

# Statistical analysis of RIC profiles

E.Seliunin<sup>1</sup>

<sup>1</sup> Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade Técnica de Lisboa, Portugal

Instituto de Plasmas e Fusão Nuclear  
Instituto Superior Técnico  
Lisbon, Portugal  
<http://www.ipfn.tecnico.ulisboa.pt>



**ipfn**  
INSTITUTO DE PLASMAS  
E FUSÃO NUCLEAR

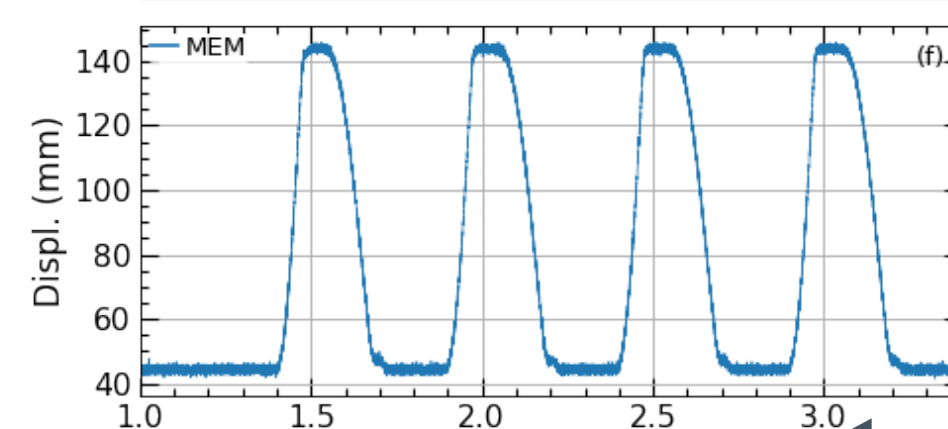
