



RE-Driven Instability Monitoring at Start-Up

Proponents and contact persons:

William Bin and Daria Ricci

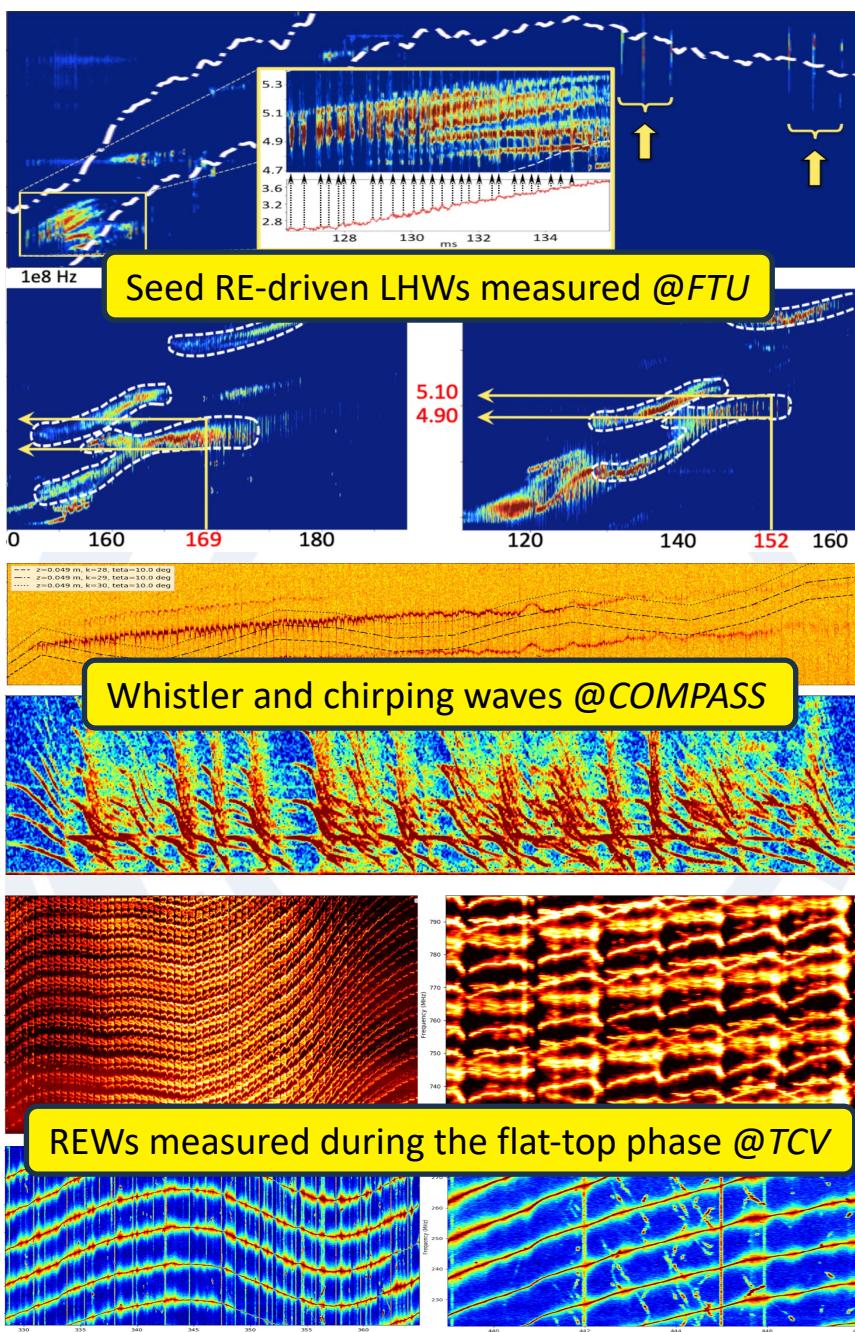
(william.bin@istp.cnr.it, daria.ricci@istp.cnr.it)

Scientific Background

- In ITER, **RE generation could affect plasma initiation phase with EC injection even at high pre-fill gas pressure**
[Yong-Su Na et al., *Nucl. Fusion* **65** 093001 (2025)]
- In JT-60SA, during IC and OP1, experimental evidence shows presence of RE during ECRH assisted start-up in both FNC and TPC.
- **RE-driven waves** excited already at the beginning of the pulse, opening the way for monitoring seed REs formation at the early plasma stage
[W. Bin et al., *Phys. Rev. Lett.* **129** 045002 (2022)]

