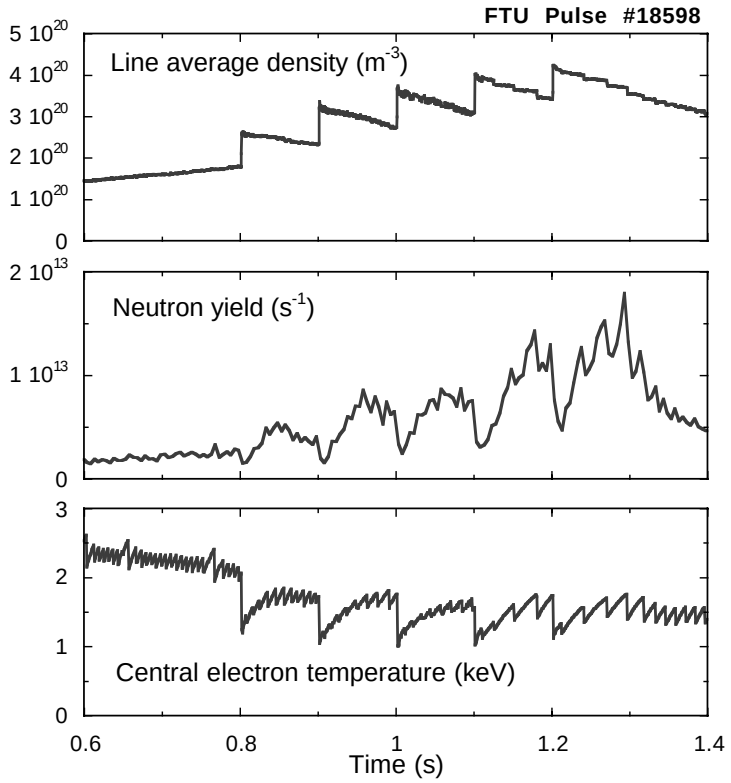
FTU vs IGNITOR

- Both compact high field devices
  - FTU 8T/0.9m IGNITOR 13T/1.3m
  - FTU is circular IGNITOR is elongated
- Similar density values with pure ohmic heating
- FTU has an inboard TZM toroidal limiter
- **What can we learn from the FTU experience ?**

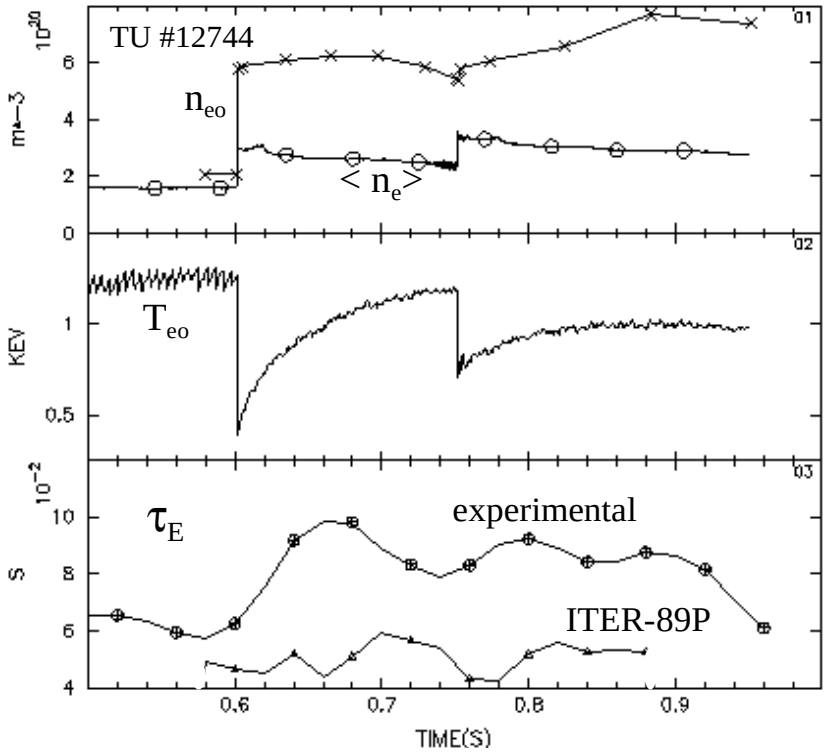
Quasi steady state confinement improvement at high current and high density achieved on FTU with multiple pellet injection

