

Effect of ELM event on current profile during and in-between ELMs

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2010 NSTX Results and Theory Review

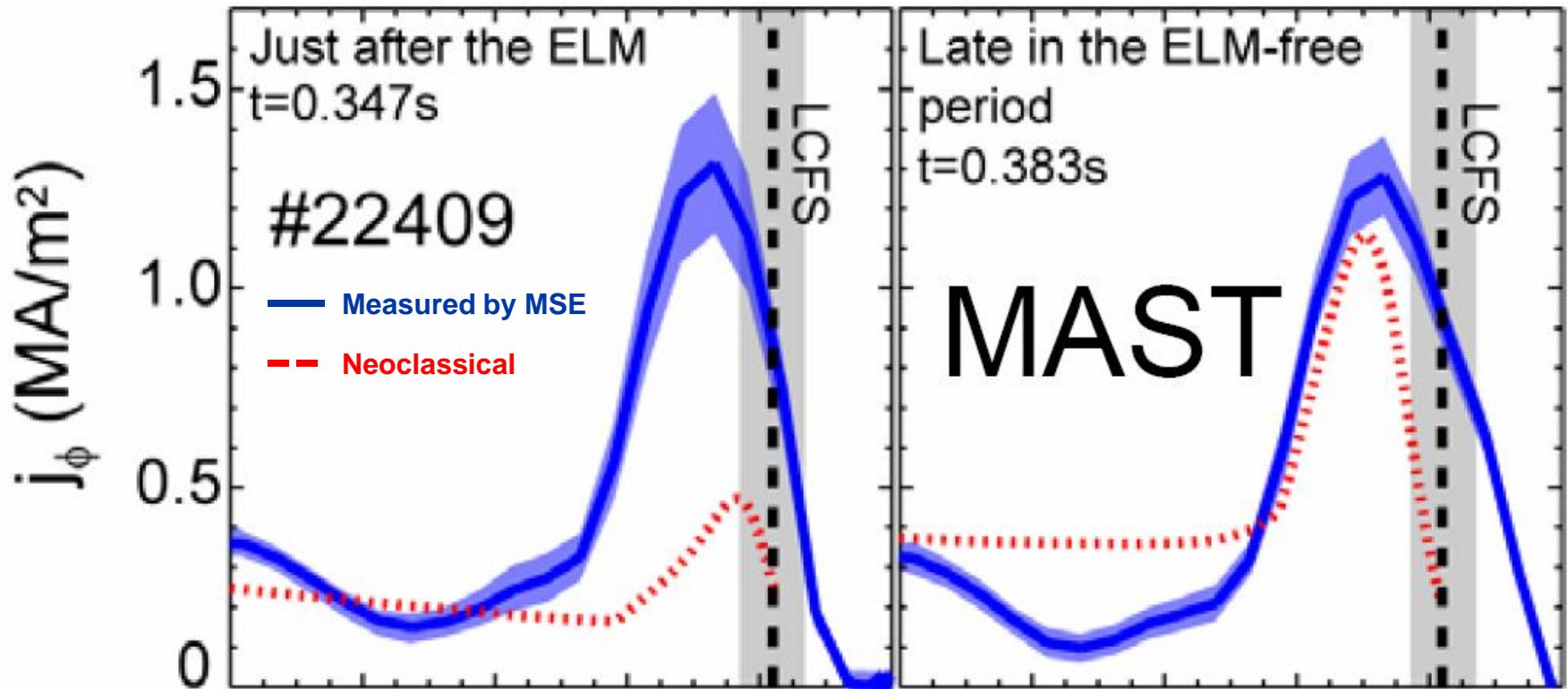
Dec. 1 2010

Work performed for U.S. DOE by U.C. LLNL under Contract DE-AC52-07NA27344, grants DE-FG03-95ER54309 at general Atomics, and by the UK Engineering and Physical Sciences Research Council under grant EP/H012605/1 and the European Communities under the contract of Association between EURATOM and CCFE.