Objectives

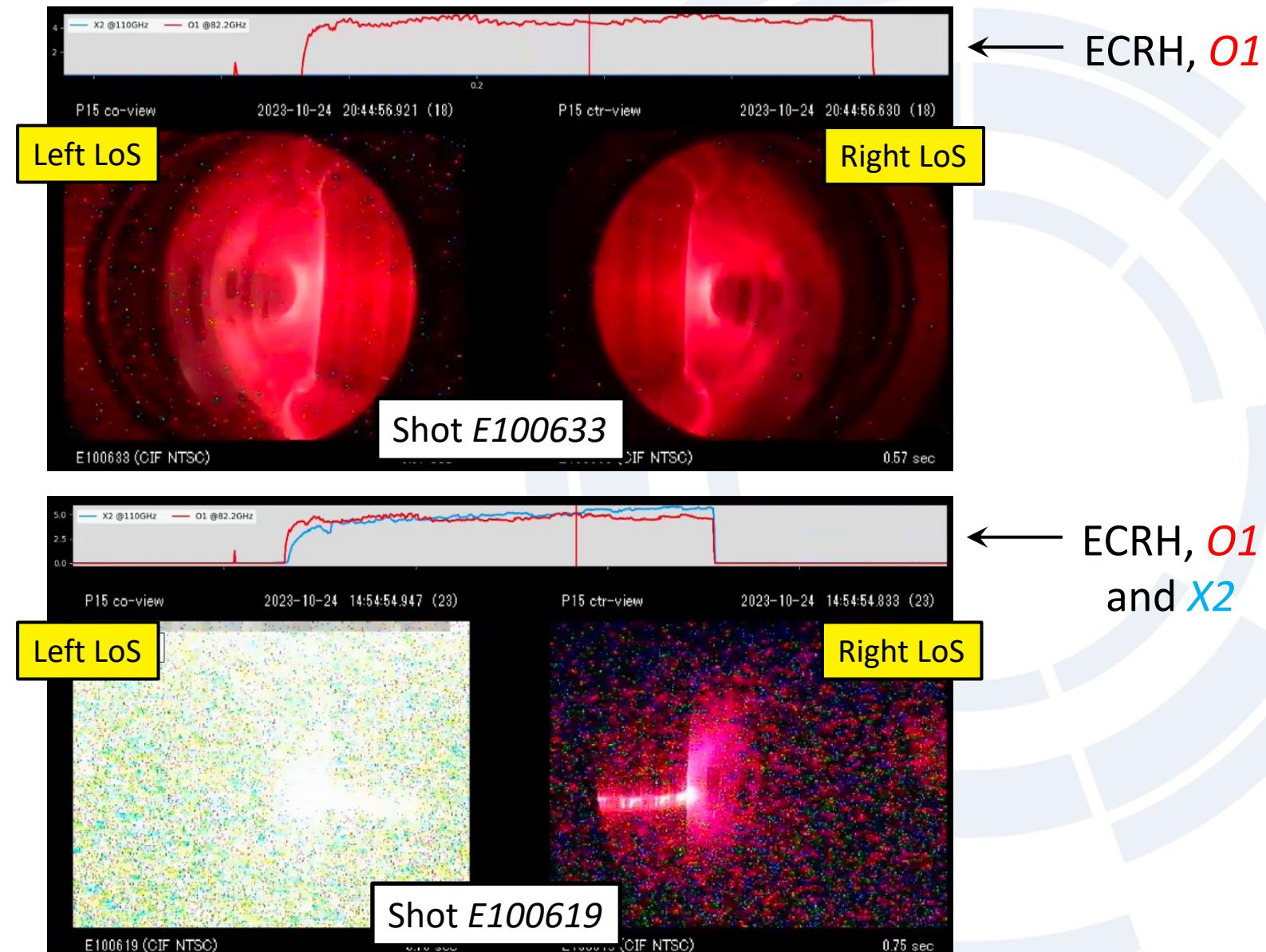
- Investigate RE dynamics through **monitoring RE-driven instabilities during start-up phase**, in both FNC and TPC → only Neutron Detector and EDICAM available during OP2
- Develop a **monitoring system for seed RE conditions** based on detection of RE waves
Detection can be very sensitive even during the early ramp-up phase
[W. Bin et al., *Rev. Sci. Instrum.* **93** 093516 (2022)]
 - Measurement of RF emissions by instabilities can be attempted even using an ex-vessel antenna system, with no interaction with the plasma or the vessel → straightforward measurement





Video Recordings during the Ramp-Up Phase @JT-60SA

During the ramp-up phase of several shots carried out in the *Integrated Commissioning* phase of JT-60SA, multiple indications of RE were observed using both the Japanese video camera system and *EDICAM*.



Piggyback RF measurements with an antenna system **could support the comparison of RE dynamics and activities during the breakdown and ramp-up phases of different discharges.**