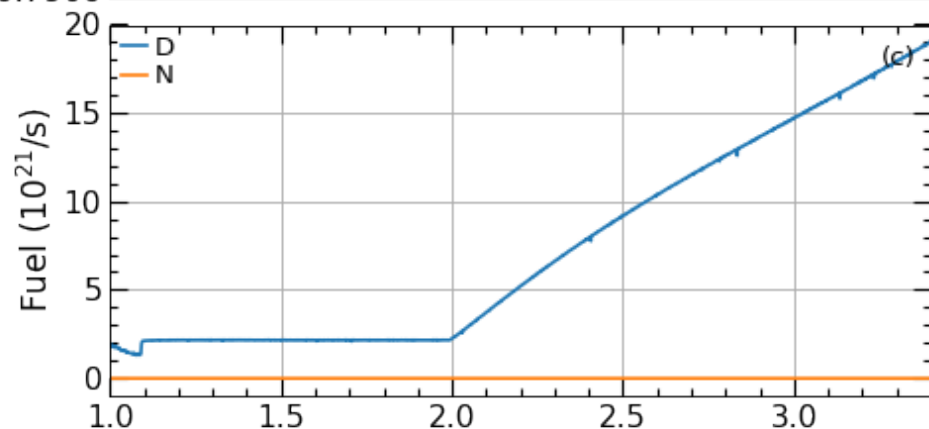
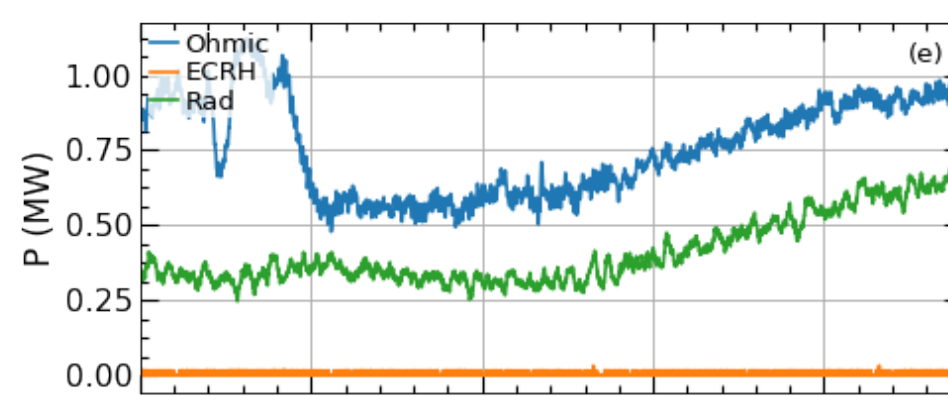
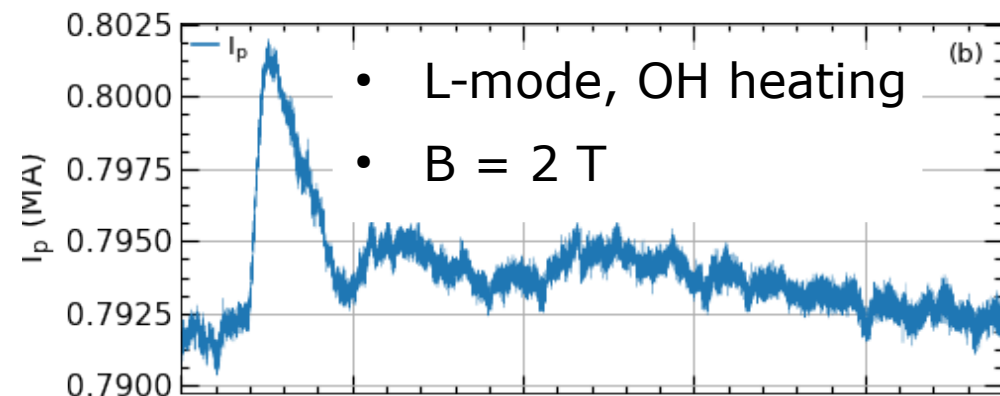
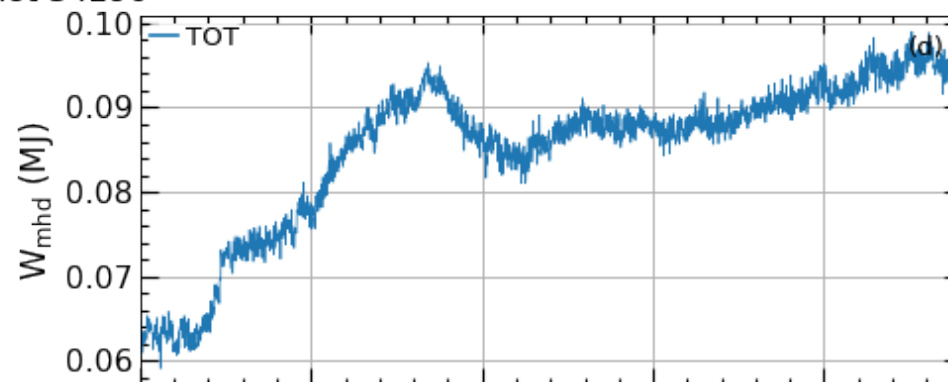
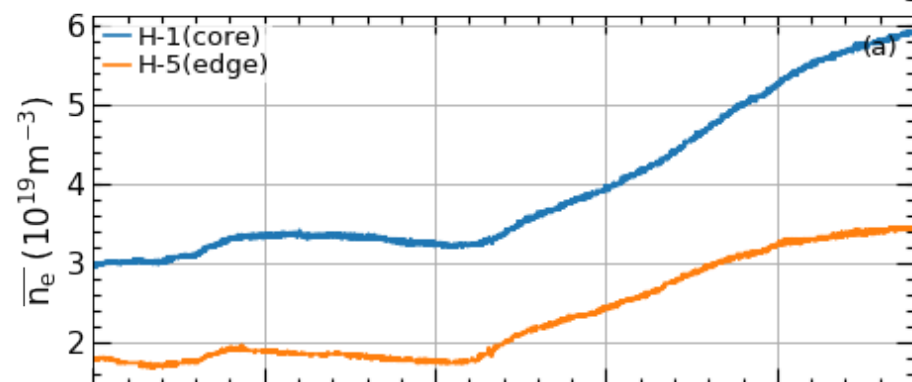
The data of X-mode reflectometry system (RIC) from shots #34100 - 34118 was lost.

The analysis is performed on the discharge #34290 with parameters, close to the conditions of the discharge #34103.

