

Heat and Particle Flux Scaling vs. Heating Power, Density, and Plasma Current (and shape) in NSTX

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Heat flux scaling and power accountability is integral part of ST mission

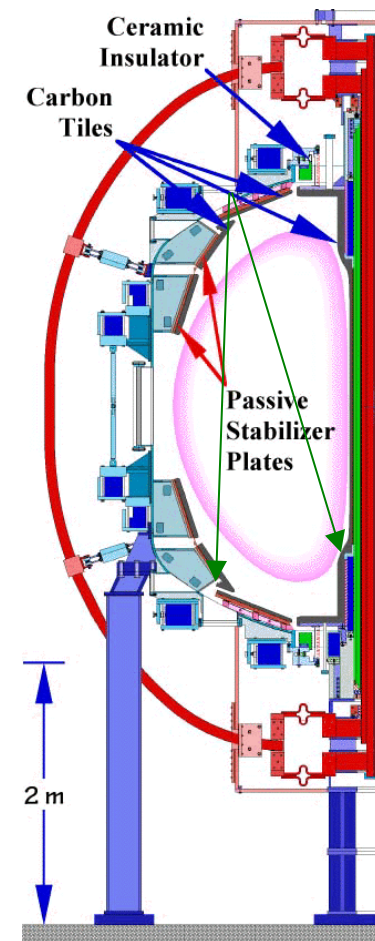
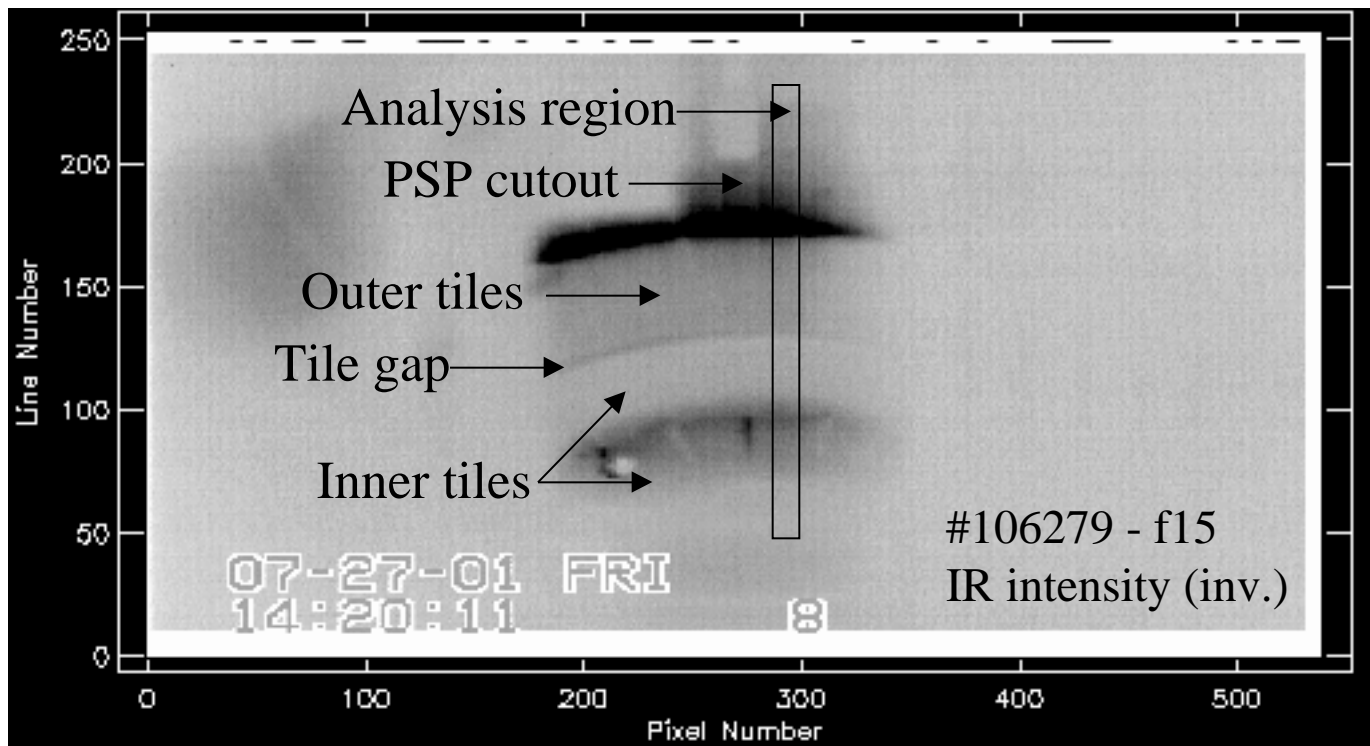
- Next step ST's designed for high power density operation
 - Higher heat loads on plasma facing components
- Milestone (in FY '03) for heat flux scaling and NSTX PFC needs for long pulse ~ 5s operation in '04-'06
- Proposal (2-3 days):
 - Measure quasi-steady heat flux vs. n_e , P_{heat} , and I_p
 - Compare profiles in L-mode and H-mode discharges
 - Measure in/out divertor heat flux ratios in single-null and double-null discharges

