

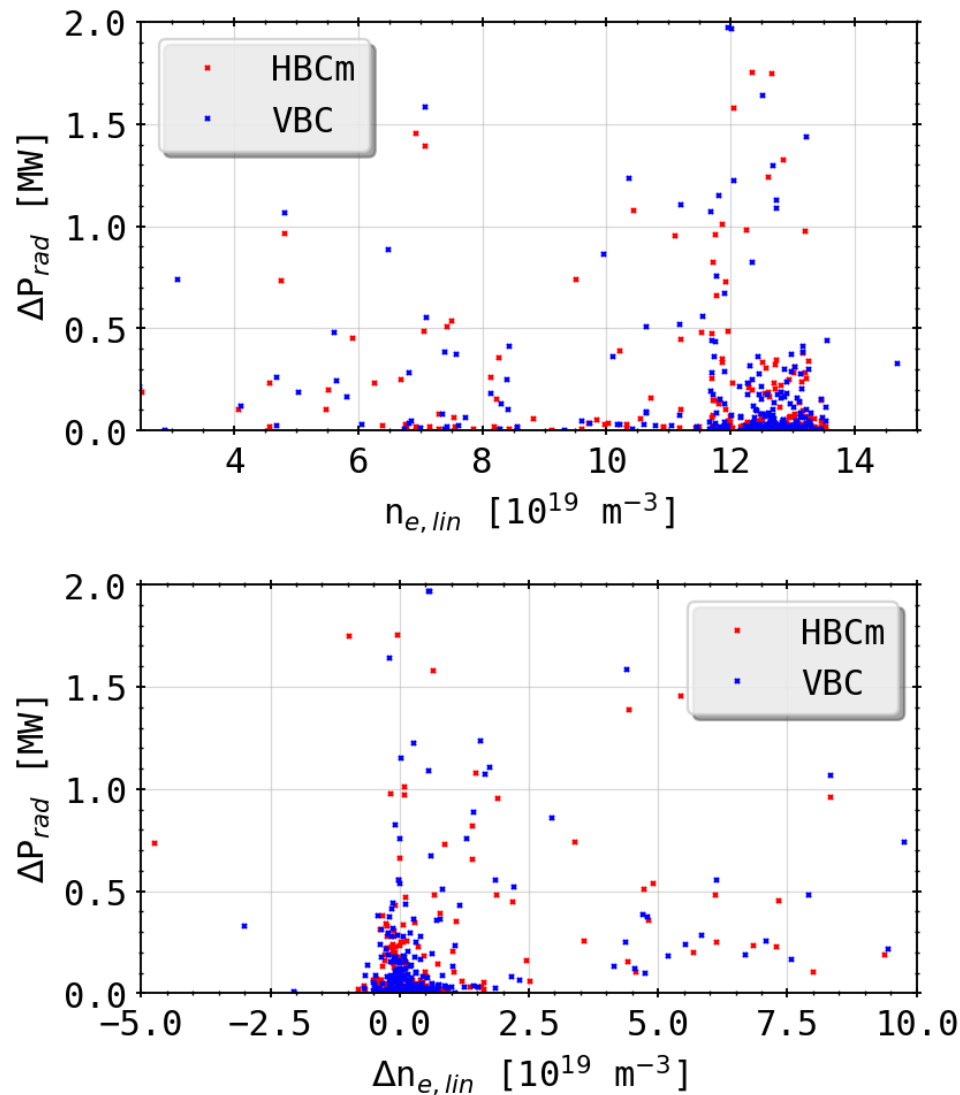
Report 11/27/2020

P. Hacker

HELMHOLTZ
SPITZENFORSCHUNG FÜR
GROSSE HERAUSFORDERUNGEN

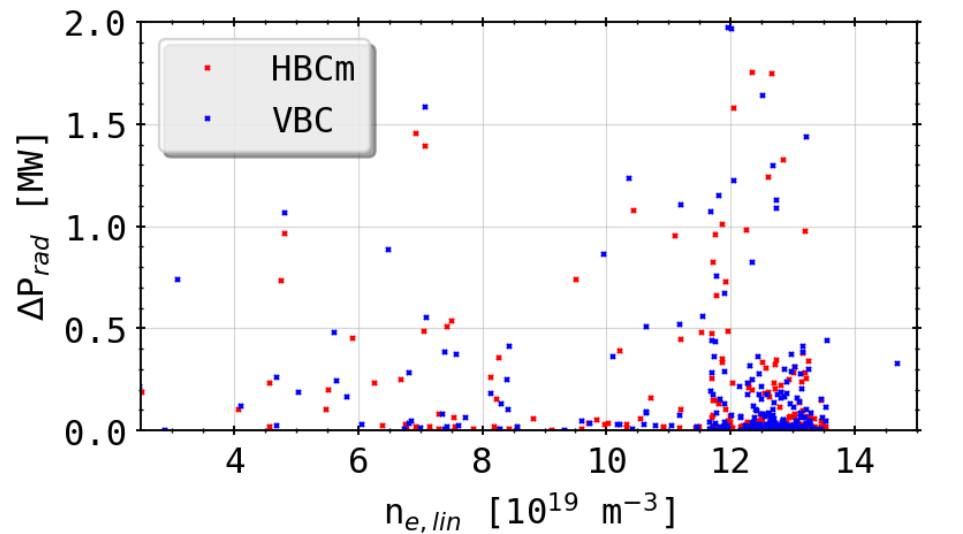


This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

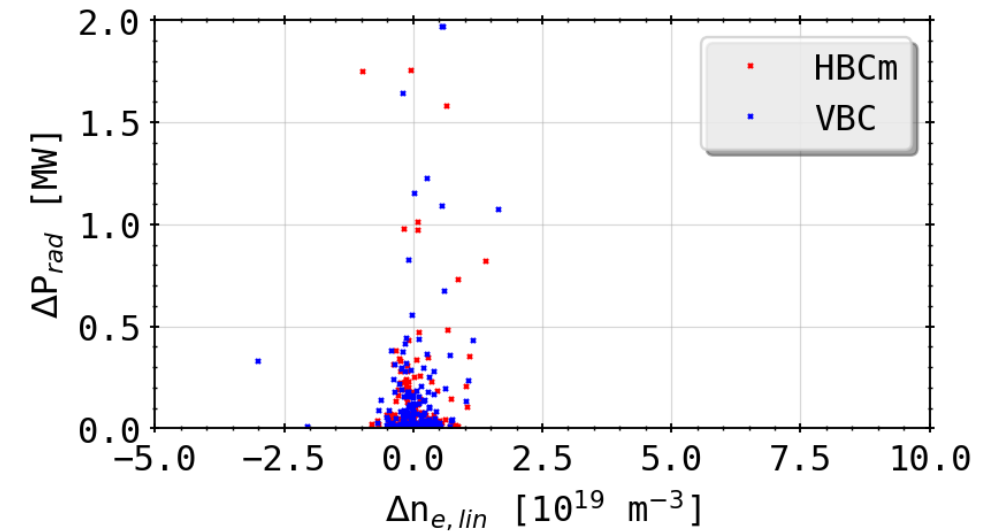
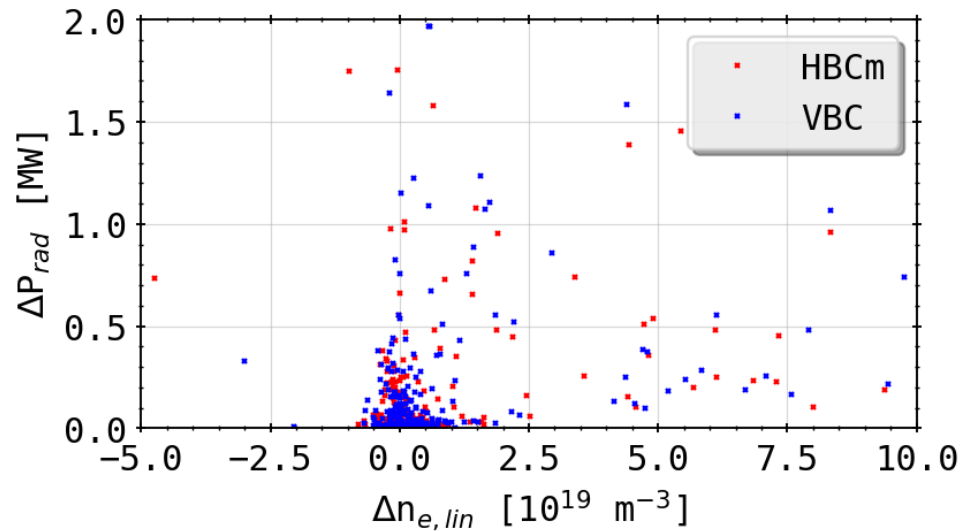
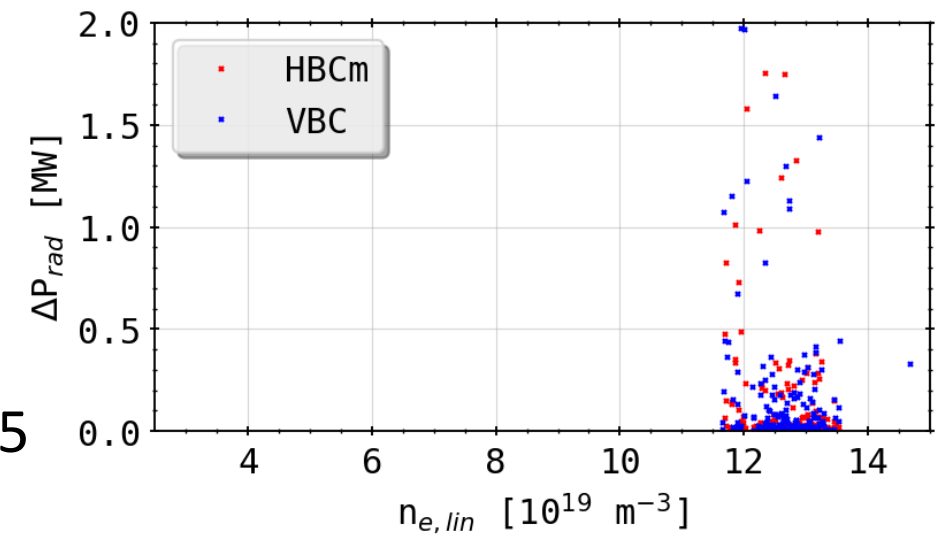