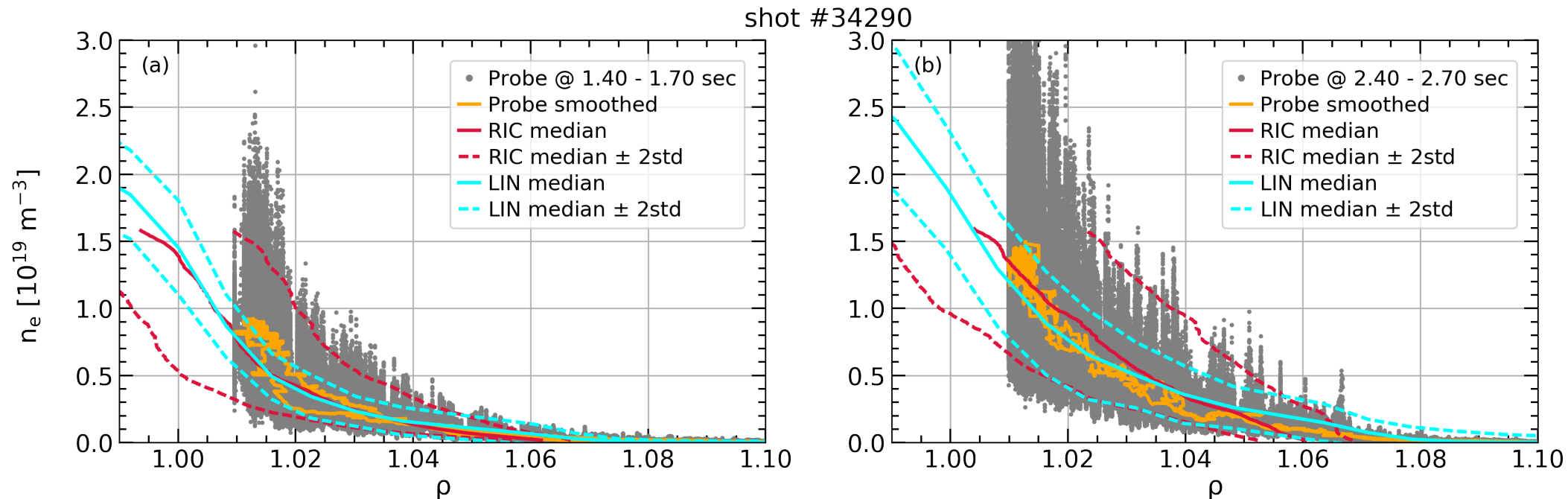
- Comparison of profiles, obtained from RIC, lithium beam (LIN) and Langmuir probes.
- Evidence of shoulder formation in RIC profiles.
- Statistical analysis of RIC profiles.



