



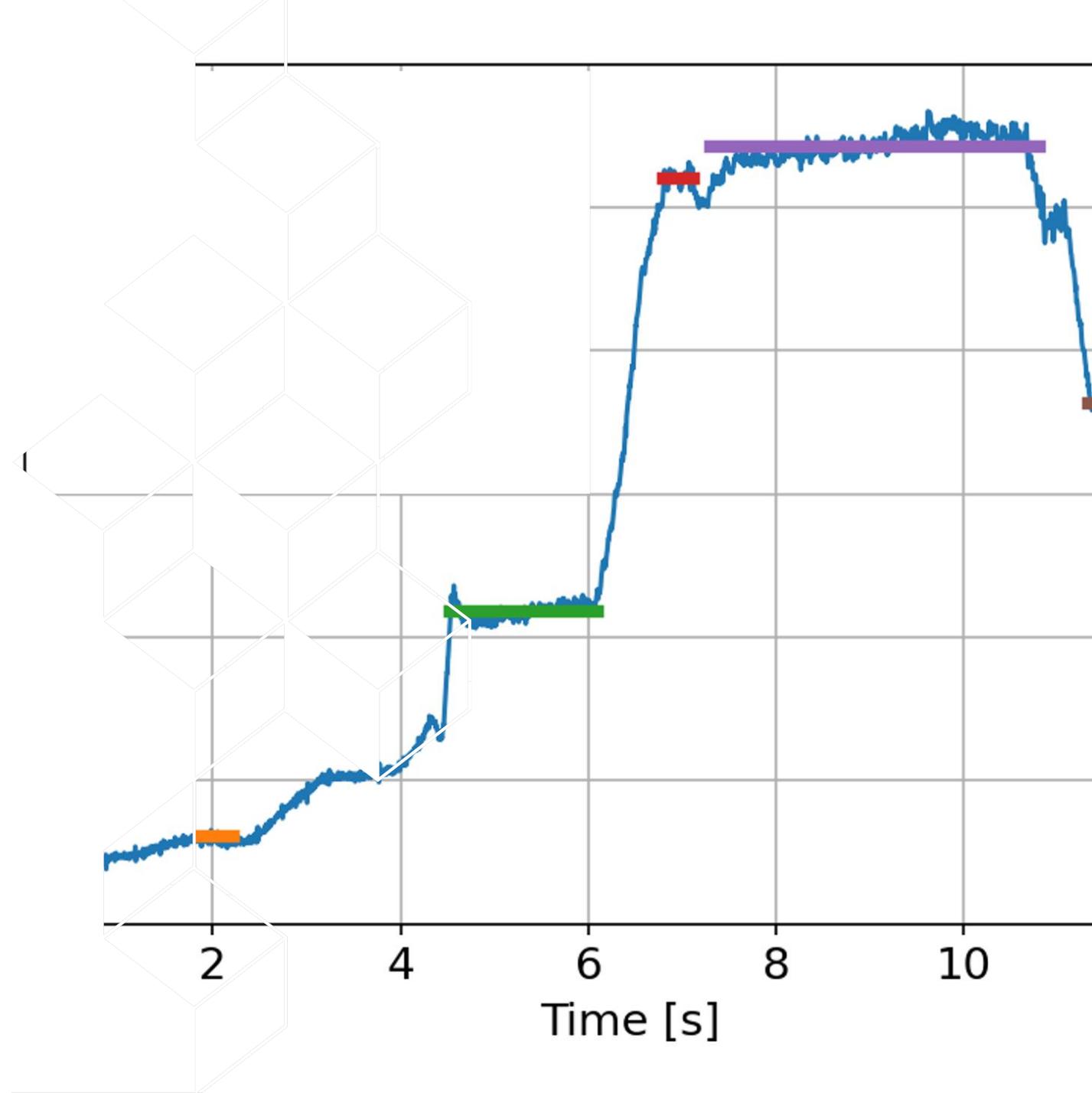
irfm



Flattop identification tool

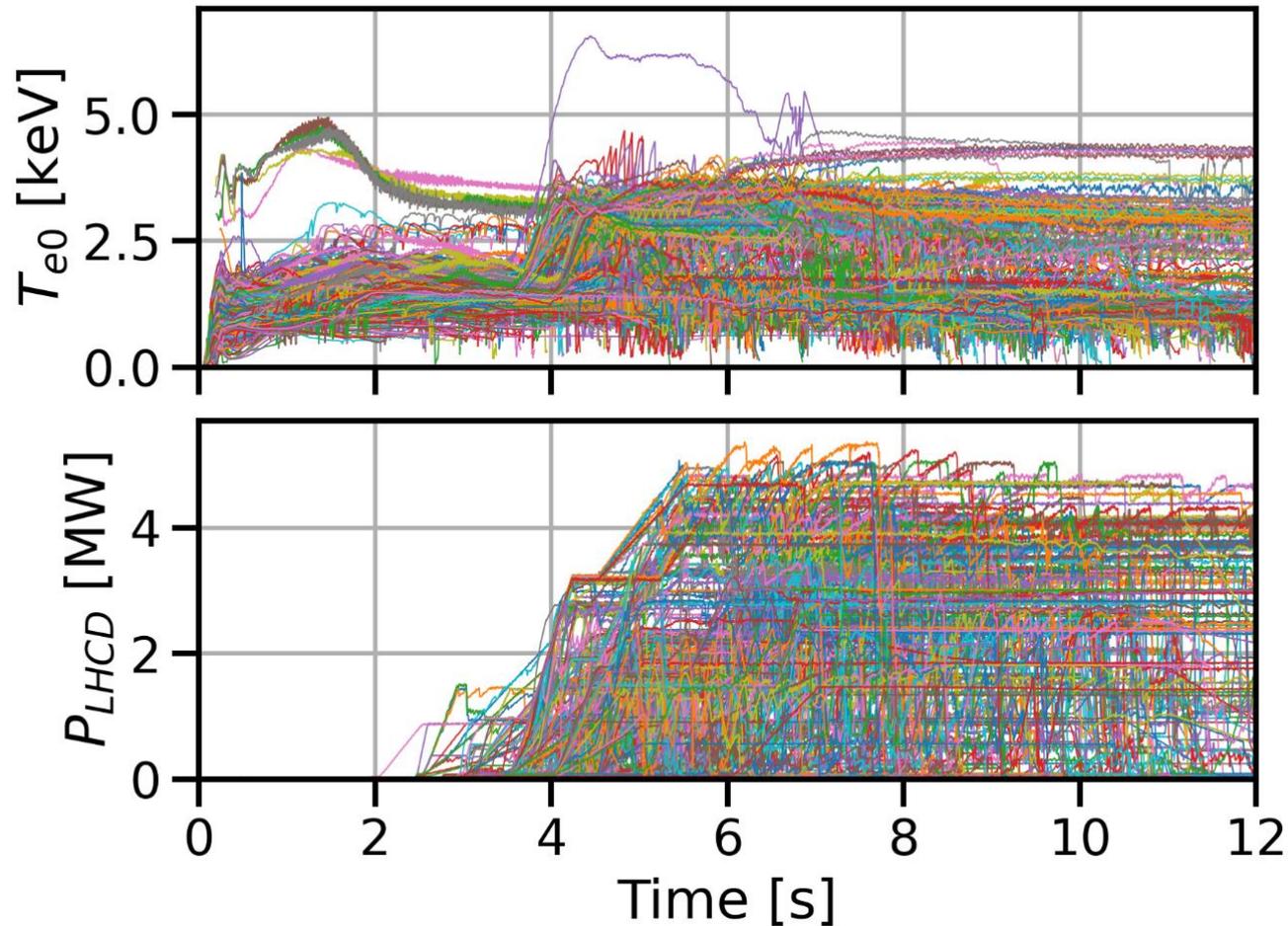
J. Morales

DMP meeting 04/03/2026



How efficiently analyze entire experimental campaigns?

Example: 764 pulses from C4 campaign



To efficiently characterize several campaigns: development of a numerical tool for **plateau detection on 1D signals**