LLNL-PRES-420586

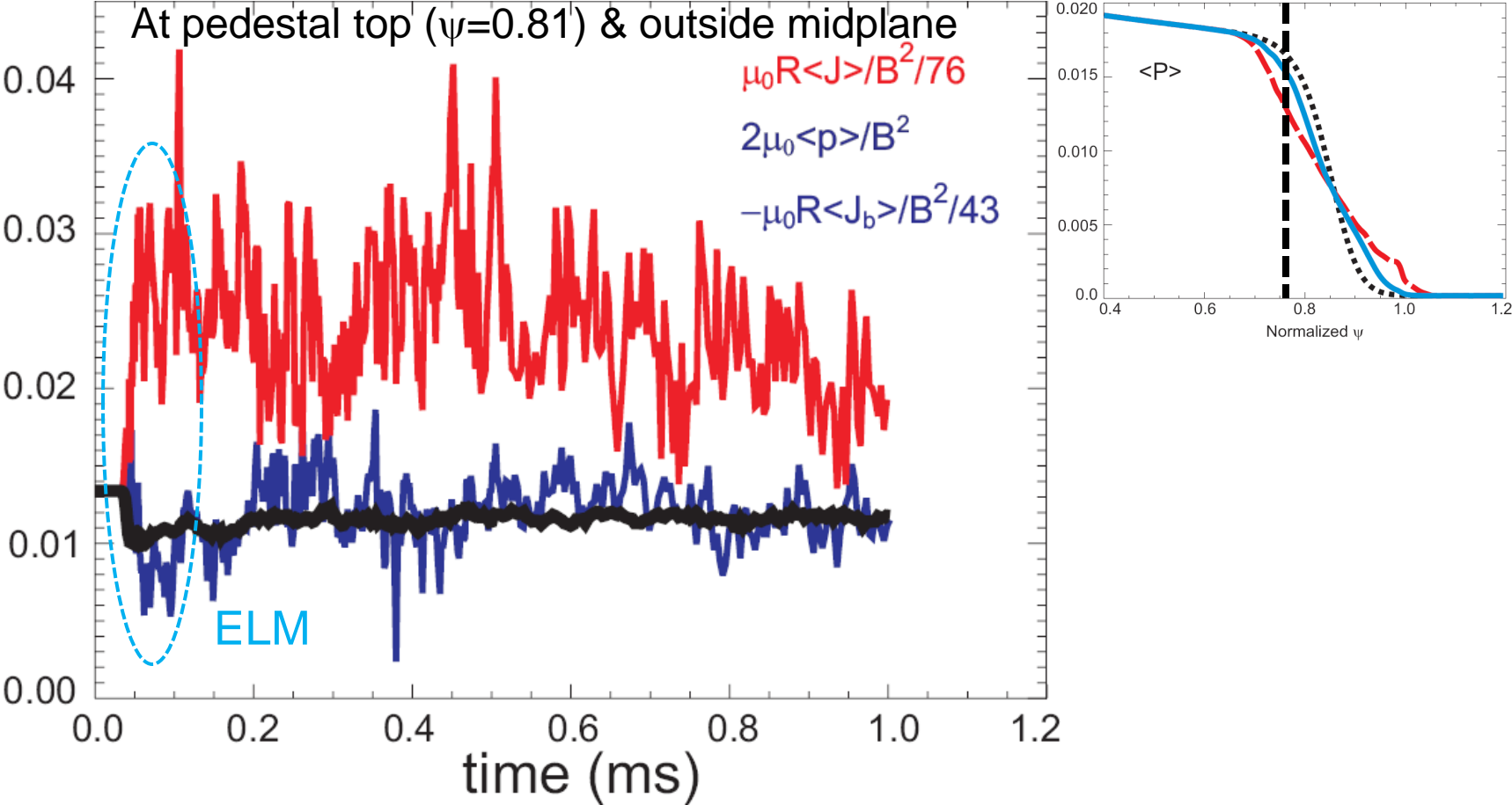
MAST: j_ϕ is not affected by the occurrence of a type-I ELM

Comparison of j_ϕ from MSE with the neoclassical calculation according to Sauter et.al.