shot 34290

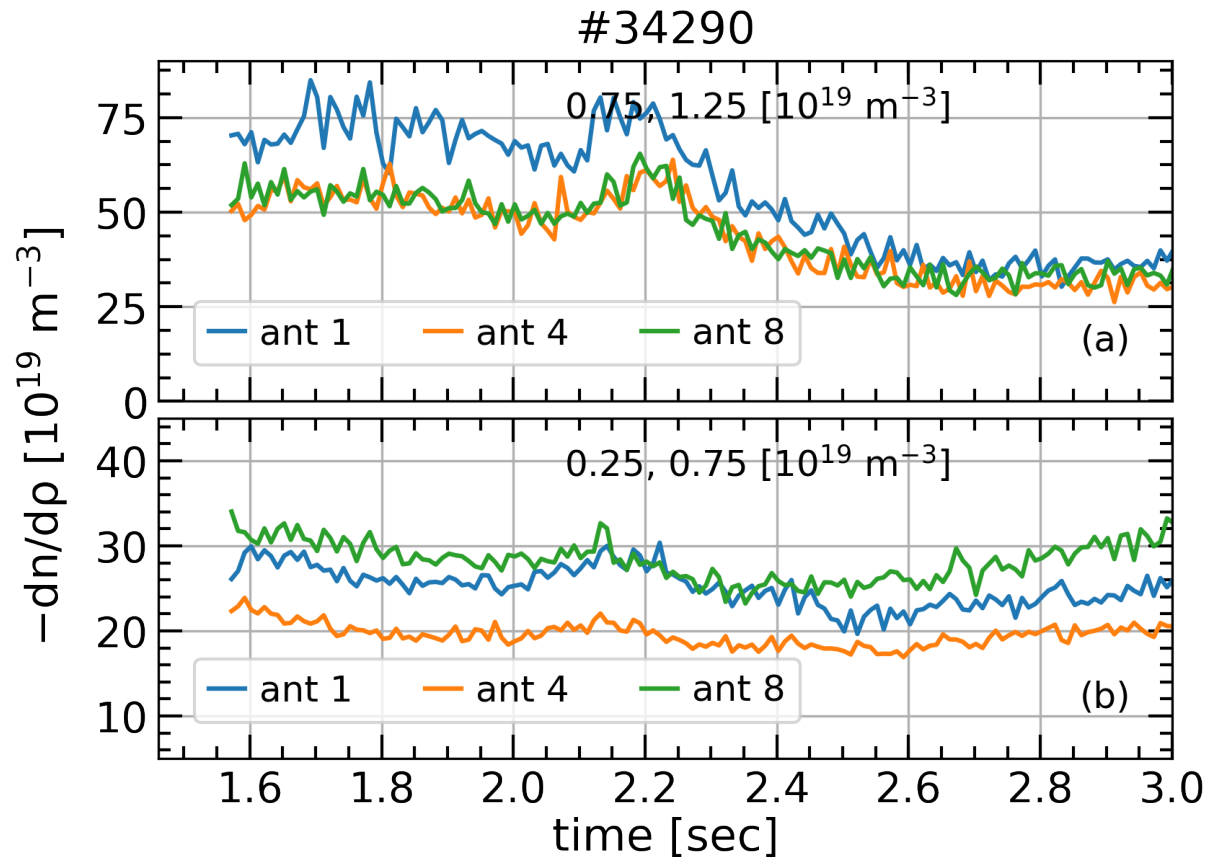


Time (s)



- **RIC** and **LIN median** profiles are in a good agreement with smoothed probe profile.
- **RIC median  $\pm$  2std** represents the impact of filamentary activity in plasma profiles.
- Large events seem not to have influence on RIC profiles