- looking up general plasma parameters, where possible, at points in time of peak detection from previous database display
- pre-filtered misleading results: spiking, digital glitching or missing data
- no obvious grouping of radiation increase over plasma density
- slightly higher radiation increase potential for higher plasma densities
- assuming at given density, larger range of radiation increase possible

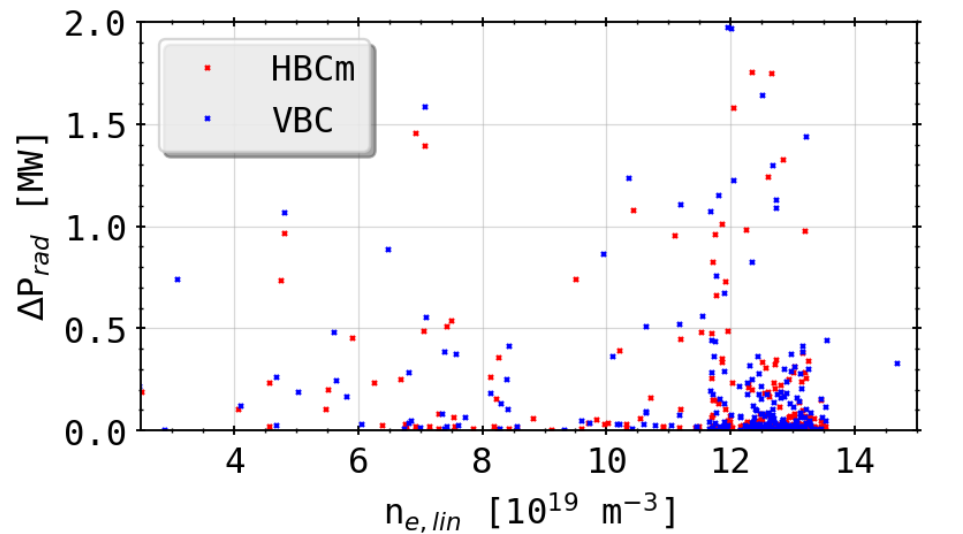
Peak Database: Plasma Parameters



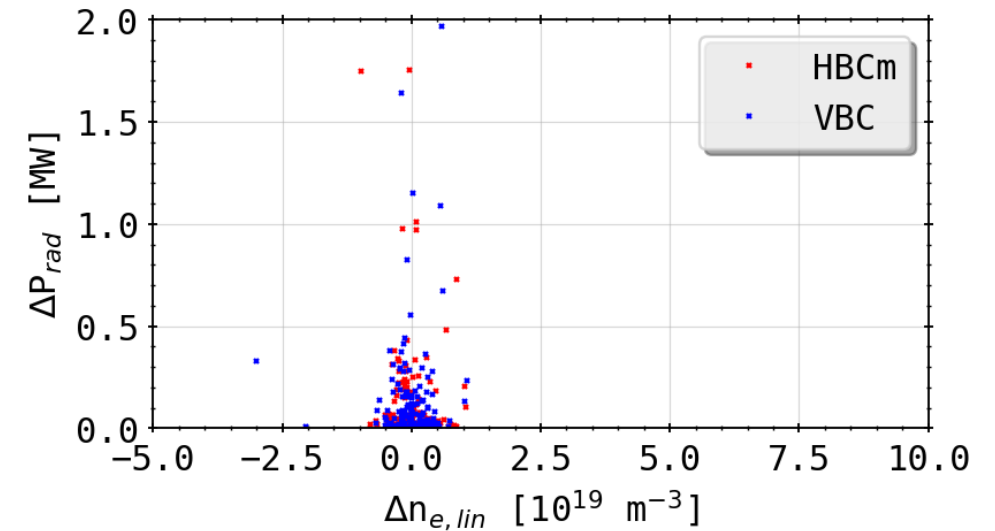
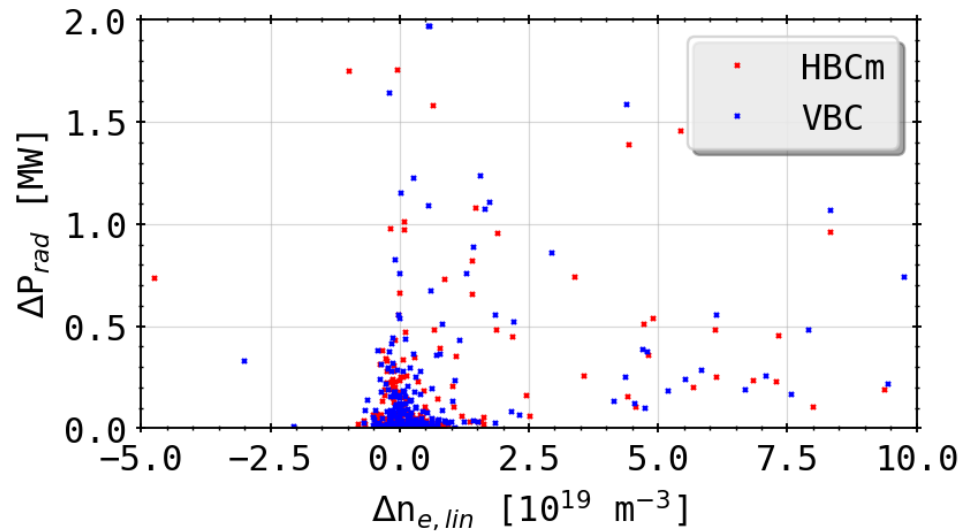
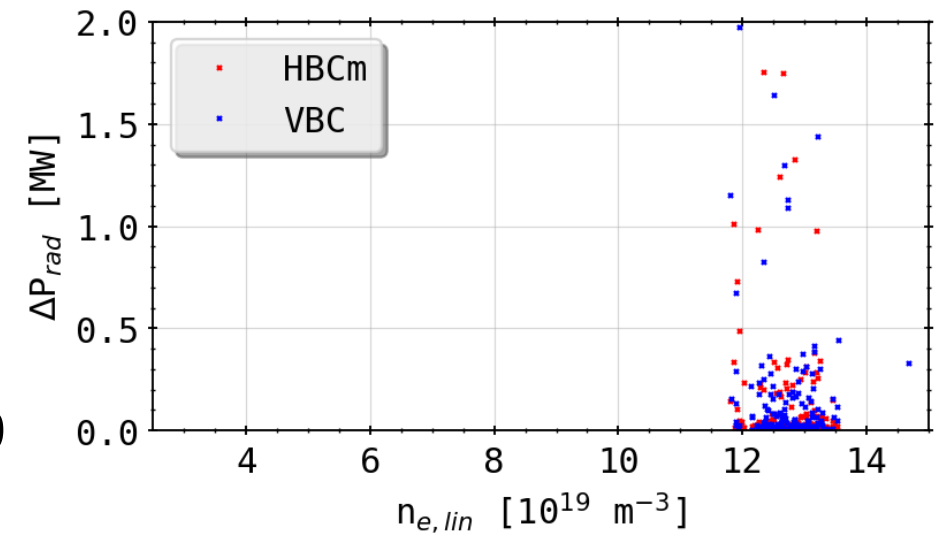
only $f_{rad} > 0.5$