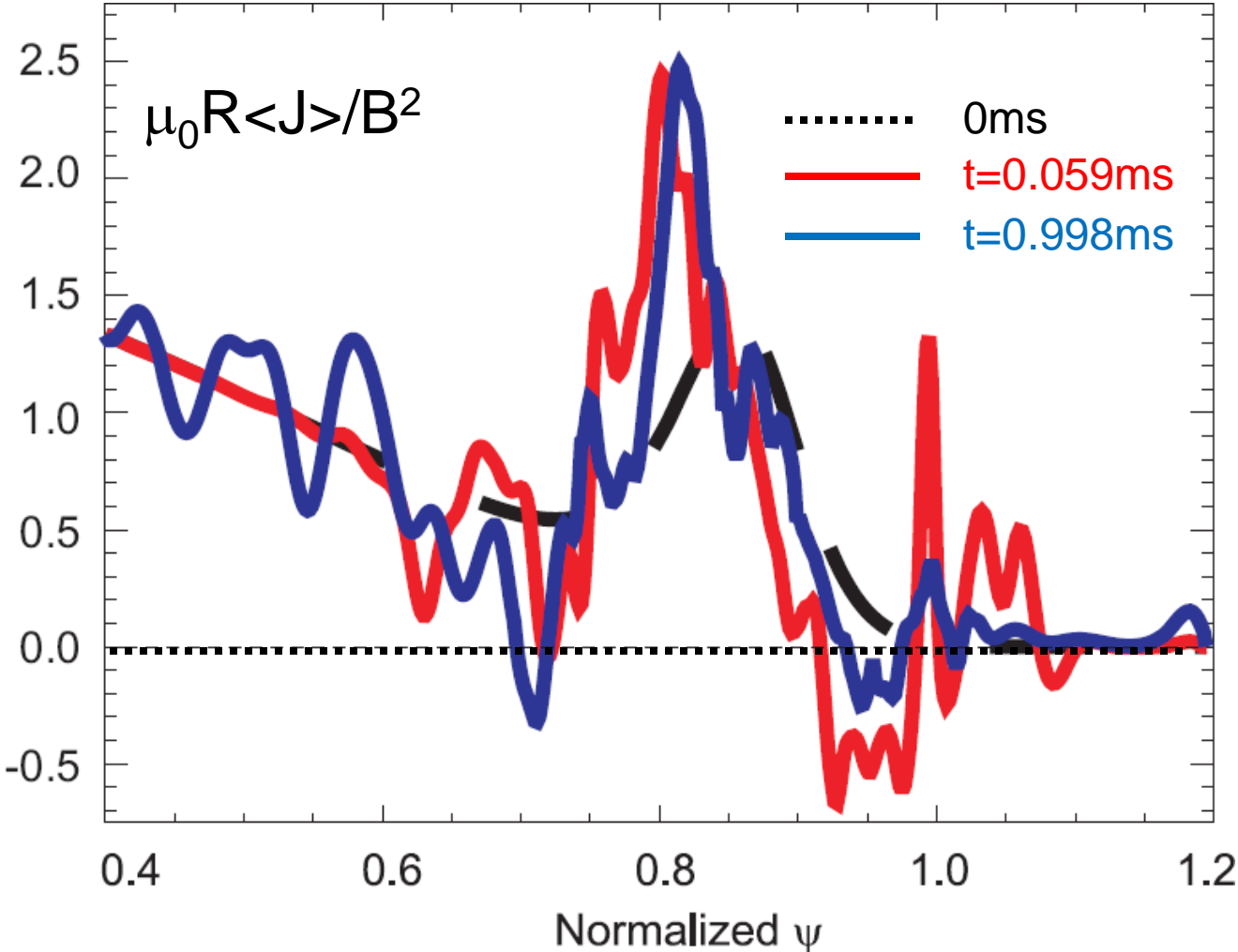
➤ Edge current larger than expected bootstrap current

After an ELM event, BOUT++ simulations show pedestal pressure profile almost restores with proper sources, but current profile remains high



