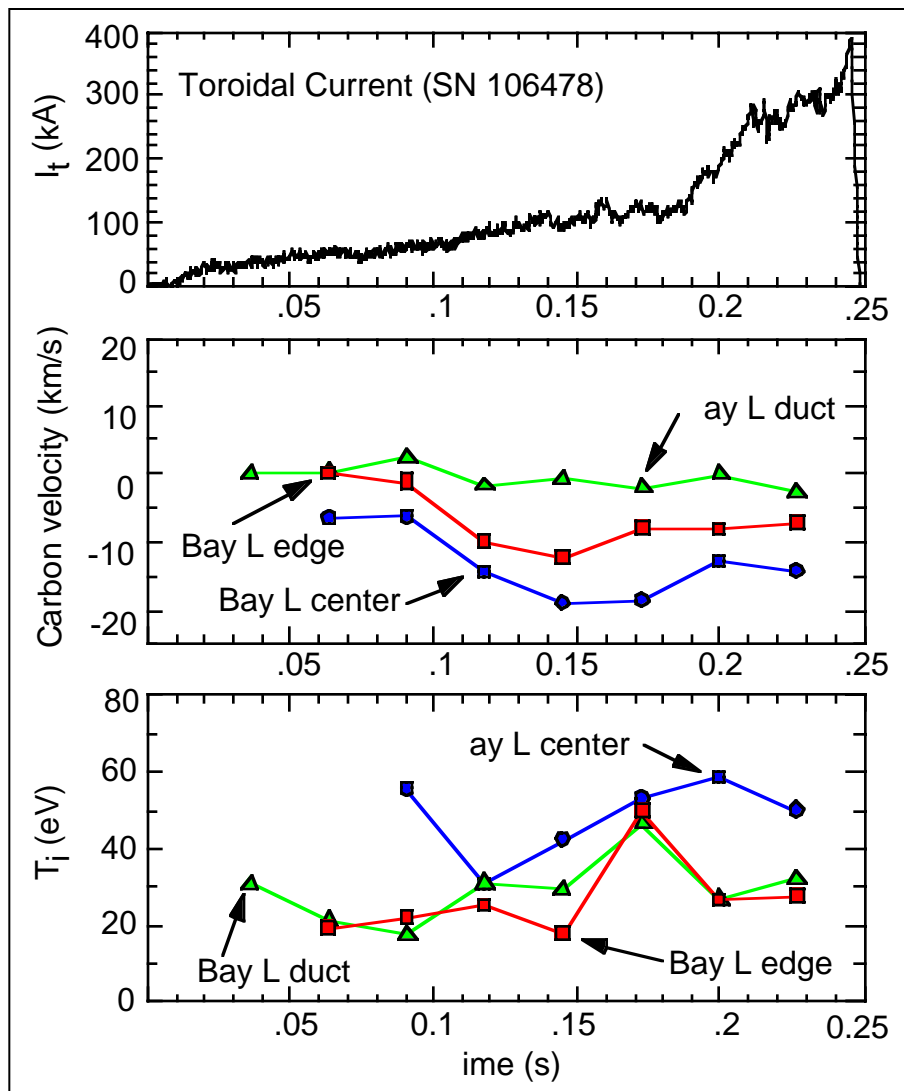
MFIT: M.J. Schaffer (GA)



Shot 106488 at 334 ms



CHI Ion Doppler measured rotation consistent with HIT-II



Time resolution : 26 ms

Direction of rotation: clockwise
(same as on HIT-II)

Rotation speed ~ -10 to -20 km/s

Ion Temperature ~ 30 - 50 eV

Instrumental error: 4 eV

Summary



- Produced 390kA discharges with 14 times current multiplication in 330ms long discharges.
 - Desirable features observed ($n=1$, MFIT reconstructions and SXR emission)
- More than doubled the toroidal current in the preferred flux configuration.
 - Enables the investigation of flux closure and fluctuations.
- Made real progress on flux closure and fluctuations, though we are still far from complete or conclusive solutions.
 - EFIT reconstructions needed.
- Absorber arcs considerably restrict operating parameter space.
 - Improved hardware design underway.

Invited CHI presentation by Aaron J. Redd (LI1, Wed. afternoon)