IR cameras refurbished during opening

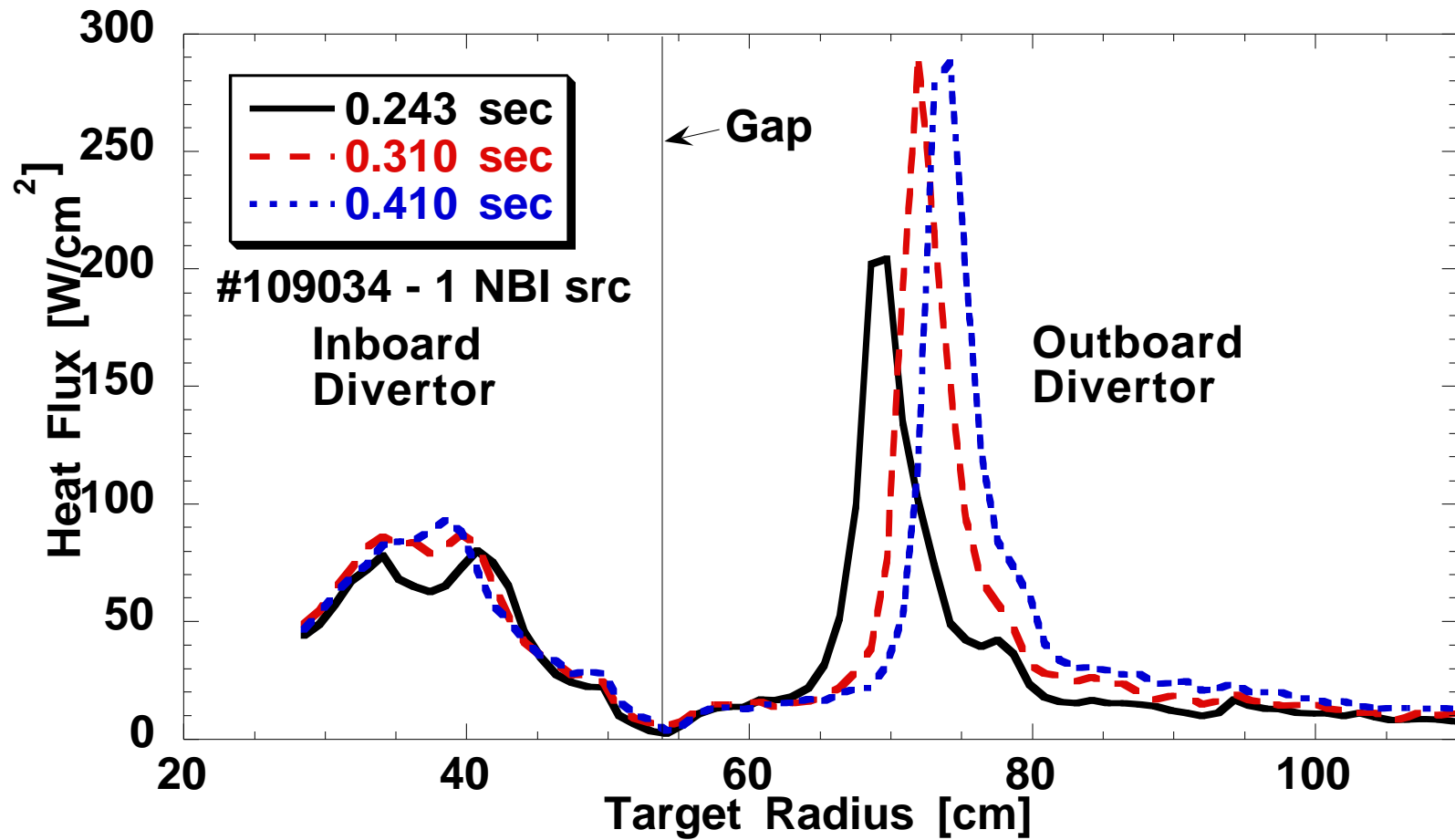
- Camera specifications
 - 12 bit digital data
 - 30 Hz sampling time, 25ms thermal e-folding time
 - 7 - 13 μm IR detection range
 - Improved spatial resolution from 1.1 cm to 0.6 cm
- Improvements needed/in progress from last run
 - Improved synchronization with shot cycle
 - Improved dynamic range ($\sim 2x$) with baseline control
 - Need longer pulse, quasi-steady H-mode discharges with > 1 src., and also 1 src. quasi-steady L-mode
 - Best results occurred at different field line pitch than used in XP 217