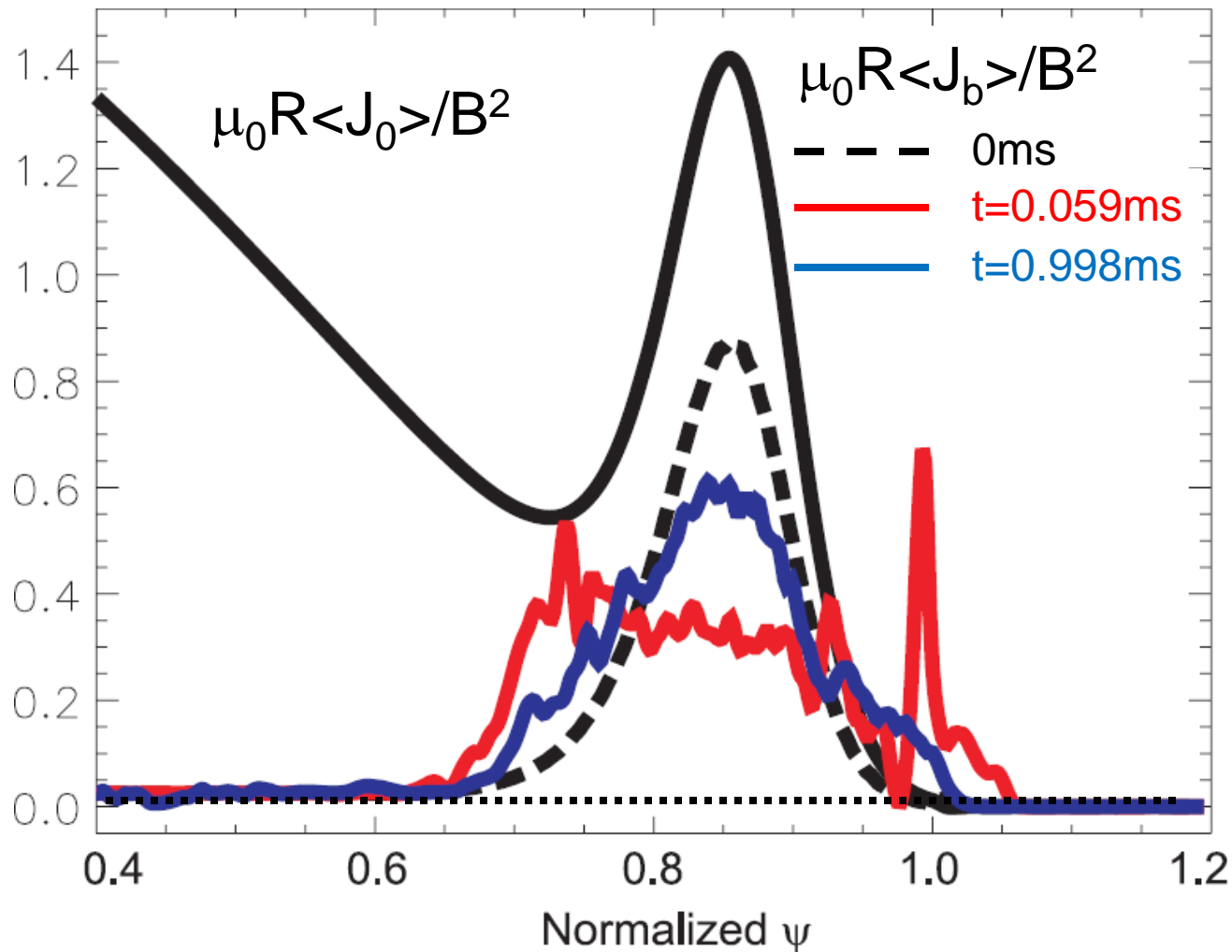
- ✓ $J_{||}$ is rising after the ELM
- ✓ Bootstrap current follows the pedestal pressure profile, collapsing and recovering

After an ELM event, pedestal pressure profile almost recovers with sources and sinks, but current profile is shifted inward and remains high