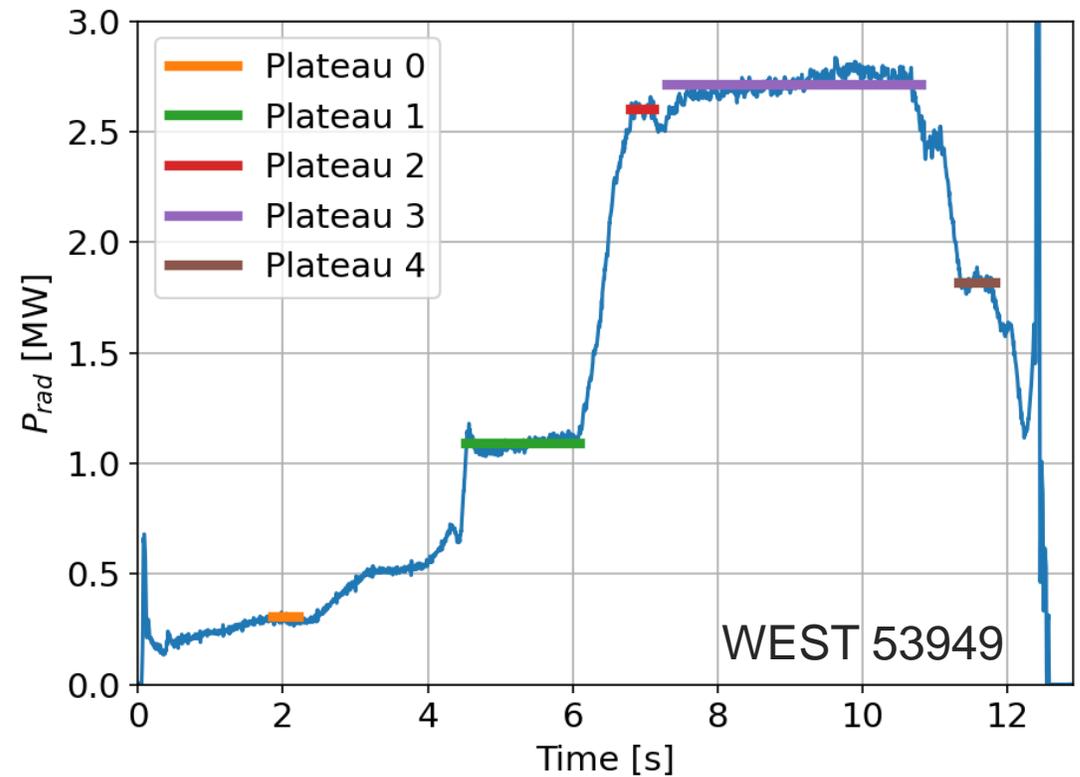
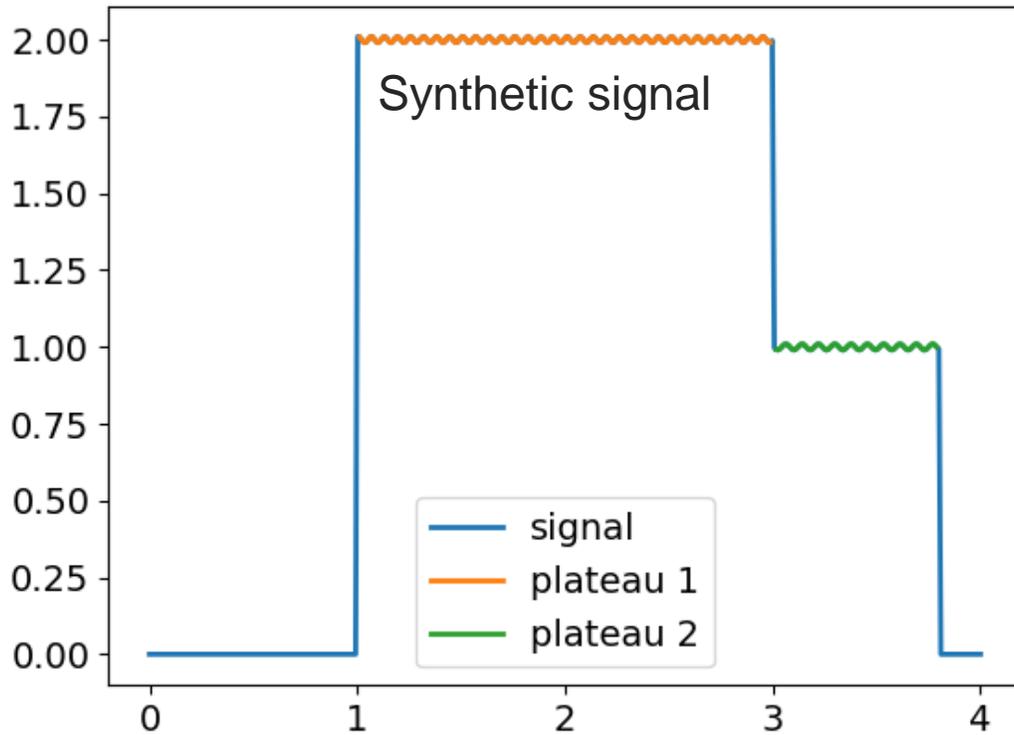
This tool allows to characterize one pulse by a **small number of values**:

1D signal

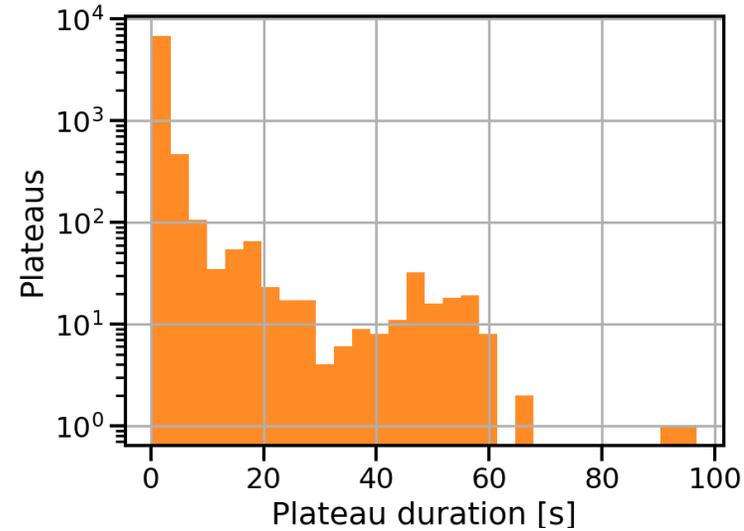
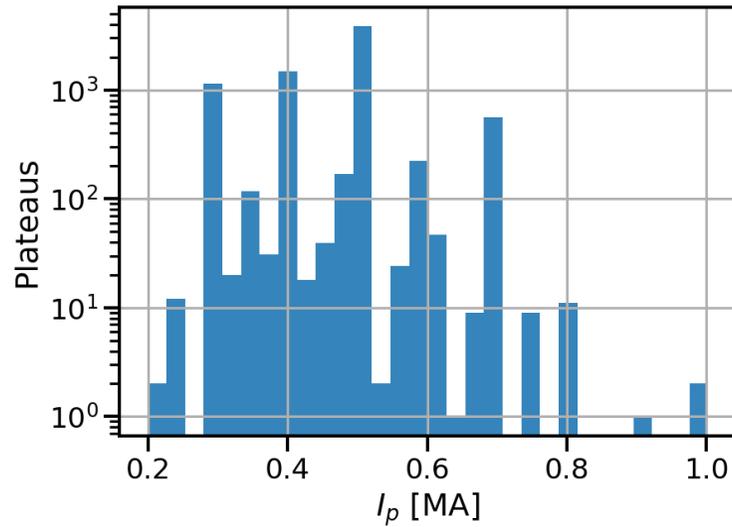
Plateau values:
duration, mean,
standard
deviation...

Plateau detection

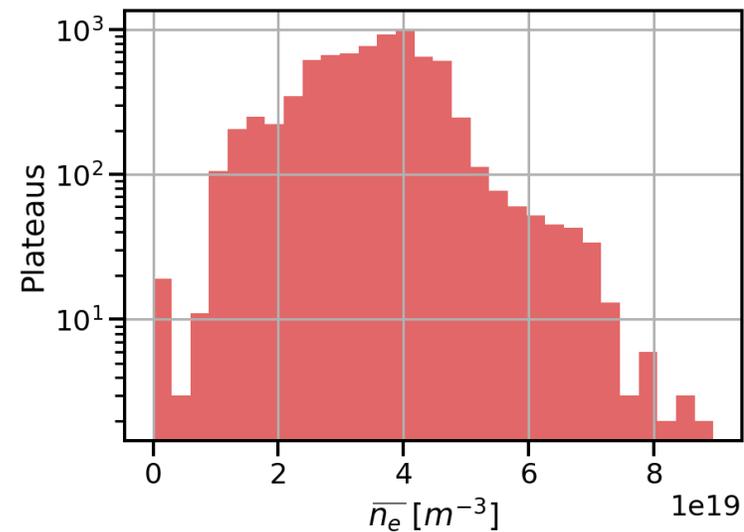
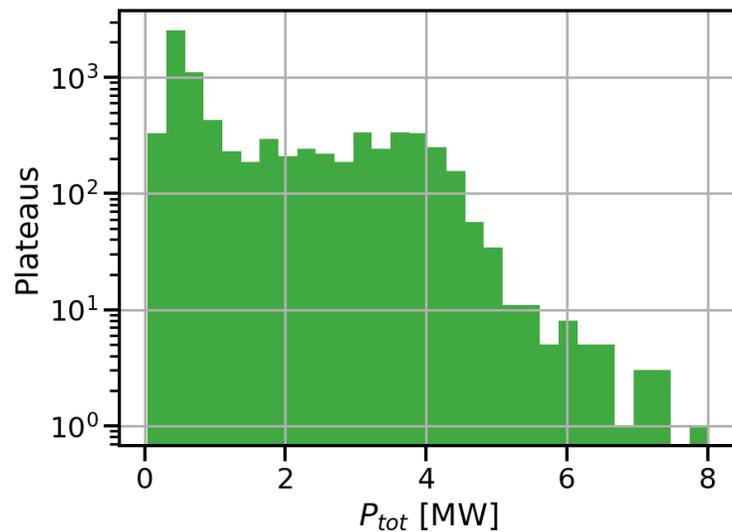
- Plateaus (quasi-steady states) are **detected automatically**
- **Code available (open source) at:**
https://github.com/IRFM/signal_plateau_recognition