IR camera view allows radial profile measurements

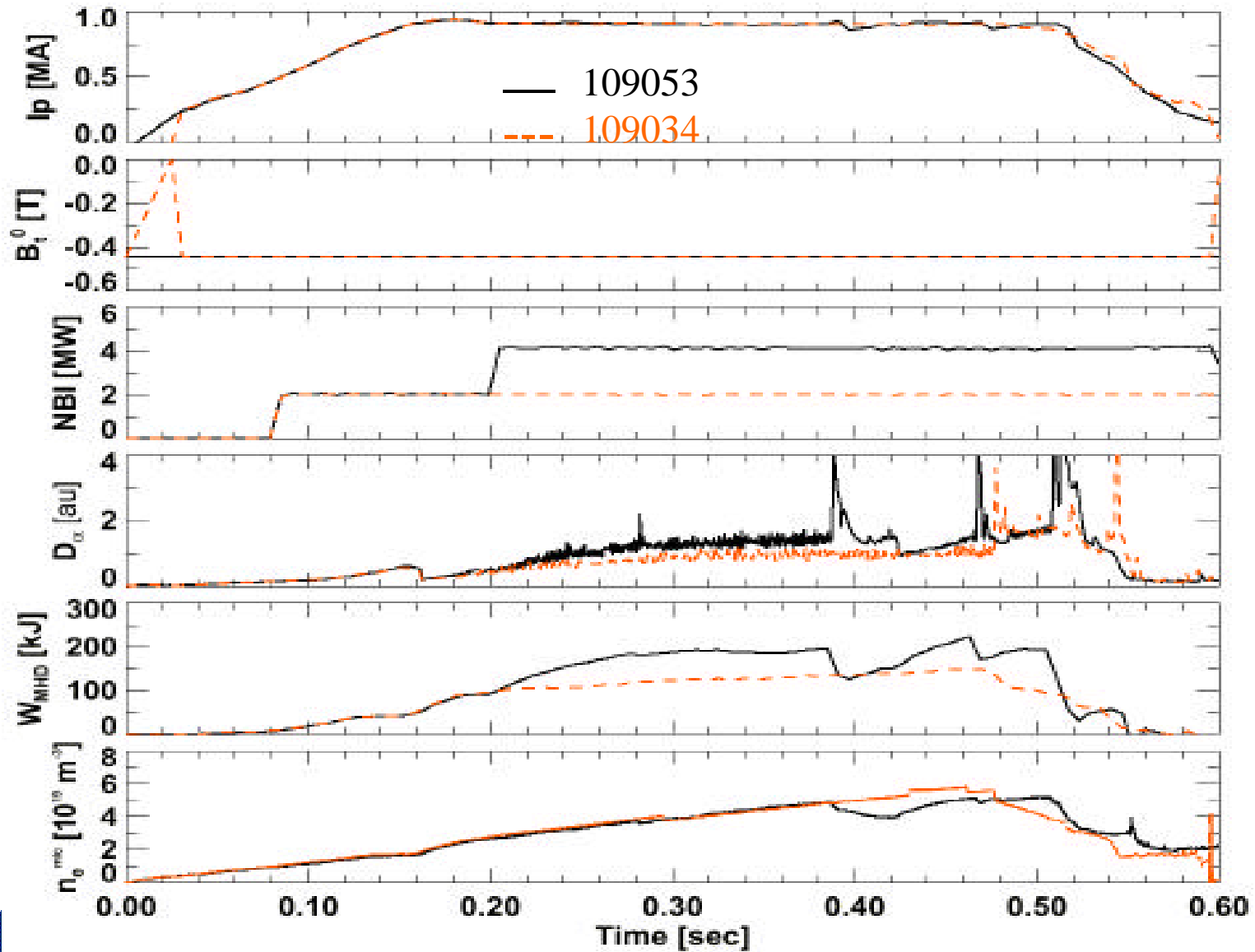
IR camera: 7-13 μm range, 30 Hz, 25ms thermal e-folding time, spatial resolution ~ 1 cm with present optics



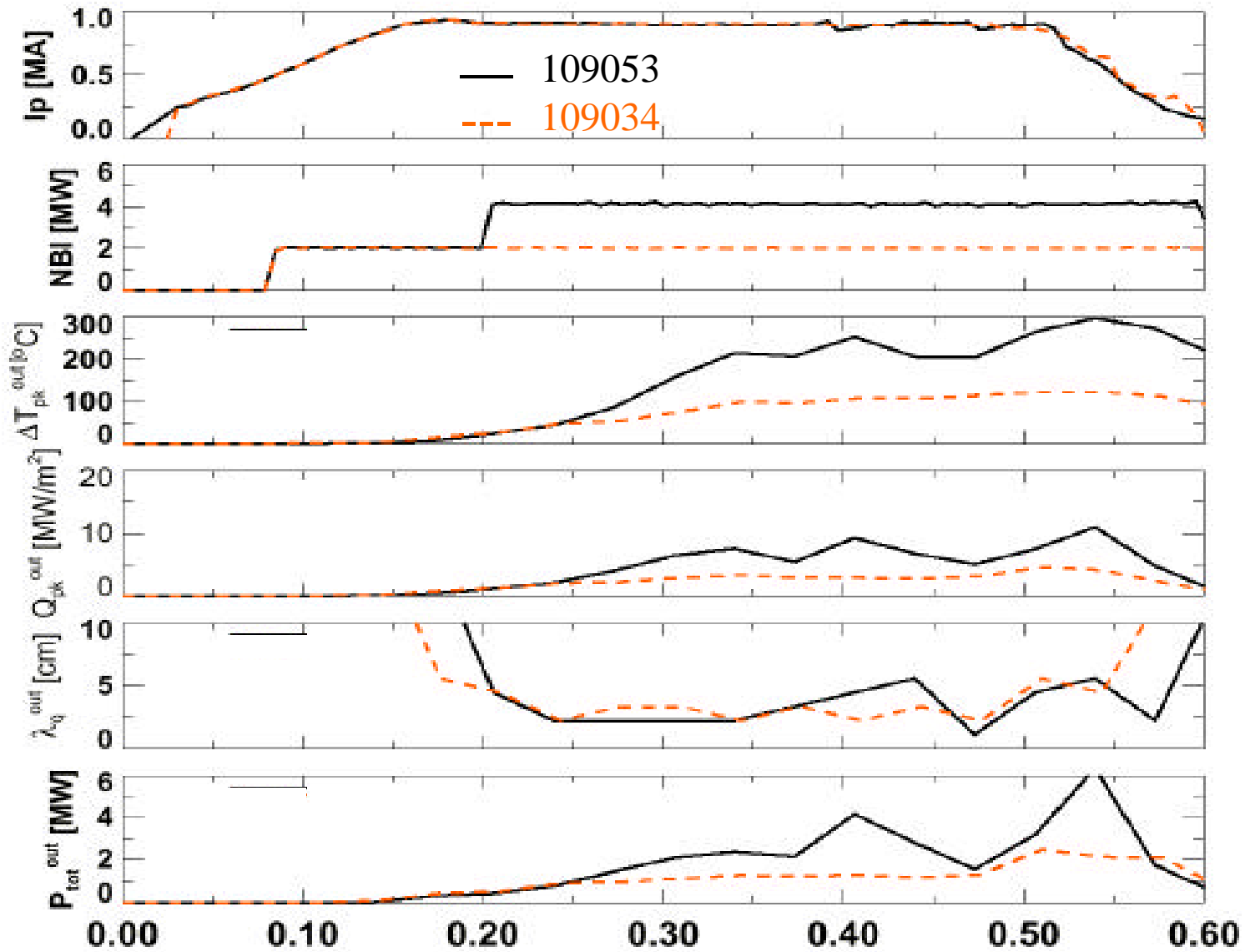
Heat flux profile in 1 src. NBI shot comes into equilibrium