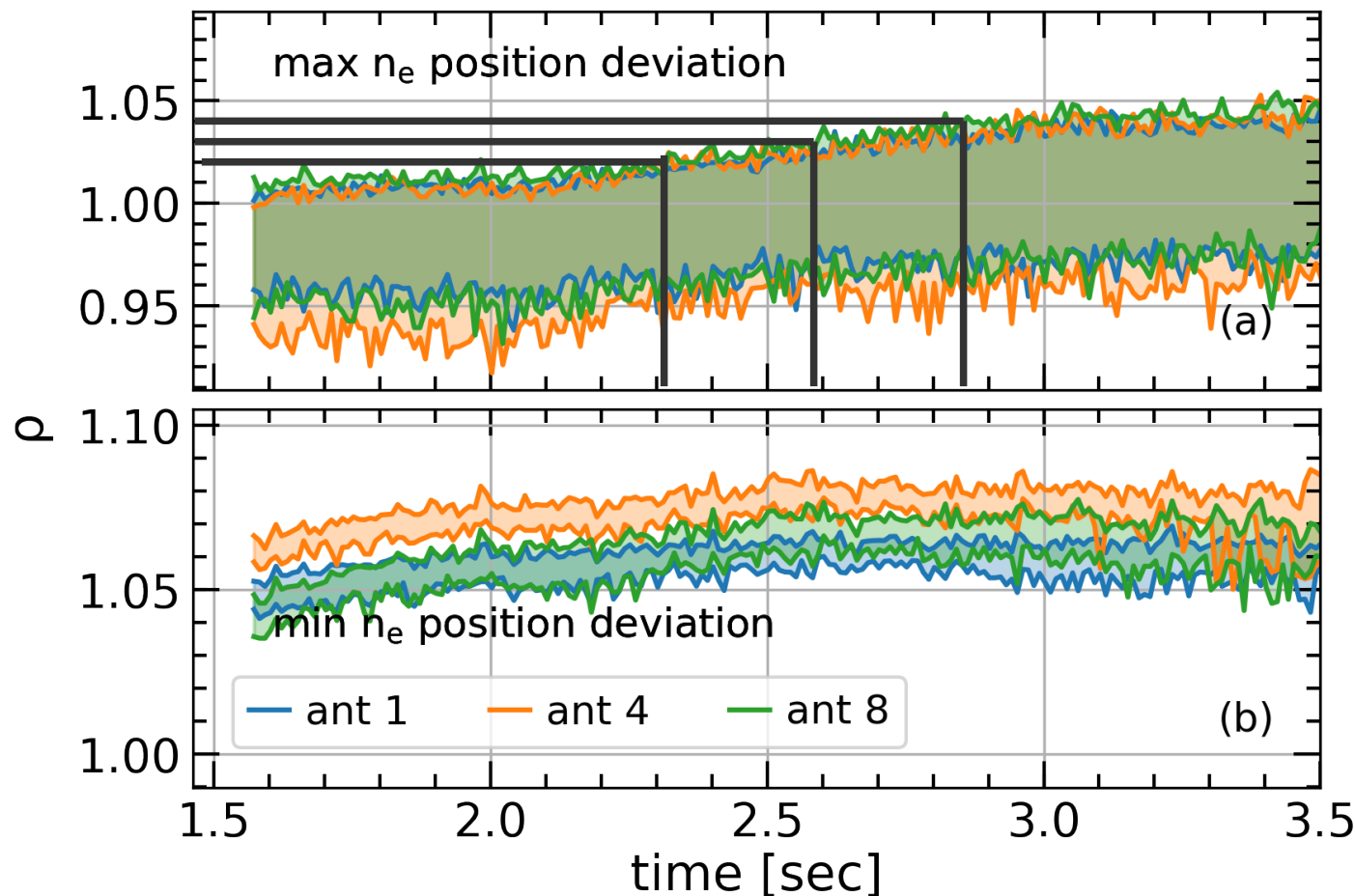




The profile flattening appears at  $n_e = 3.34 \times 10^{19} \text{ m}^{-3}$ , similar to the high density transition (HDT) density, reported in *Caralero et al, Nucl. Fusion 54 (2014) 123005*.



Reflectometry measures  $\rho(n)$  rather than  $n(\rho) \rightarrow$  variation in  $\rho$   
#34290

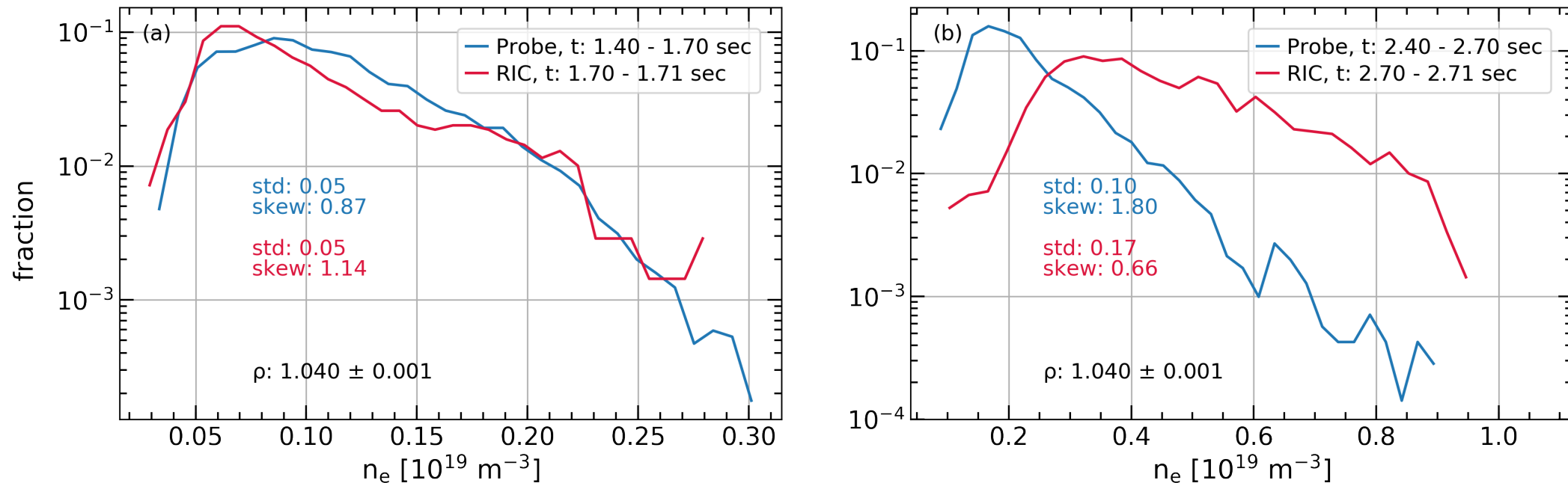


To get accurate statistics on density variation, the proper position ( $\rho$ ) should be chosen.