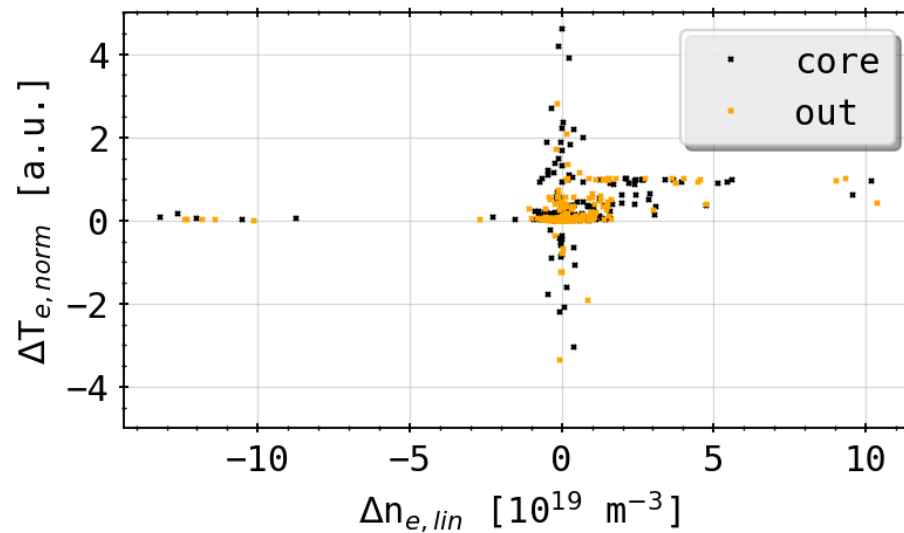
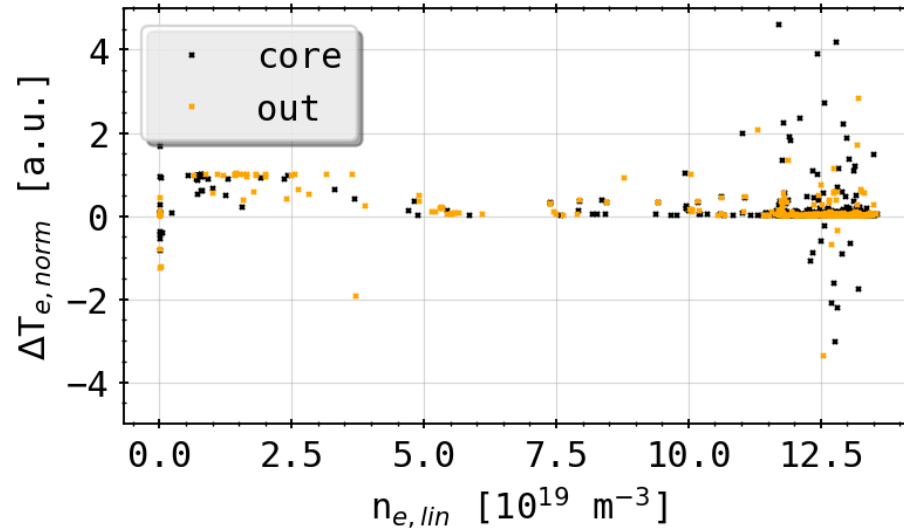


Peak Database: Plasma Parameters



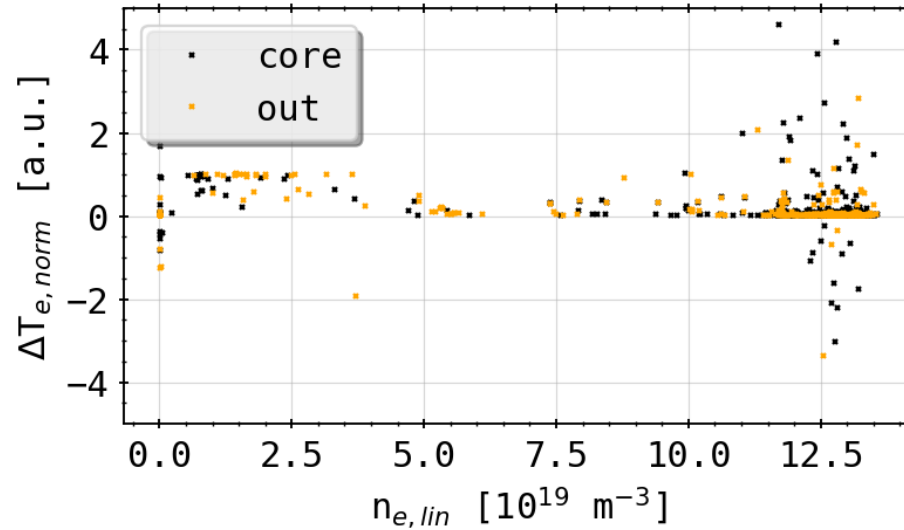
only $f_{rad} > 0.9$



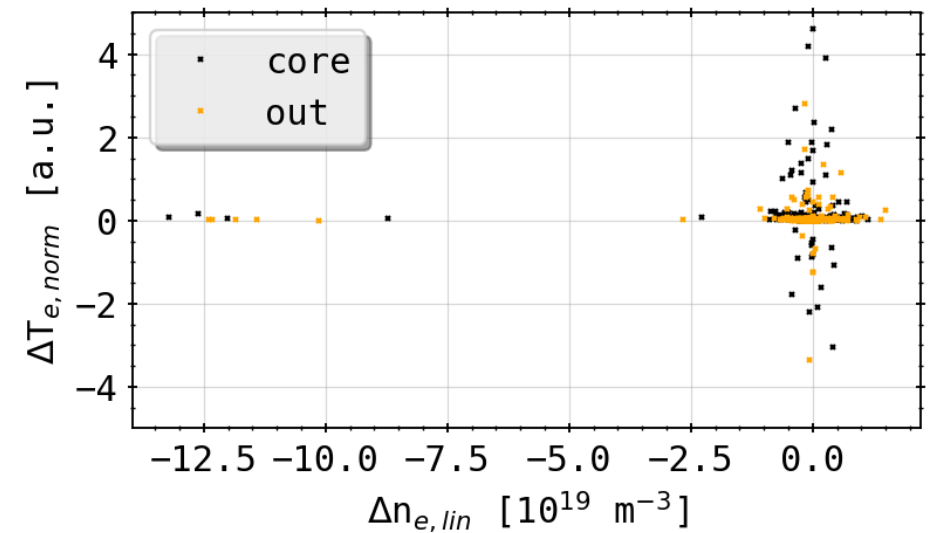
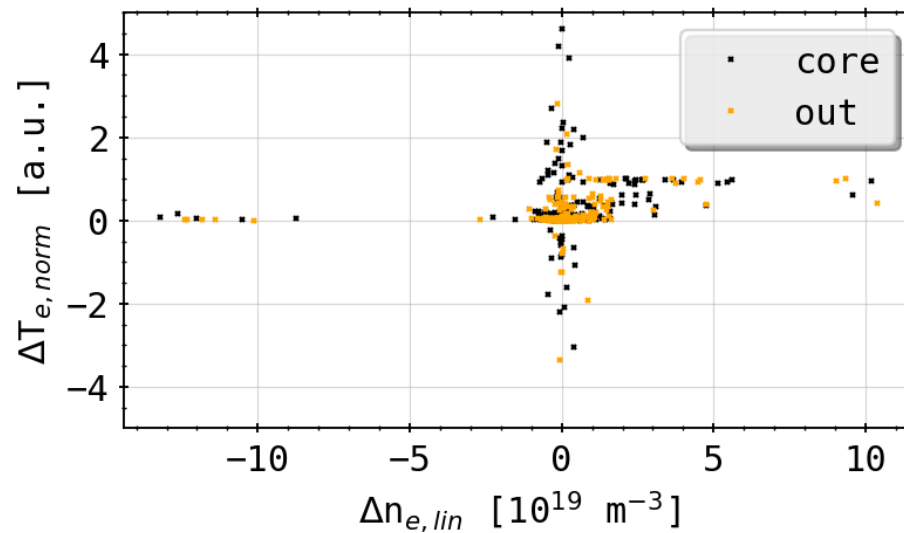
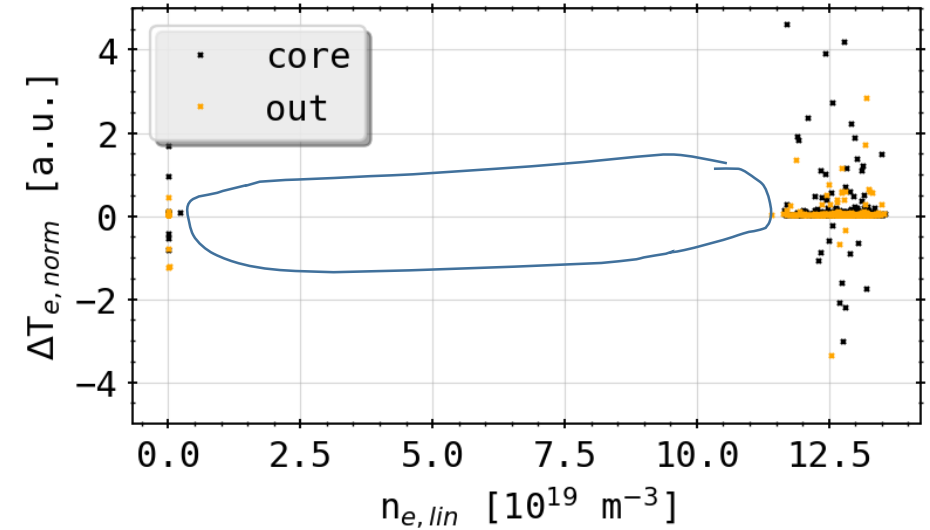