Example: WEST data

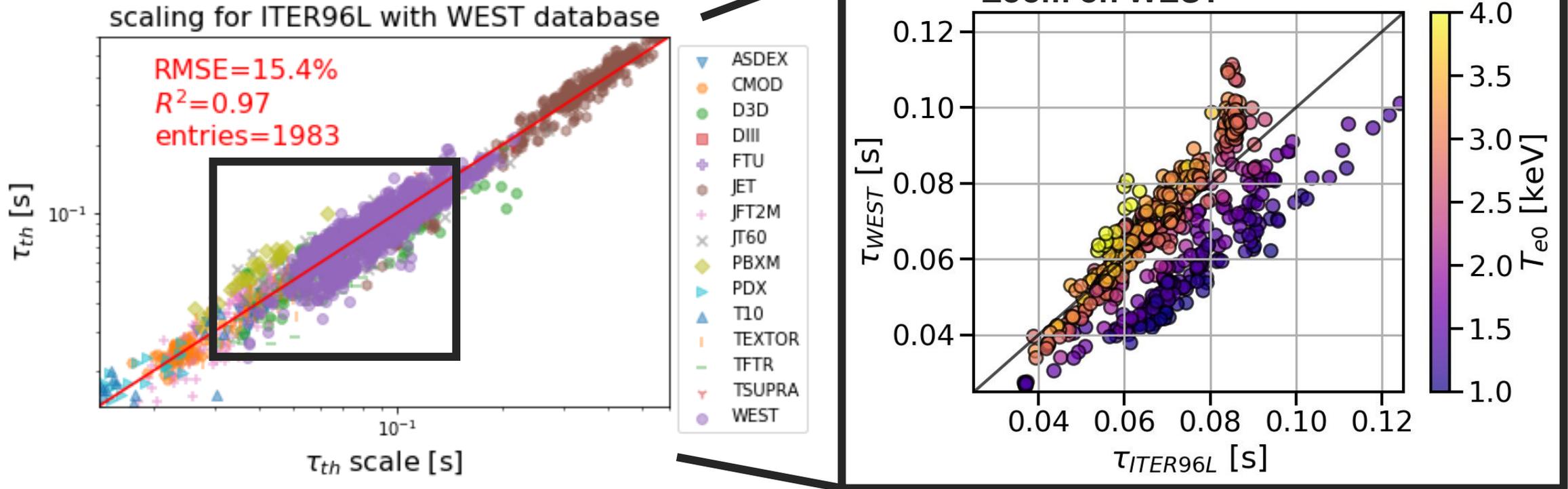


Database includes more than 2000 quantities (as I_p , P_{tot} ...)



Histogram data: mean quantities in identified plateaus during WEST C4 to C7 campaigns

Identification of plasma states, example: hot and cold branches in WEST



$$\tau_{ITER96L} = 0.023 I_p^{0.96} B^{0.03} P^{-0.73} n_e^{0.4} M^{0.2} R^{1.83} \epsilon^{-0.06} k^{0.64} \text{ [Kaye, NF, 1997]}$$

- Using **plateau averaged quantities**, we find WEST confinement time in L mode **well aligned with ITER96L scaling law**
- Two confinement regimes** (clusters) are observed, they are strongly correlated with central temperature (T_{e0}), we call them: **hot and cold branches**

[Ostuni, NF 2022]
 [Bourdelle, NF 2023]
 [Morales, NF 2025]

Summary

Open-source flattop identification tool

- **Repository:** https://github.com/IRFM/signal_plateau_recognition
- **Key features:**
 - Enables rapid visualization and statistical analysis of entire experimental campaigns
 - Routinely deployed in **WEST** as part of the plasma reconstruction chain:
 - Automatically identifies **power** and **plasma current plateaus**
 - Computes and archives statistics for **more than 2000 parameters** in a reduced database
- Can serve as a basis for advanced **AI/ML** applications leveraging the reduced database