$\rho=1.04$  is a good candidate for statistical analysis.

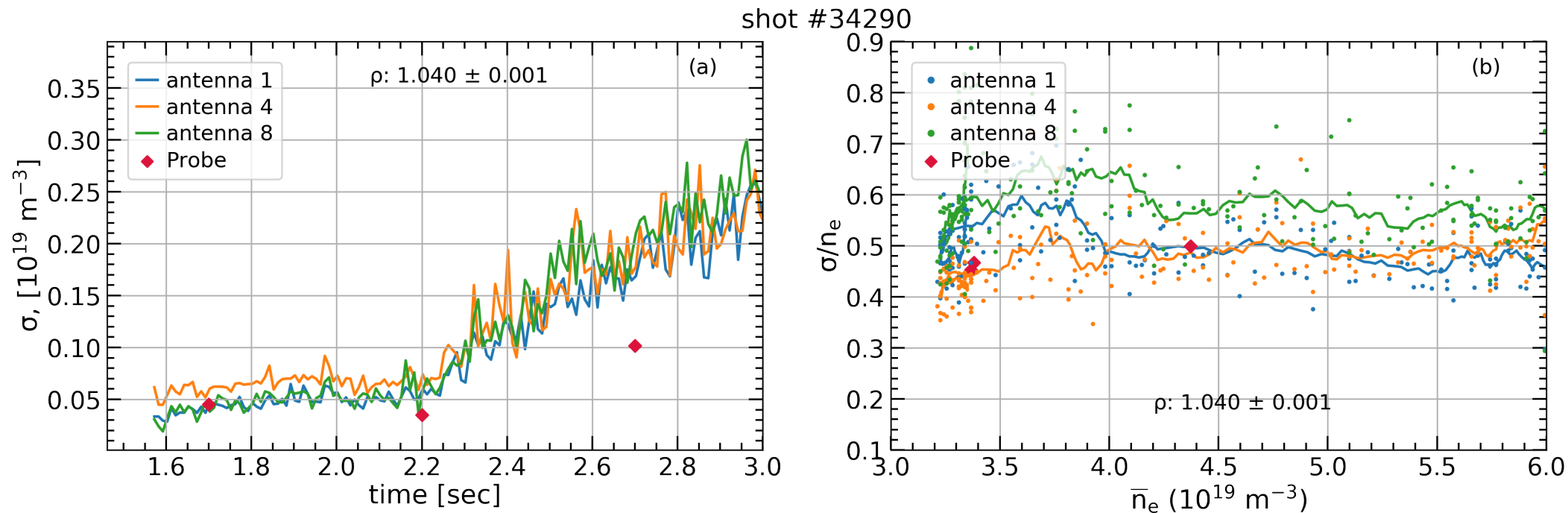


shot #34290



- The PDF of RIC profiles in density shows a good agreement with probe in low filamentary active plasma.
- In high filamentary active plasma the PDF of RIC is different from PDF of probe.





- The std start to rise at 2.2 sec, corresponding to HDT and to increase of filamentary activity.
- The std of RIC profiles rises faster, than the std of probe.
- The fluctuation level remains equal to 50-60% with changes in core density both in RIC and probe profiles.





## Conclusions:

- RIC, LIN and probe profiles are in a good agreement.
- RIC profiles indicate the profile flattening at HDT.
- RIC does not see events with high amplitude.
- RIC profiles are strongly affected by filamentary activity and show faster growth of std than probes.
- The fluctuation level remains equal to 50-60% with changes in core density estimated both from RIC and probes.

## Future work:

- For validation of the method more L-mode discharges with different parameters ( $I_p$ ,  $B_T$  etc.) will be analyzed (more shots are required).
- The analysis will be extended to H-mode.