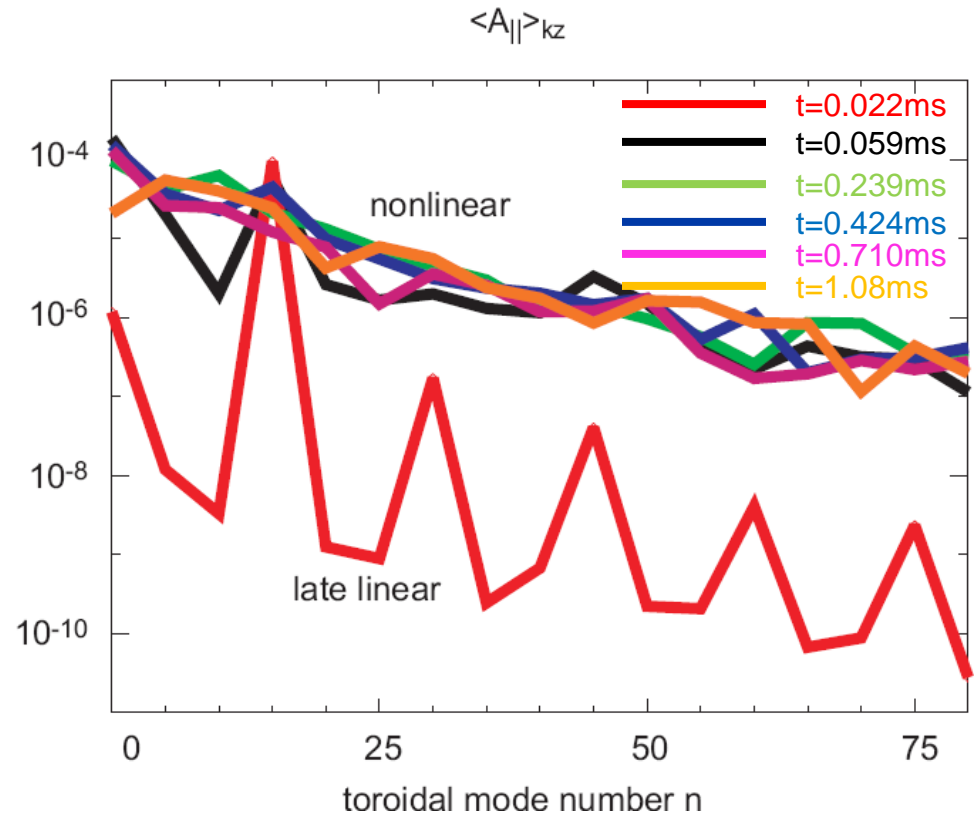
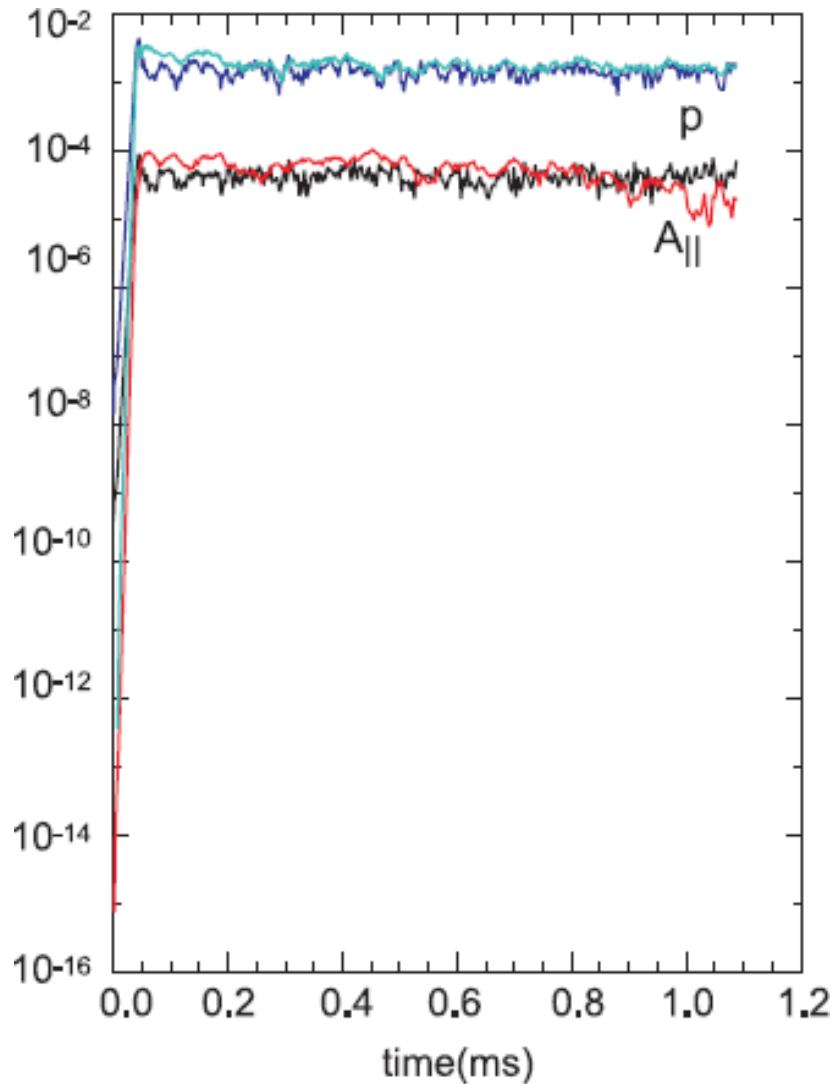


