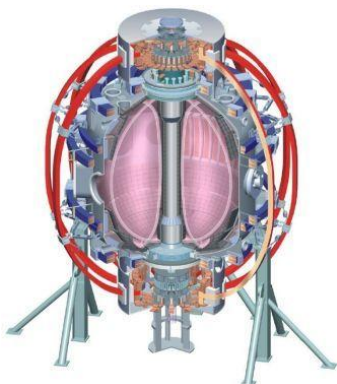


Development of Targets with Low Electron Density During the Current Ramp-up Phase

College W&M
Colorado Sch Mines
Columbia U
Comp-X
General Atomics
INEL
Johns Hopkins U
LANL
LLNL
Lodestar
MIT
Nova Photonics
New York U
Old Dominion U
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PPPL
PSI
Princeton U
Purdue U
SNL
Think Tank, Inc.
UC Davis
UC Irvine
UCLA
UCSD
U Colorado
U Maryland
U Rochester
U Washington
U Wisconsin

**R. Raman, D. Mueller,
B.A. Nelson, T.R. Jarboe**

University of Washington / PPPL



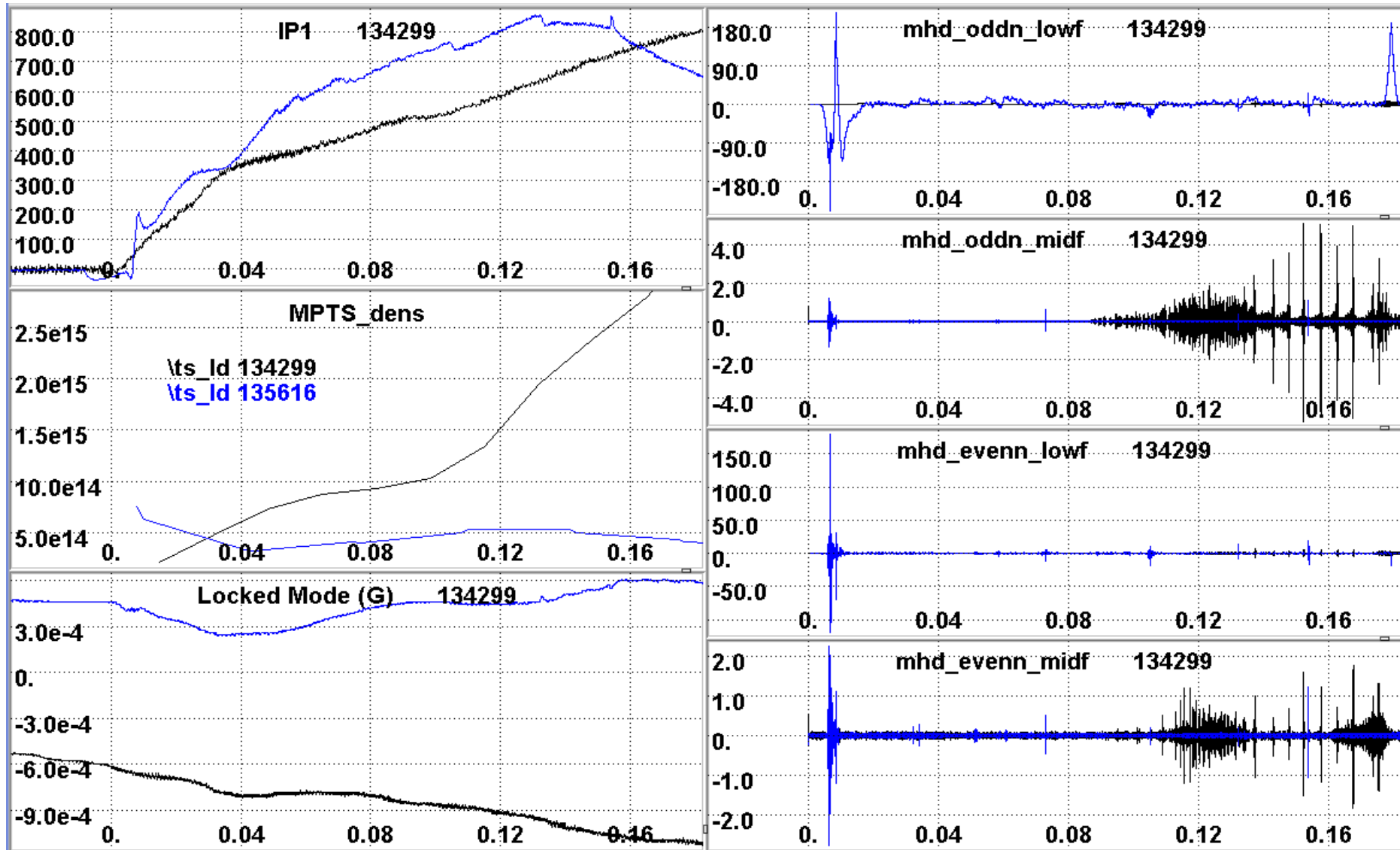
**NSTX Research Forum for
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Controlling the Density Rise During Long-Pulse Discharges is an Important Goal of NSTX Research

- Experiments on NSTX have devoted considerable effort to generating discharges that do not rely on the center stack gas injection system so that the electron density could be maintained at low levels as the plasma current ramp-up and sustainment phases.
- The use of EFC and $n=1$ feedback during the very early phase of plasma start-up has also been tested to generate plasmas that have low initial density, without generating a locked mode.
- These and other efforts have had marginal benefits in generating adequate targets aimed at maintaining a low electron density during the current ramp and during long-pulse discharges.

CHI Started Discharges Have Produced Low Target Density Plasmas with Low MHD



Run Plan (0.5 day to test idea and 0.5 day to improve it)

- Part A
 - Use the same gas programming used for CHI to start a standard NSTX discharge (probably will not work)
- Part B (If unsuccessful with part A)
 - Reproduce a CHI started discharge with zero pre-charge in the CS and use these for optimization with NBI, SGI (and with RF to heat the initial plasma) to generate long pulse discharges.
 - Need to transition to an H-mode early to increase pulse length
 - Use CS gas and LFS gas if needed
 - Non-CHI discharges will also work, but break-down is more difficult and run time may be lost. May also try starting a normal discharge with zero CS pre-charge (may be difficult due to breakdown issues)
 - In any case these discharges in themselves would be useful targets to test NSTX capability for producing long-pulse discharges at lower density and higher levels of NI CD fraction (access new parameter regime)
 - This also tests the hypothesis that the CS pre-charge is the source of the error field