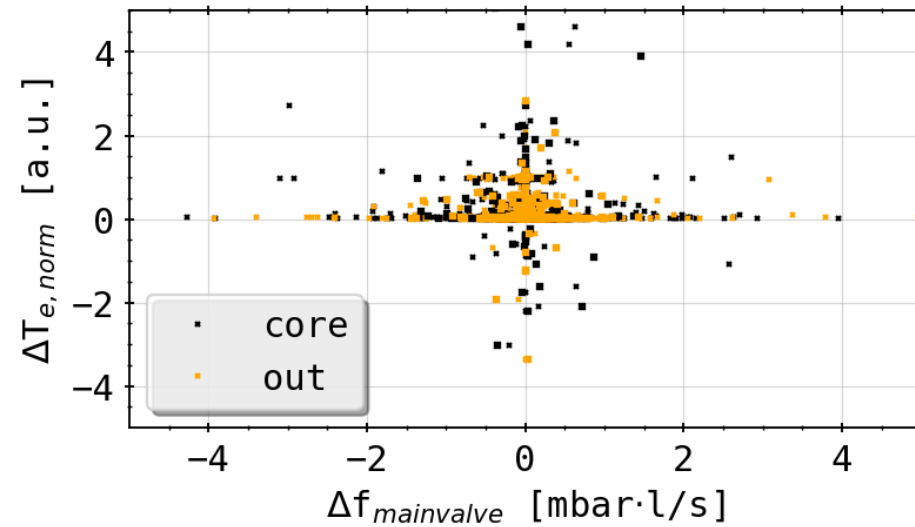
- increase/decrease in plasma temperature over plasma density
- similarly no grouping of parameters obvious

Peak Database: Plasma Parameters

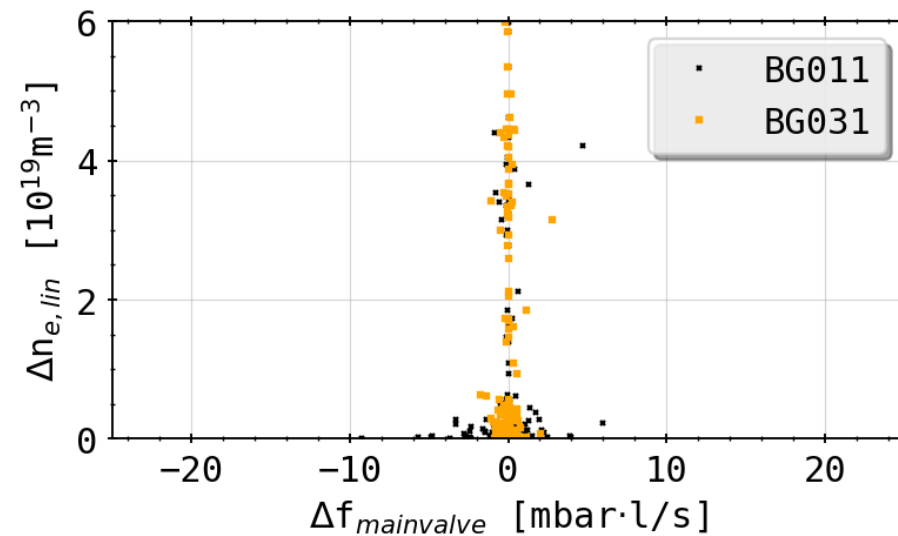


only $f_{\text{rad}} > 0.75$

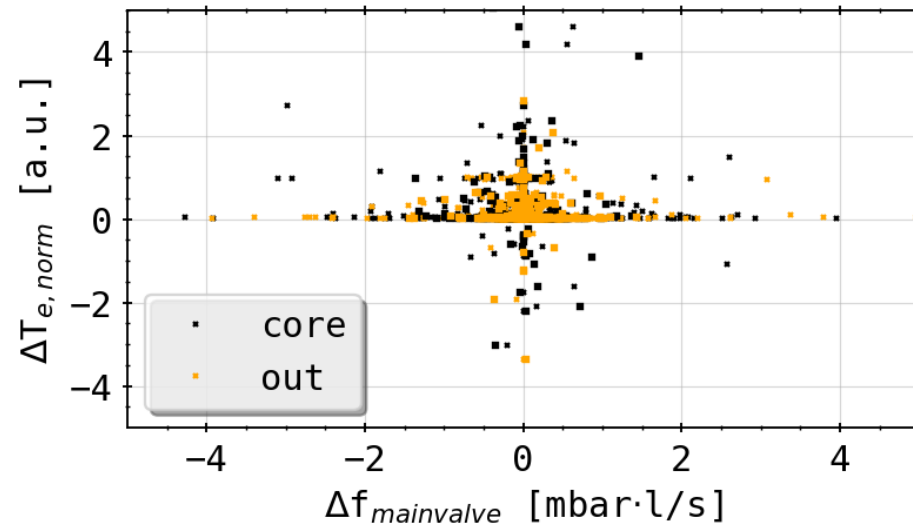




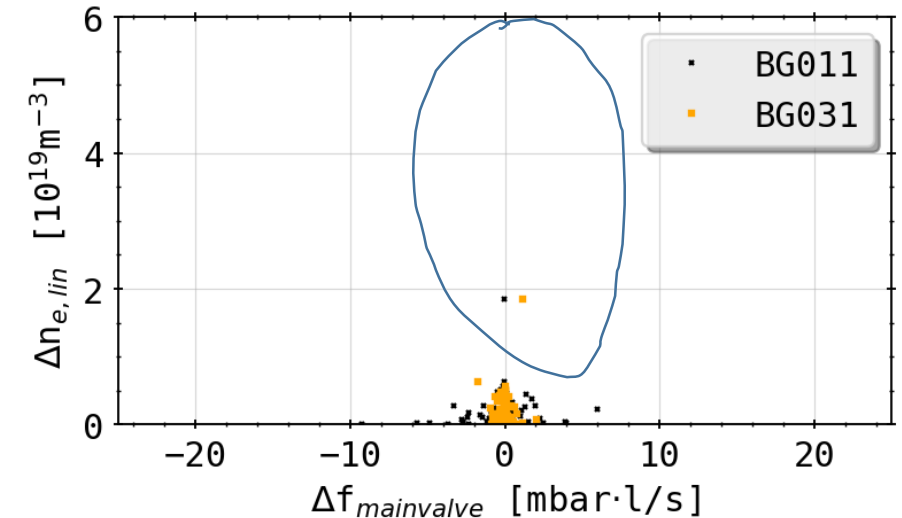
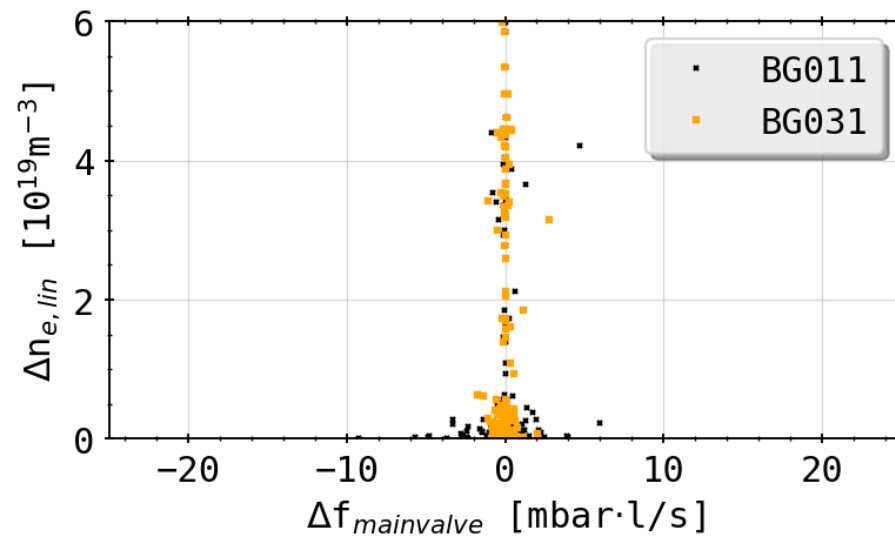
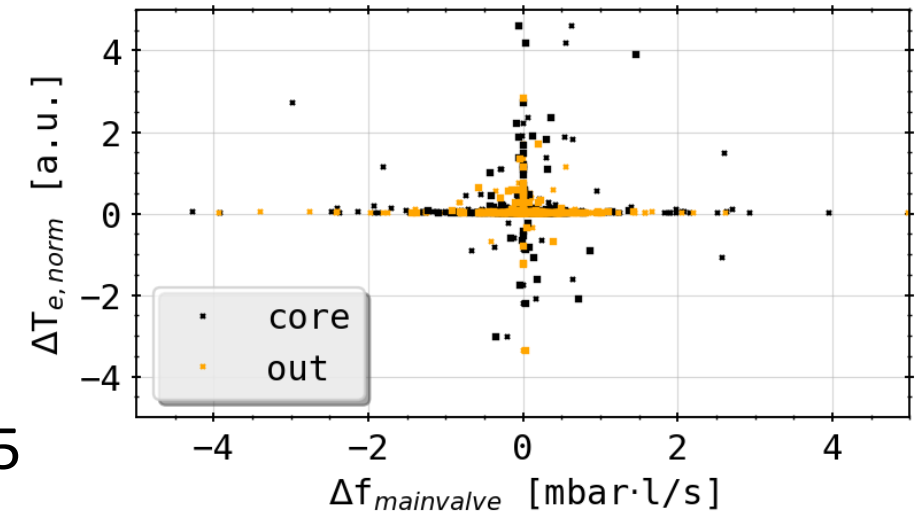
➤ change of density and temperature in relation to change in gas flow from main gas valves (any gas)