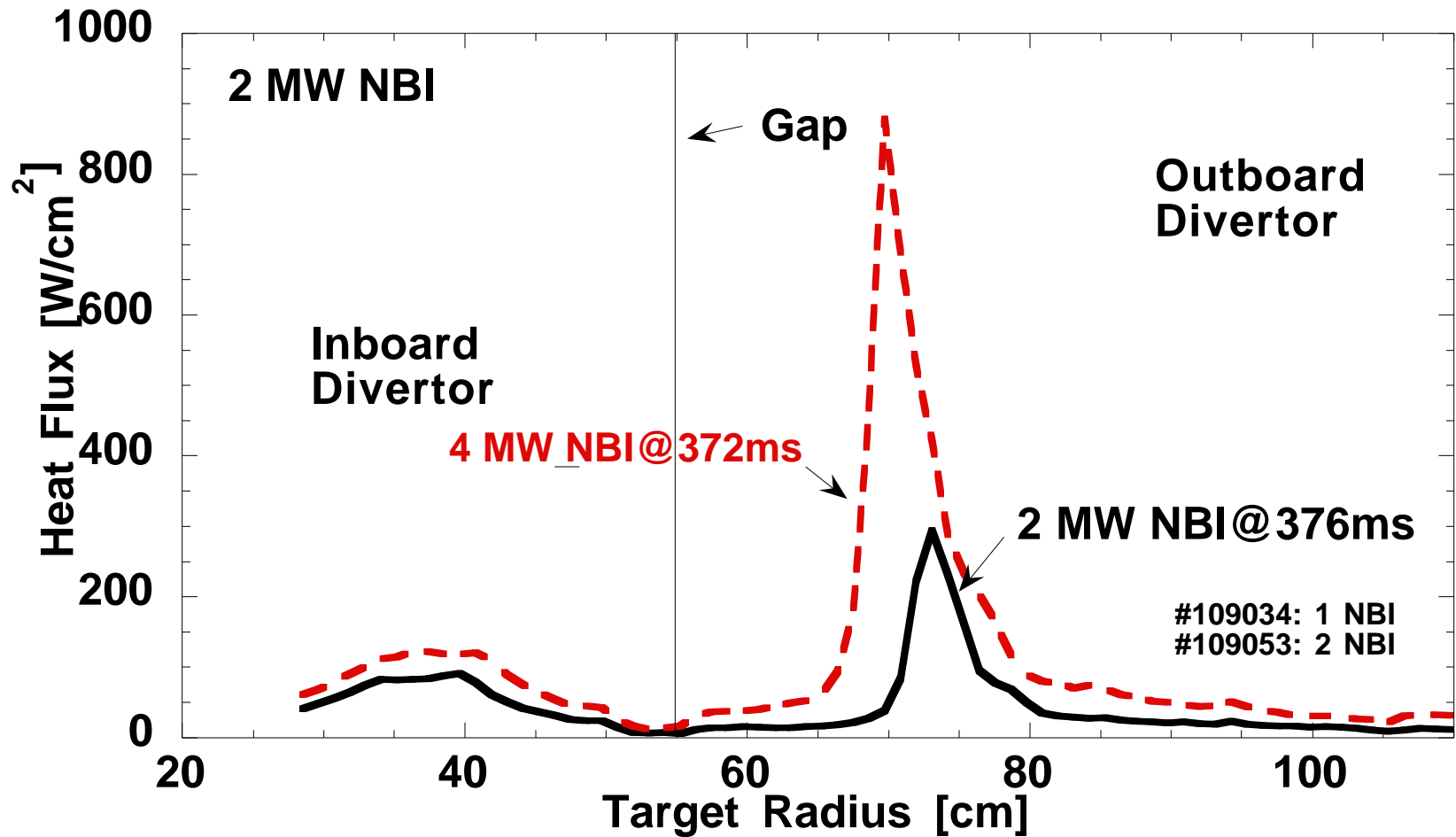
Two NBI src. shot has more stored energy and shorter H-phase