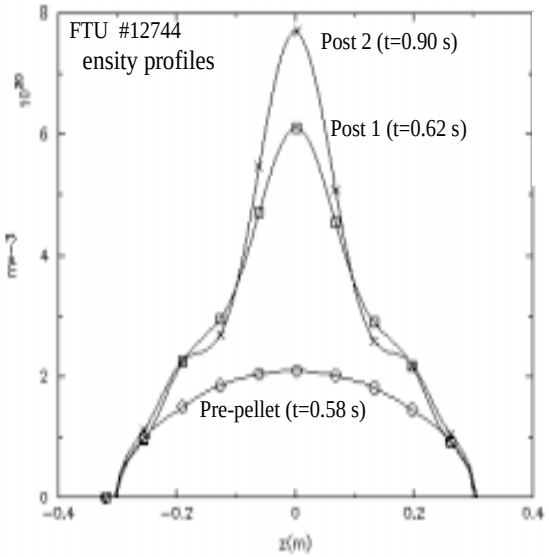


- 8T/1.25MA
- $T_e=T_i$
- Z_{eff} †1.3
- High neutron yield > 10^{13} n/s
- Change in turbulence spectra (in collaboration with Kurchatov Institute).

Vertical pellet injection in the next campaign (coll. with Consorzio RFX)

Deep fuelling needed to achieve improved confinement
Density peaking or m=1 suppression?





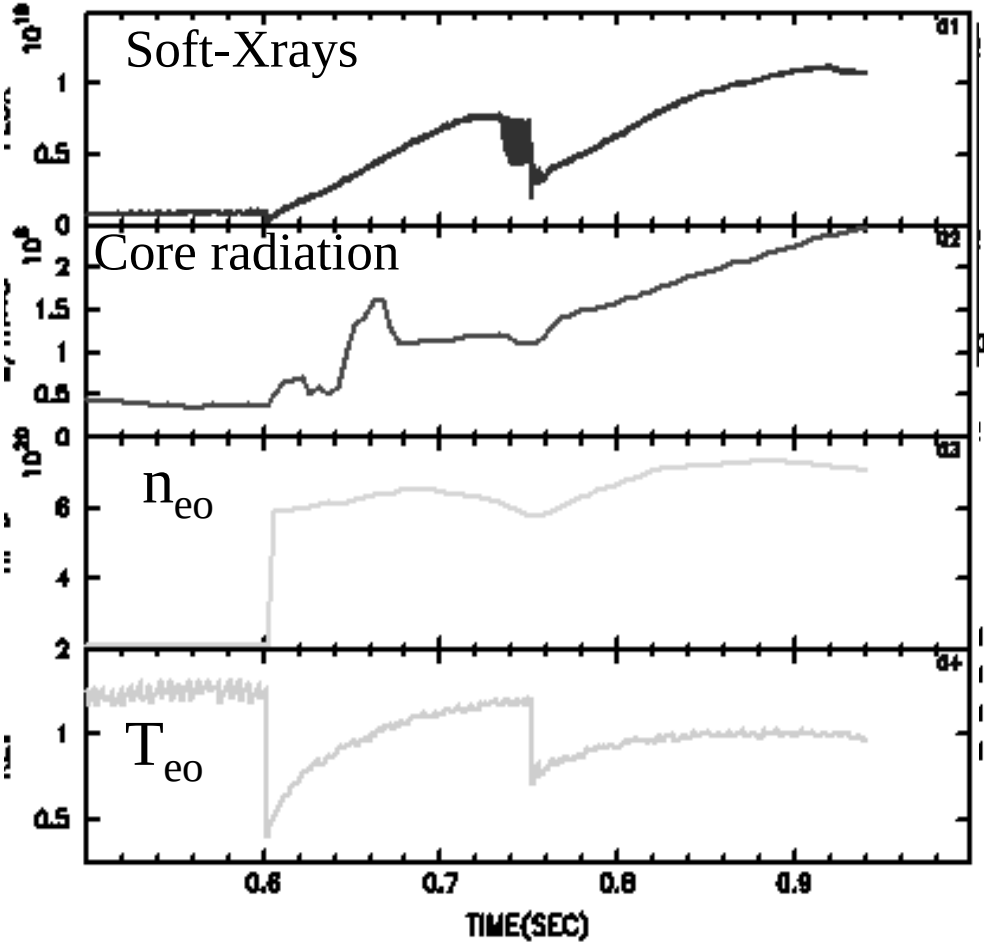
¥ Multiple, fast pellet injector (1.4km/s)