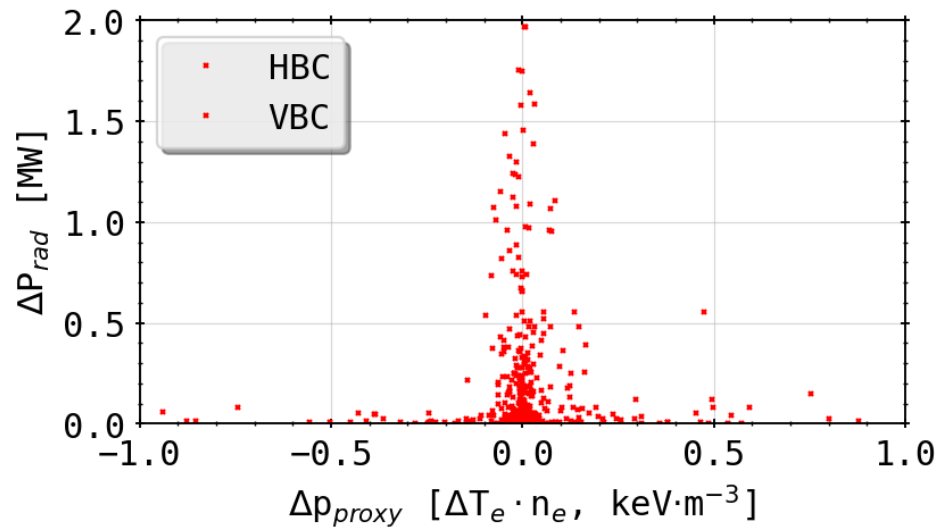
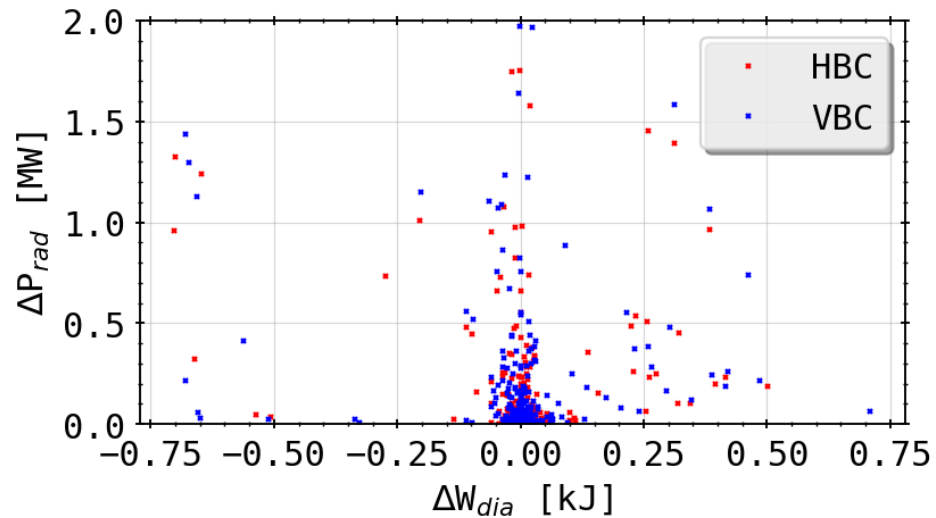


Peak Database: Plasma Parameters



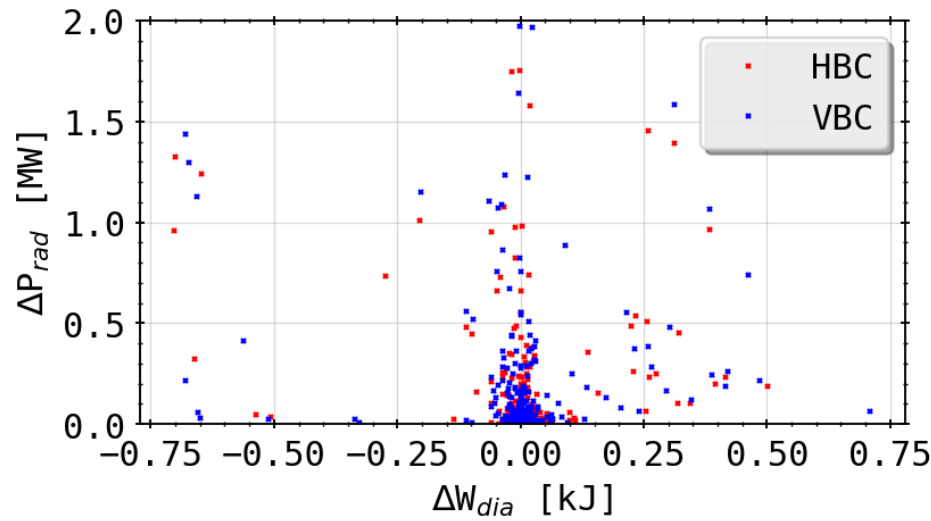
only $f_{rad} > 0.75$



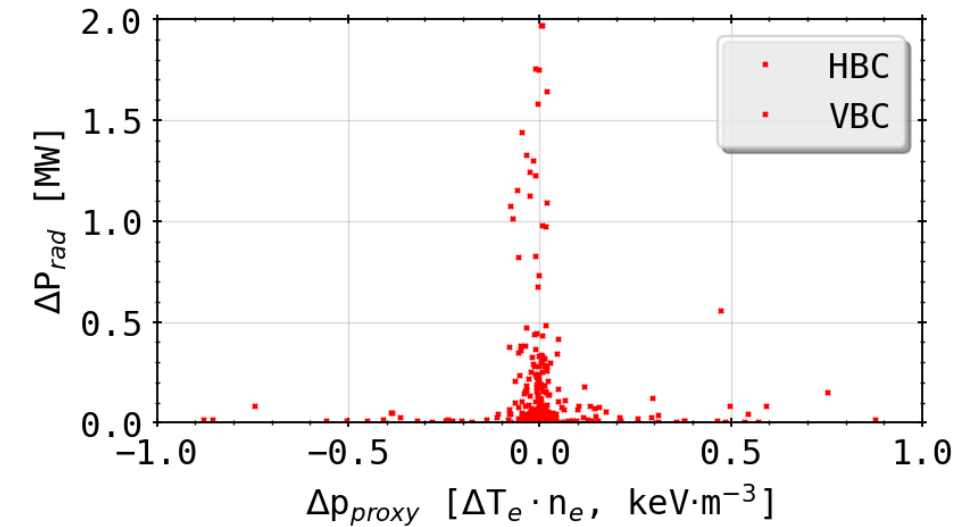
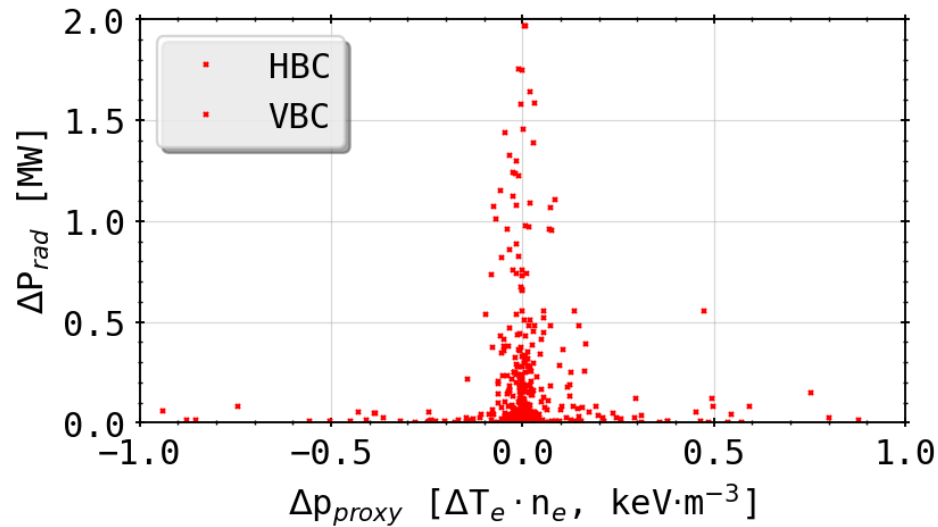
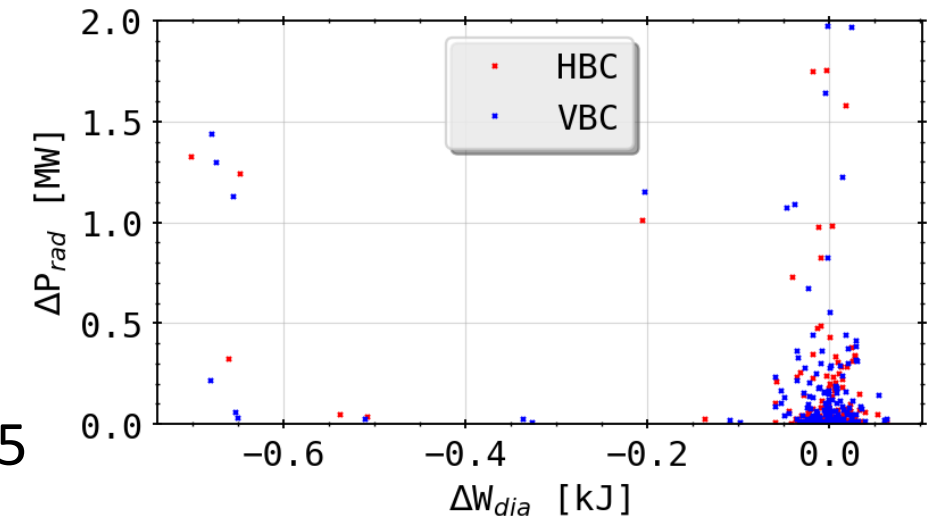