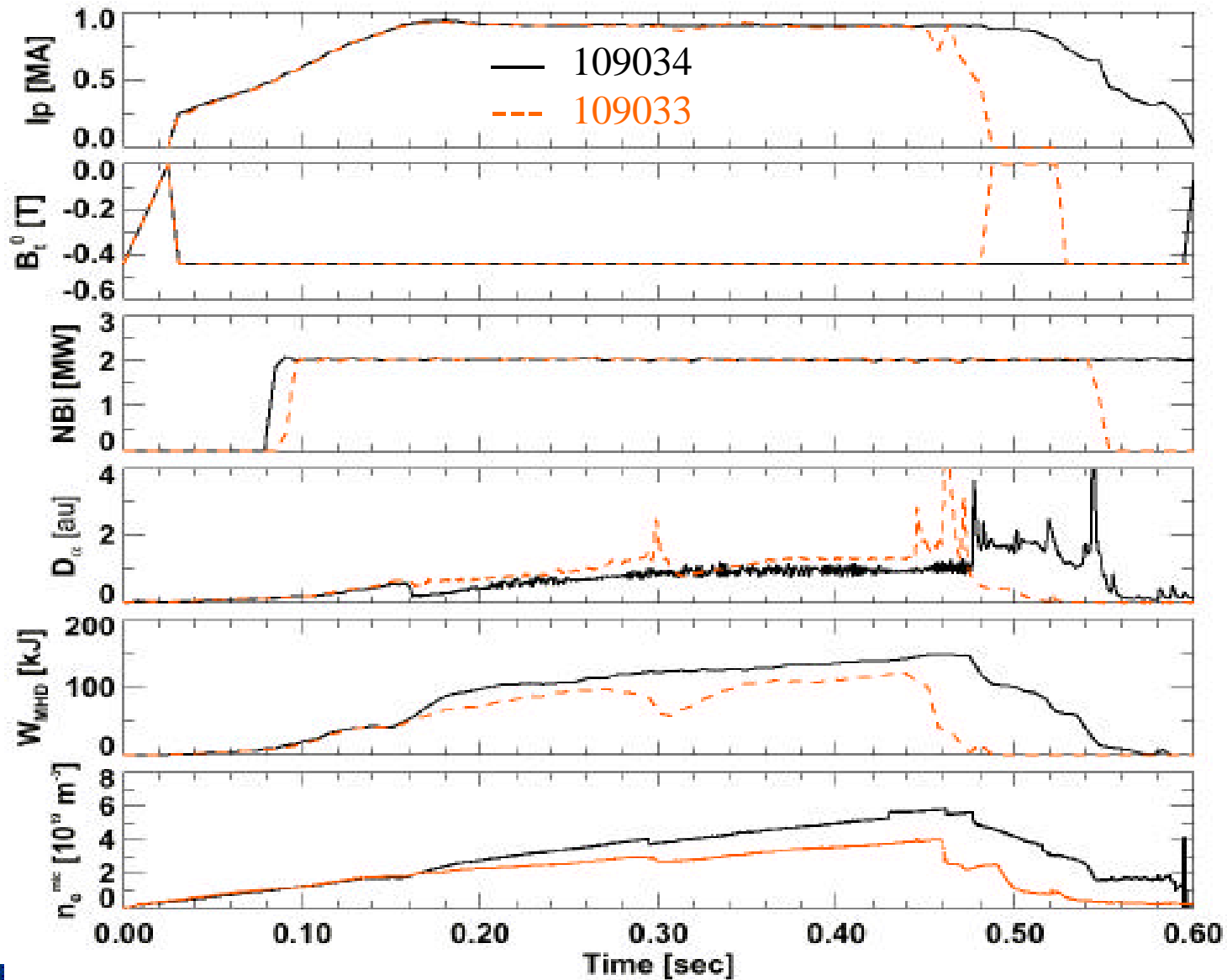
Higher peak heat flux and power to outer div. in 2 src. shot



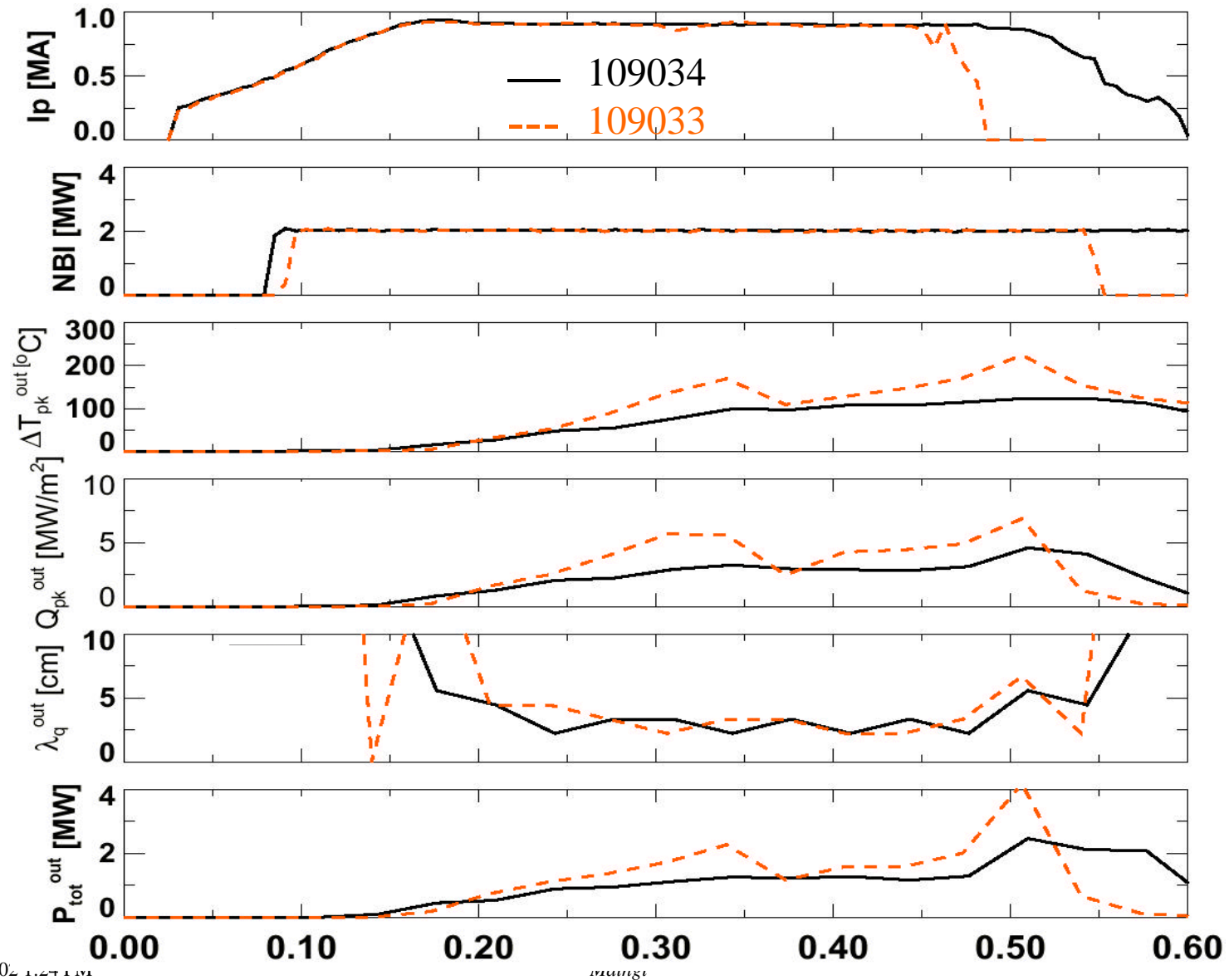
Comparison of Divertor Heat Flux Profiles in 1 and 2 src. NBI H-mode discharges