✓ Inductive current generated by ELM event, from zonal field

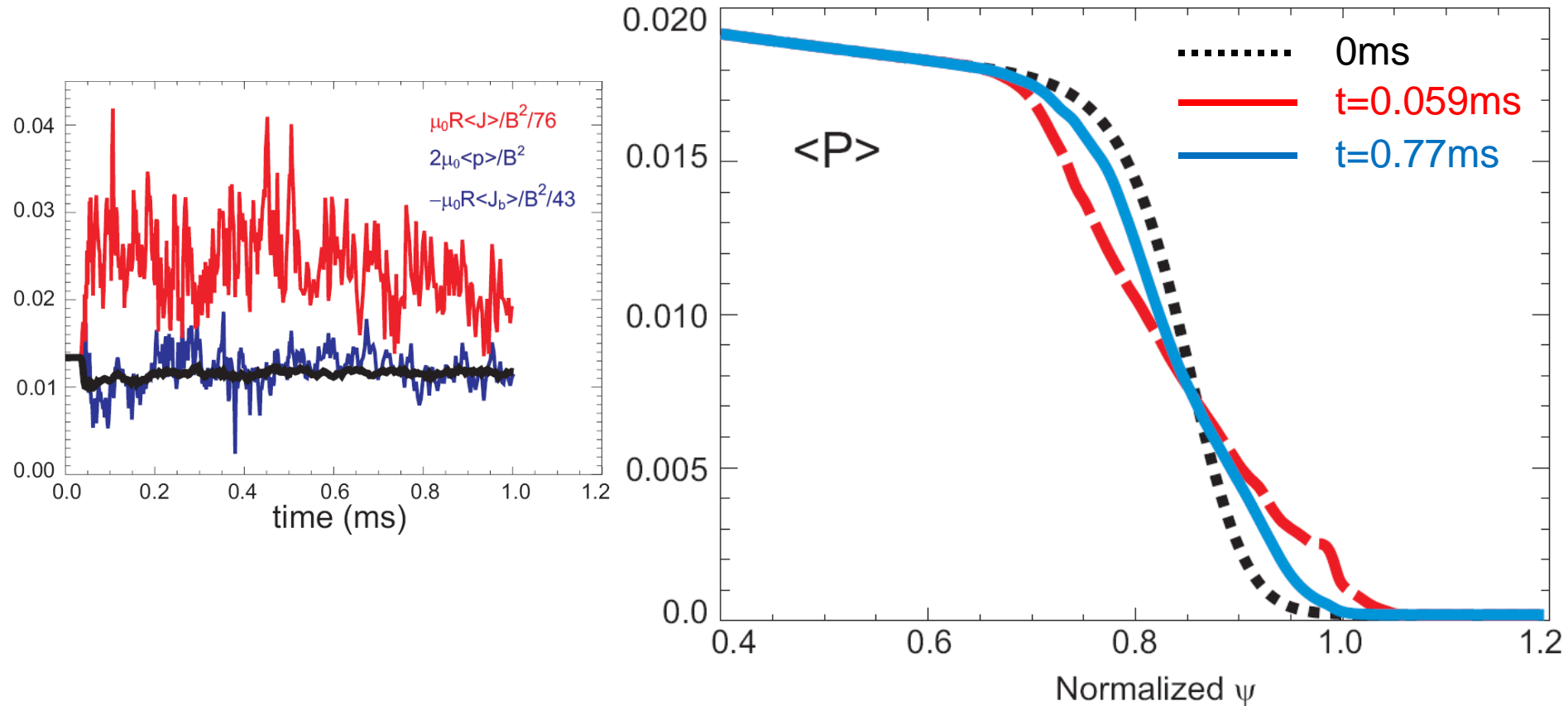
During an ELM event, bootstrap current follows pedestal pressure profile with sources and sinks, collapsing and recovering



During an ELM and in-between ELMs, zonal field is generated by nonlinear mode coupling



After an ELM event, pedestal pressure profile almost recovers with sources and sinks



✓ possibly maintain a state of peeling-balloon marginal stability

Summary

- ✓ MAST MSE measurements show that j_ϕ is *not affected by the occurrence of a type-I ELM*
- ✓ Our simulations show that it is due to the compensating inductive current from zonal field generated by an ELM event and relax slowly in-between ELMs in low collisionality regime.
- ✓ Bootstrap current follows the pedestal pressure profile, collapsing and recovering