➤ change of radiation power loss in relation to plasma stored energy and pressure proxy by product of temperature and density

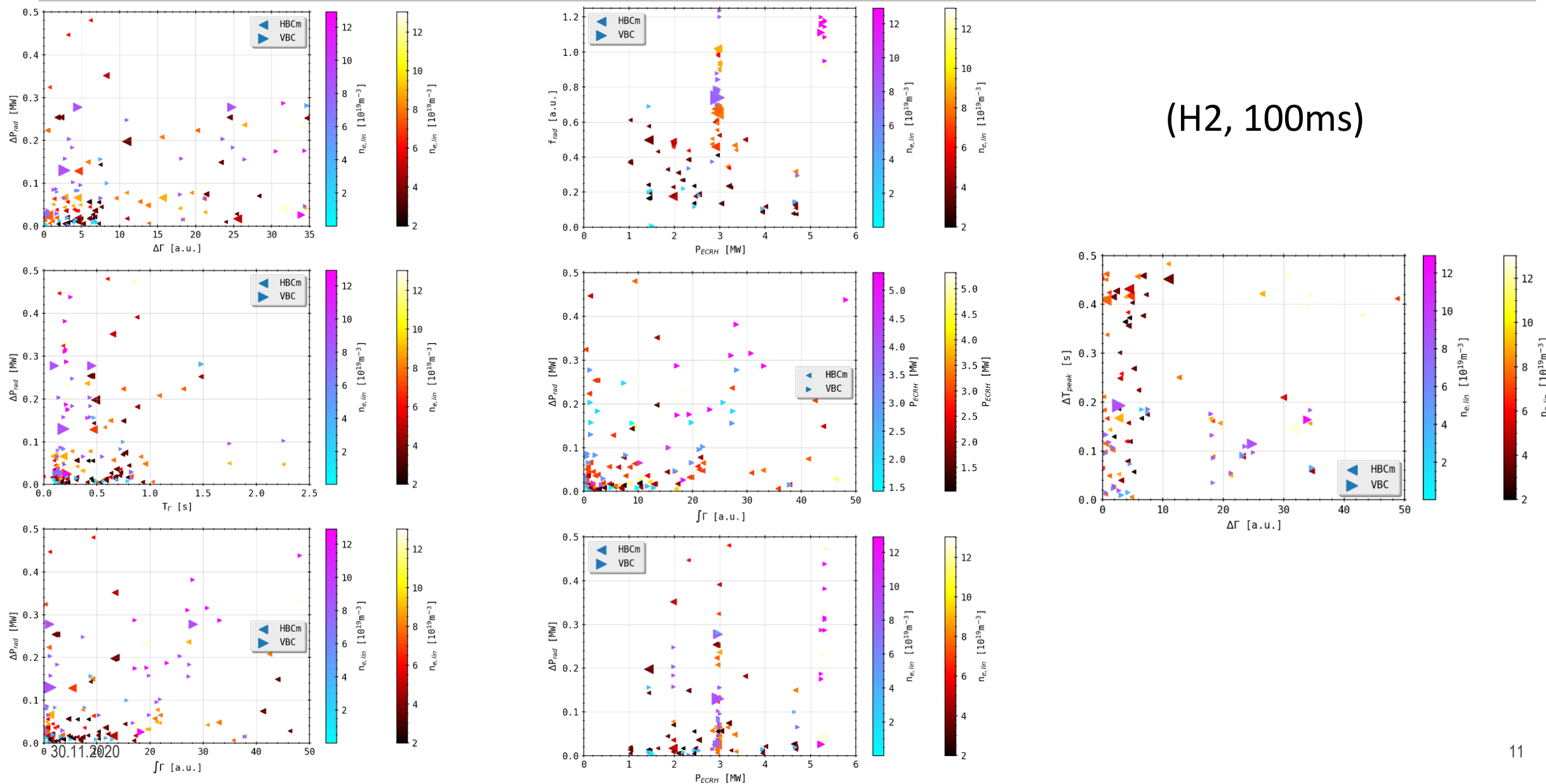
Peak Database: Plasma Parameters



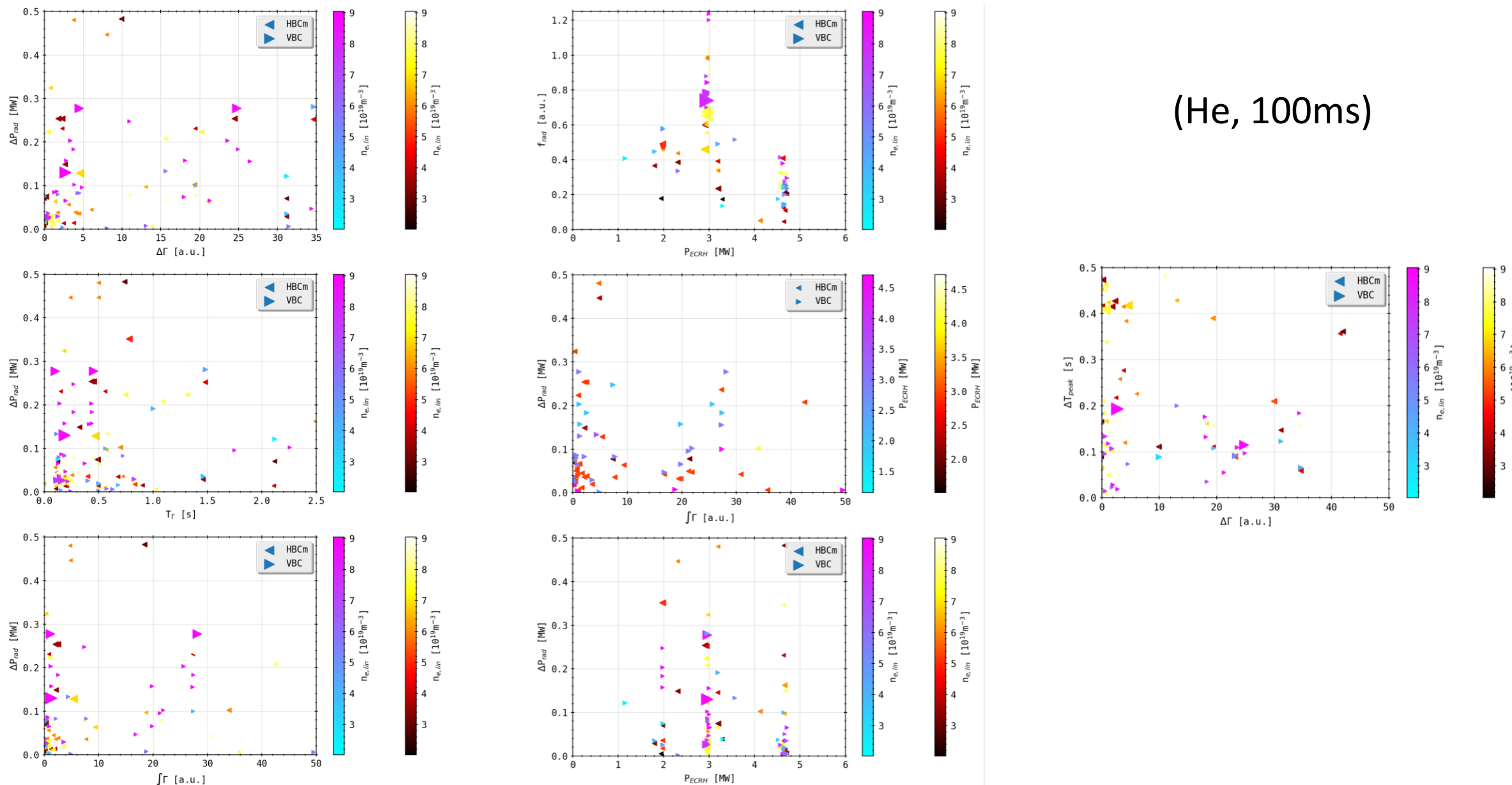
only $f_{rad} > 0.75$

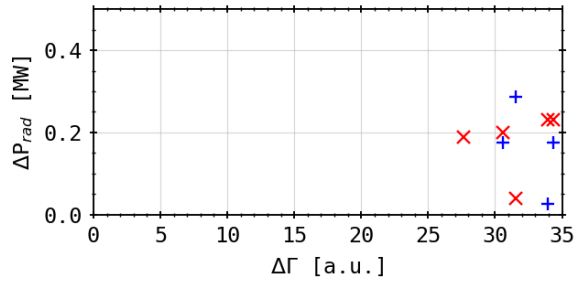


Peak Database: Plasma Parameters



Peak Database: Plasma Parameters



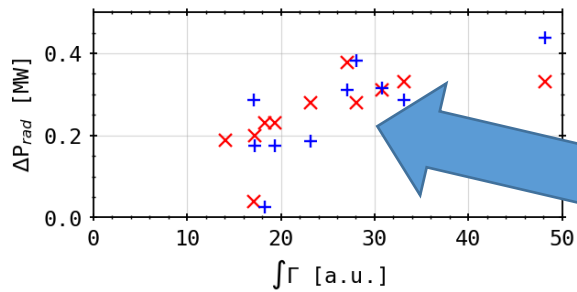
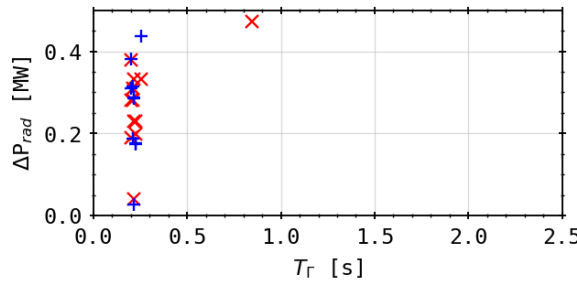


➤ results only shown for the feedback controlled discharge XPID 20181010.032