B=7T, I=0.8MA, τ_E=75ms, H_{89}=1.5, $nT\tau$=0.6 10^{20} m^{-3} keV s

Impurity accumulation (core radiation) depends critically upon sawtooth activity

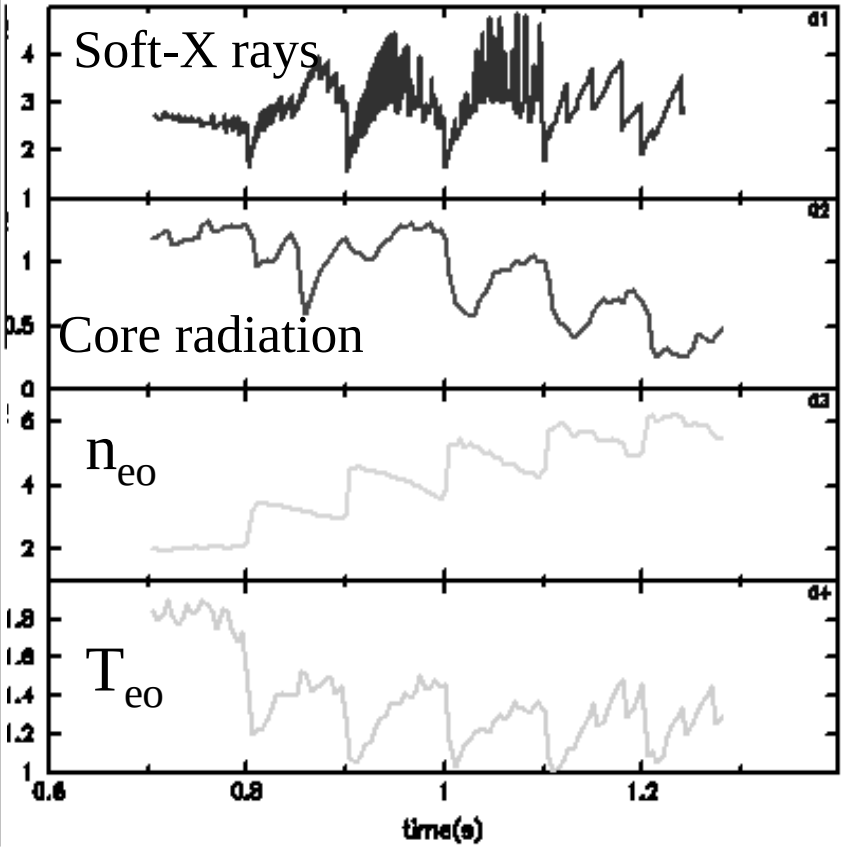
#12744 / 7T/ 0.8 MA

Sawtooth are stabilised

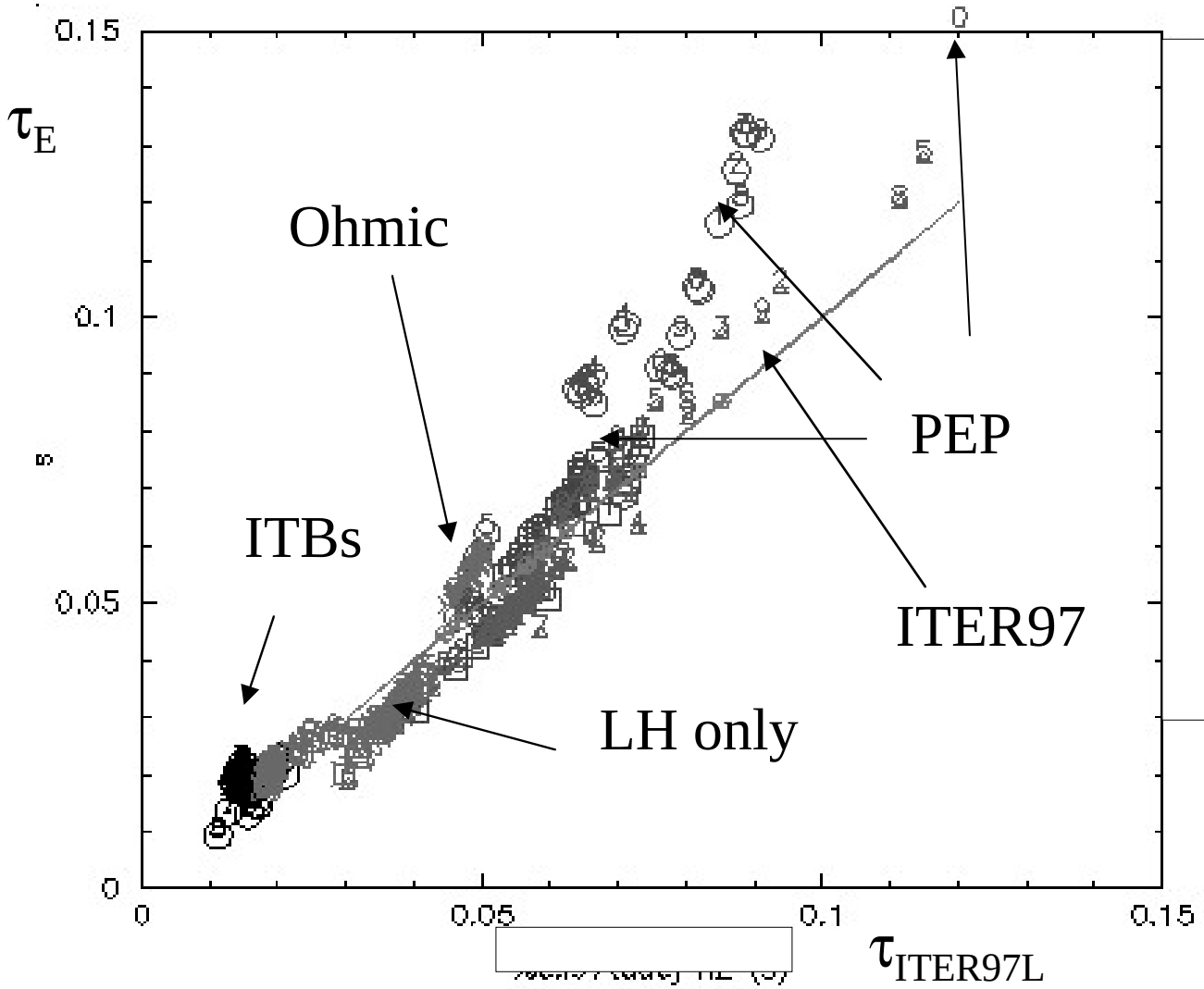


#18598 / 8T /1.2 MA

Sawteeth are only partially stabilis



Confinement higher than ITER97L scaling achieved only transiently ($t \sim 0.5\ \tau_E$) with pellets on FTU



Best stationary confinement in agreement with ITER97L scaling

Extrapolation FTU-IGNITOR

- Best FTU confinement is in line with ITER97 scaling. Improvements only transient so far (duration ¯ $0.5\tau_E$)
  - Can H97>1 be achieved in steady state?
- Peaked density profiles achieved with a target temperature <2keV. Pellets reach q=1 surface.
  - Density peaking by pellet injection above 4keV?
- Low MHD activity needed for good confinement but delayed sawteeth are needed to avoid impurity accumulation.
  - Sawteeth must be controlled but not avoided
- Pellet on the current ramp failed so far to achieve confinement improvement.
- FTU pellet discharges have very high collisionality. At high collisionality the beneficial effect of density peaking is stronger due to the small trapped electron drive.