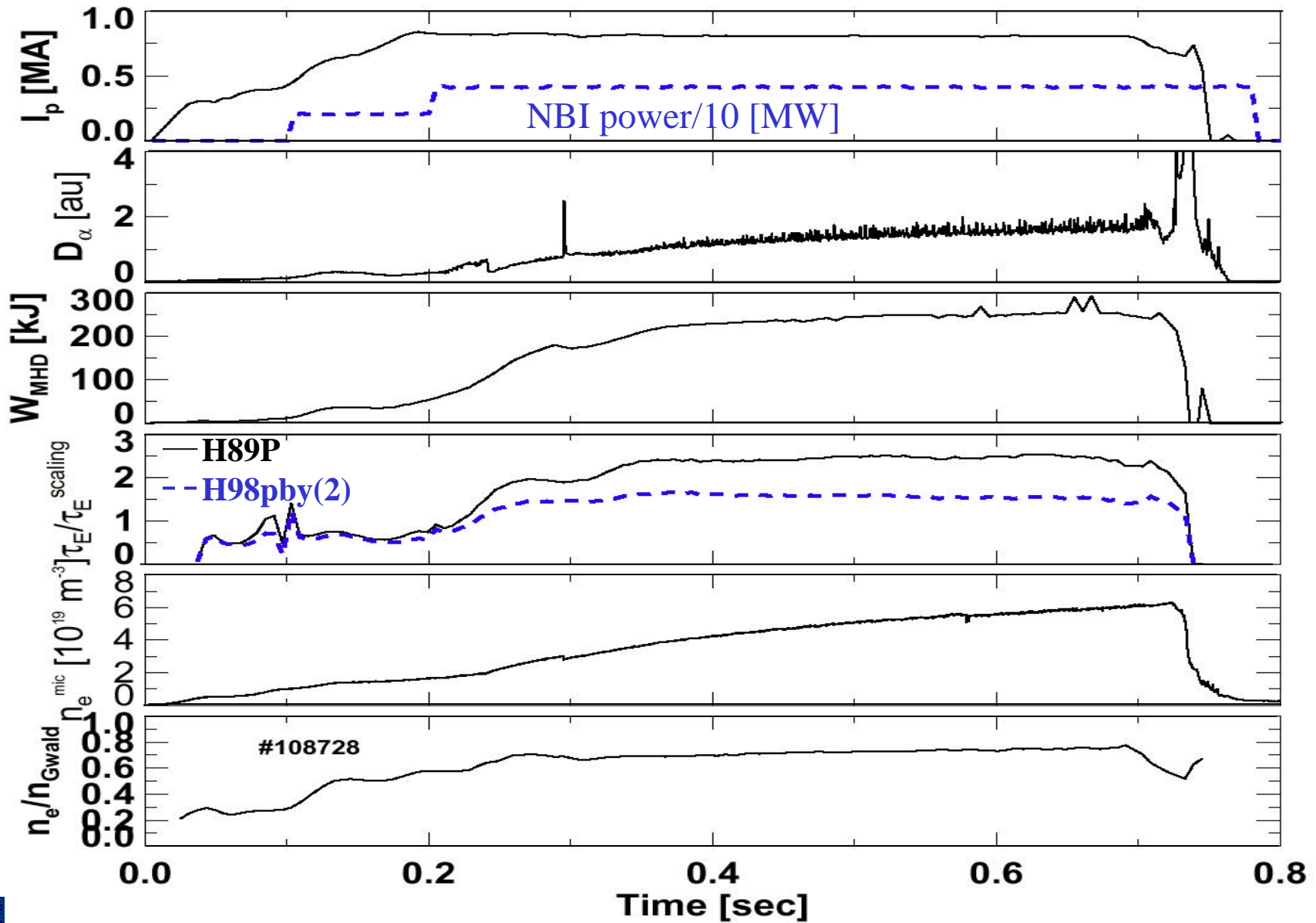
Comparison of 1 src. L and H-modes in LSND shape