➤ used *feed-forward* and density control on the main gas valves and the thermal gas valve for radiation loss feedback (H2)

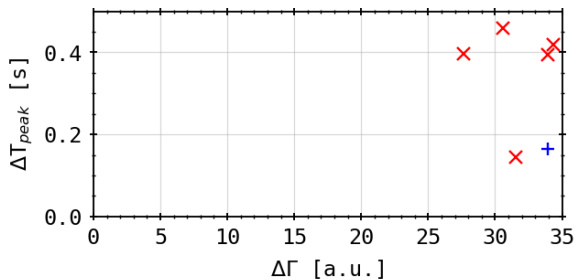
➤ ***'fix' temporal reaction delay of 200ms***

➤ linear correlation between puff and radiation reaction:



$$\Delta P_{HBCm} [MW] = (0.01187 \pm 0.0063) [MW] \cdot \int \Gamma_{QSQ}$$

$$\Delta P_{VBC} [MW] = (0.00978 \pm 0.0009) [MW] \cdot \int \Gamma_{QSQ}$$

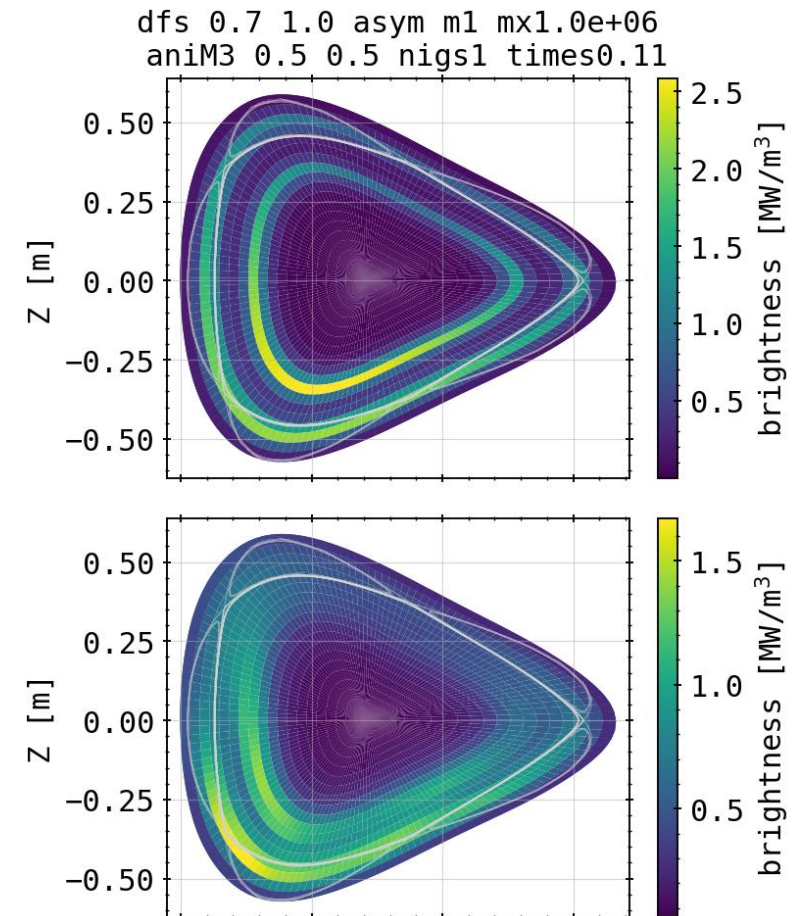
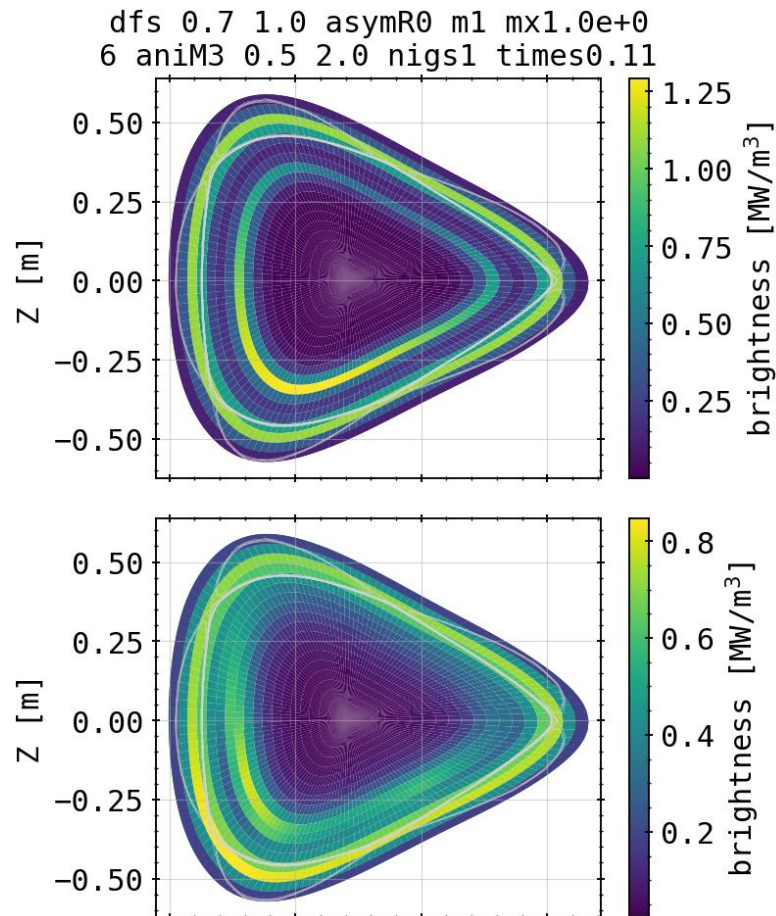
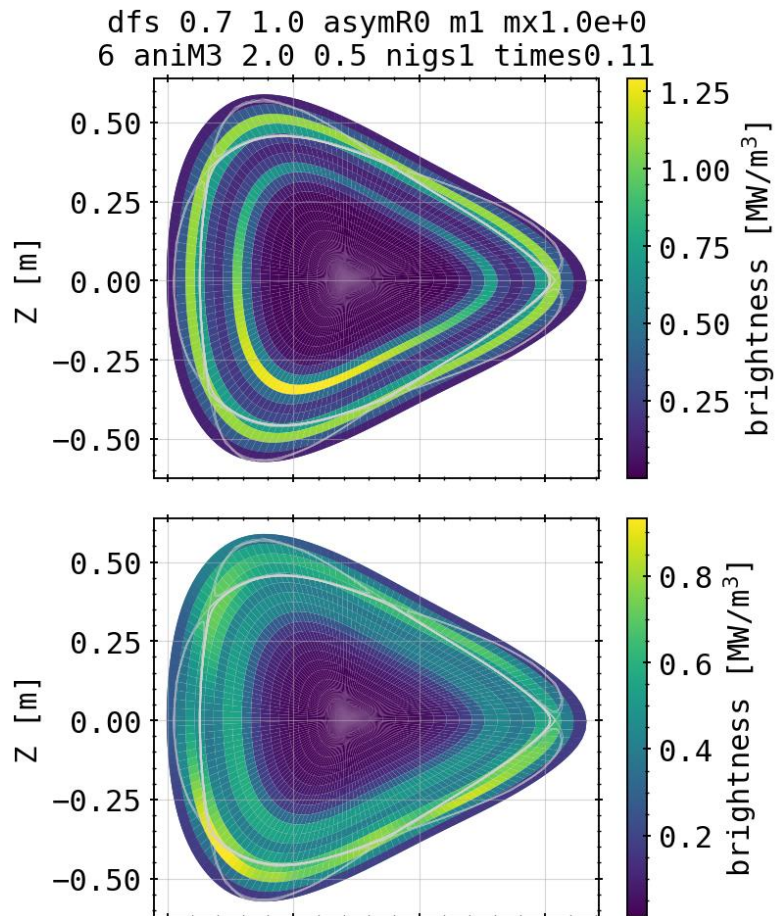