Higher outer divertor heat flux in L-mode vs. H-mode

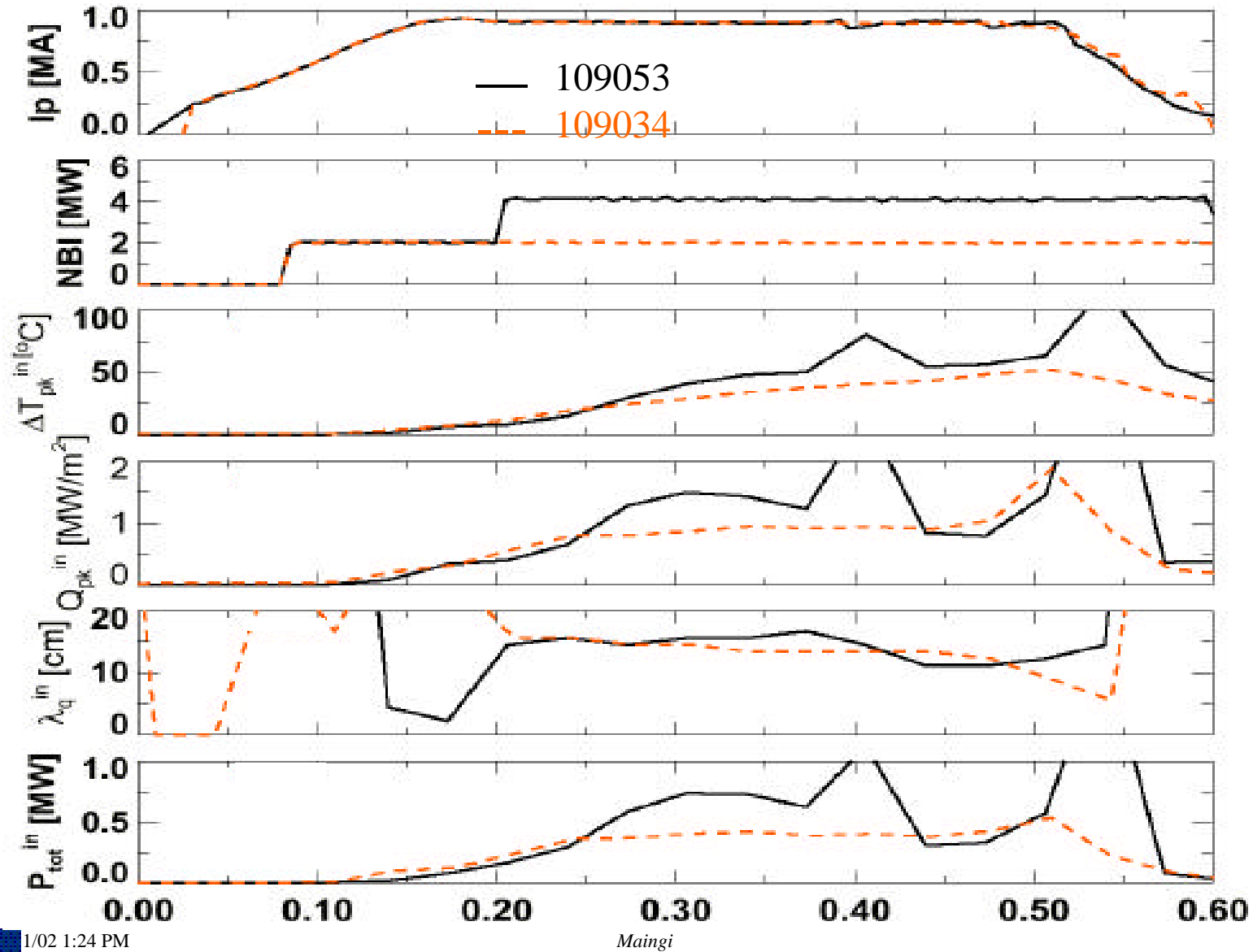


High n/n_{GW} Achieved with Good Performance in Long Pulse H-modes

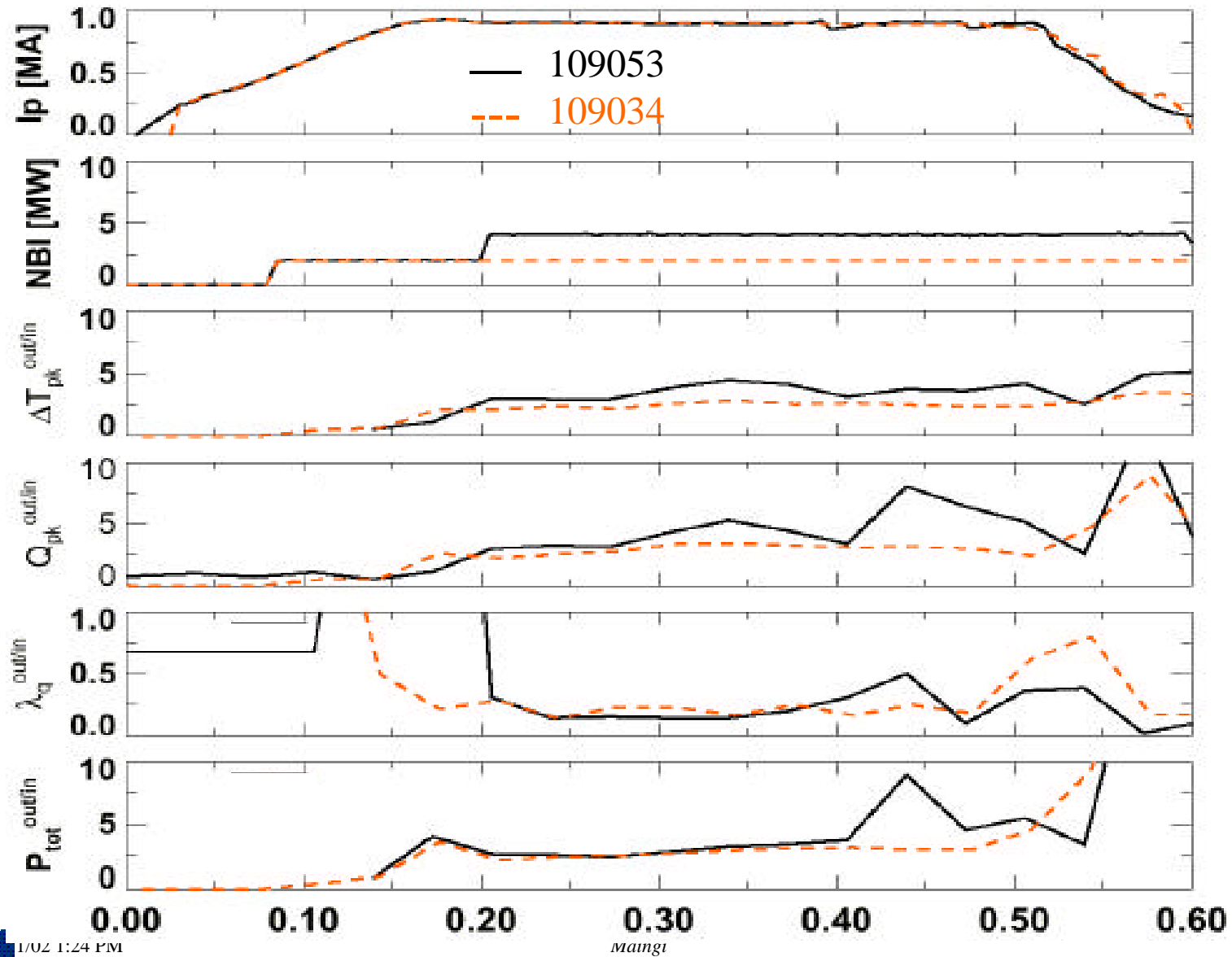


Backups

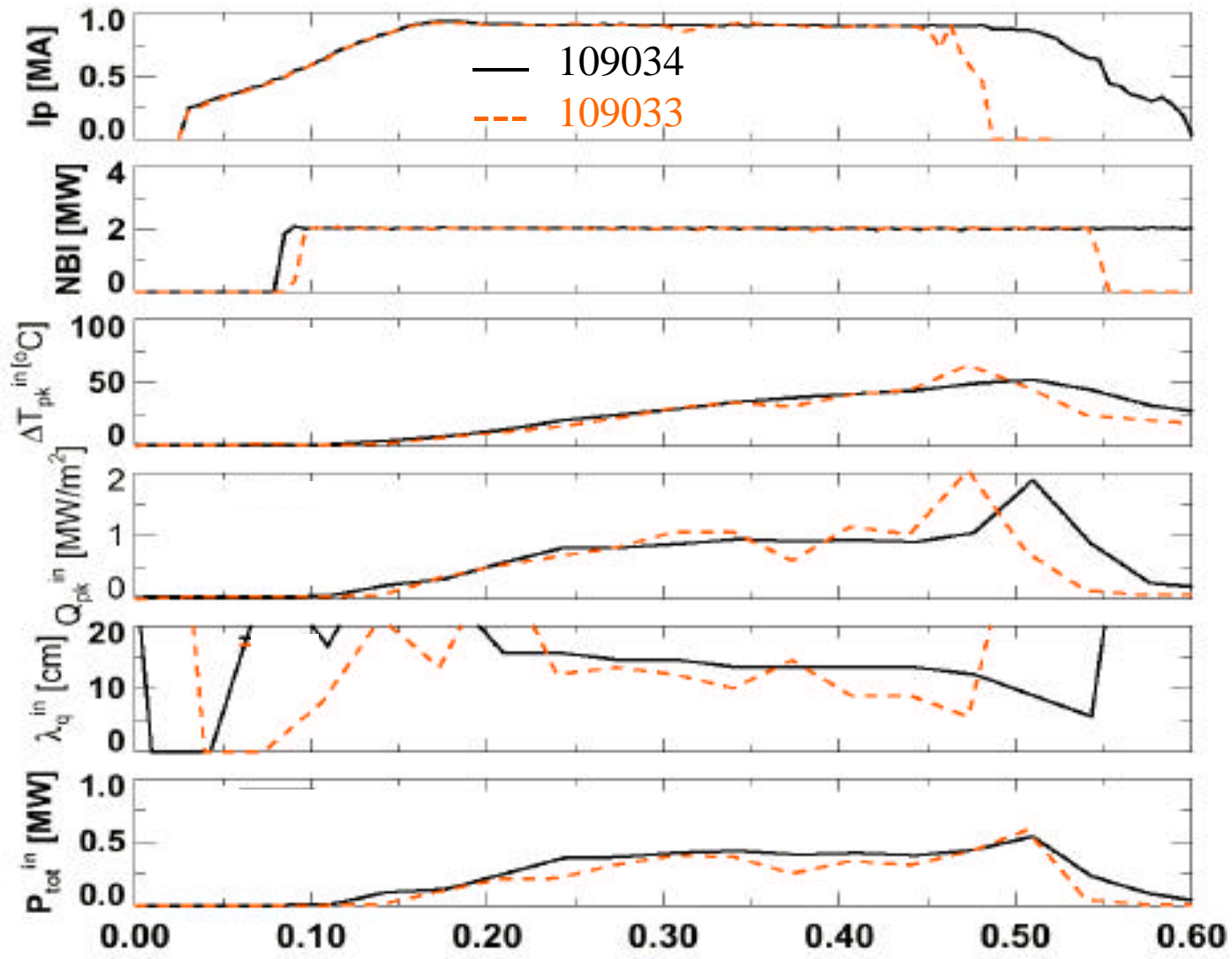
Higher peak heat flux and power to inner div. in 2 src. shot



Out/in power ratio stays constant vs NBI power



Inner divertor heat flux same in L-mode and H-mode



Out/in power ratio higher in L-mode than H-mode