Asymmetry Propagation: Phantoms

inside asymmetry,
assuming symmetry

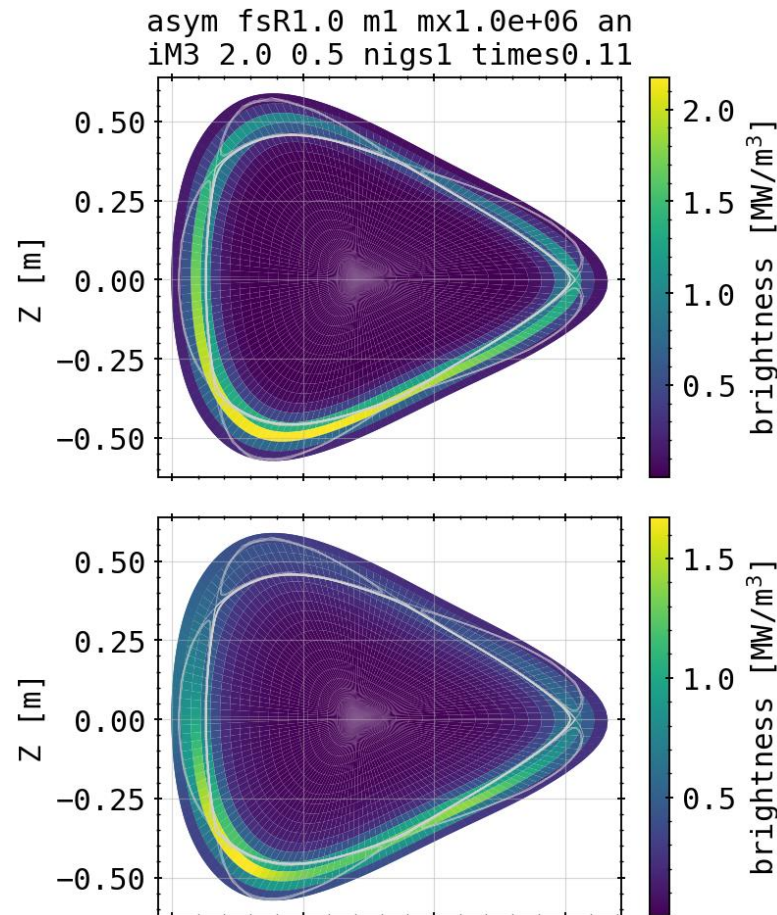
inside asymmetry,
assuming asymmetry

outside & inside asymmetry,
assuming asymmetry

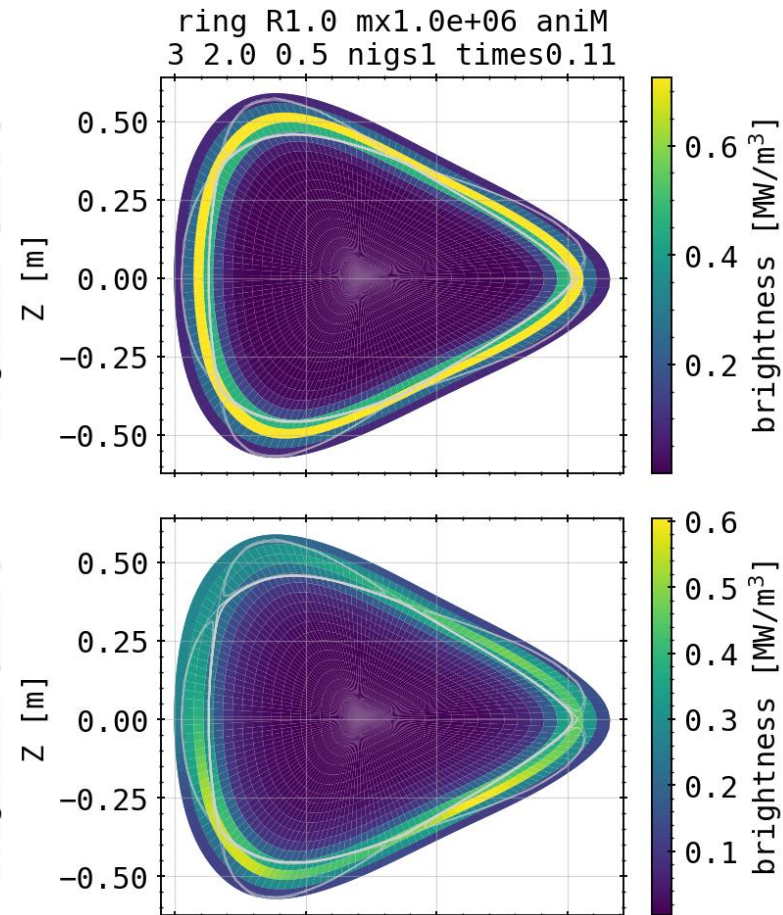


Asymmetry Propagation: Phantoms

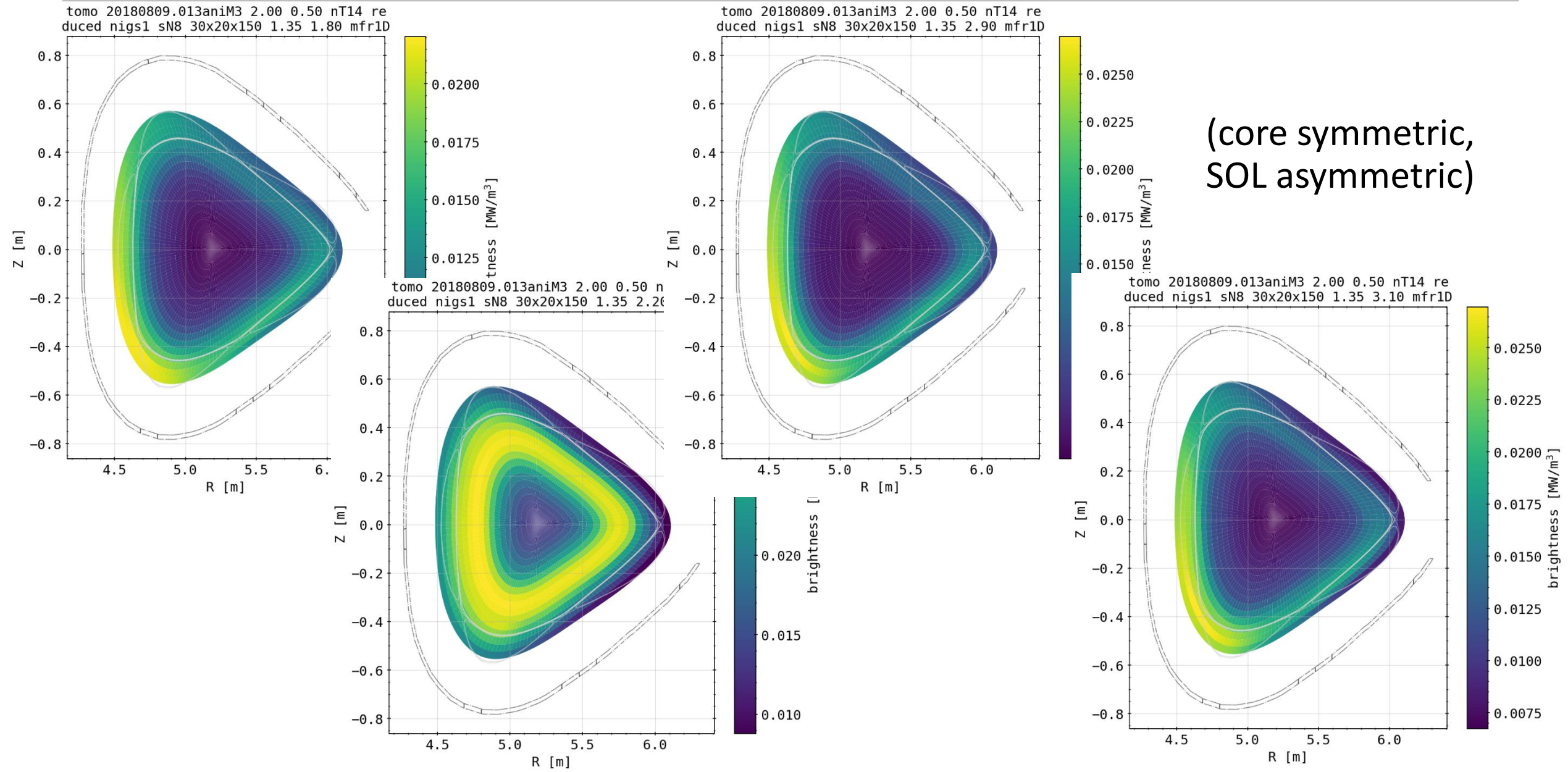
outside asymmetry,
assuming asymmetry



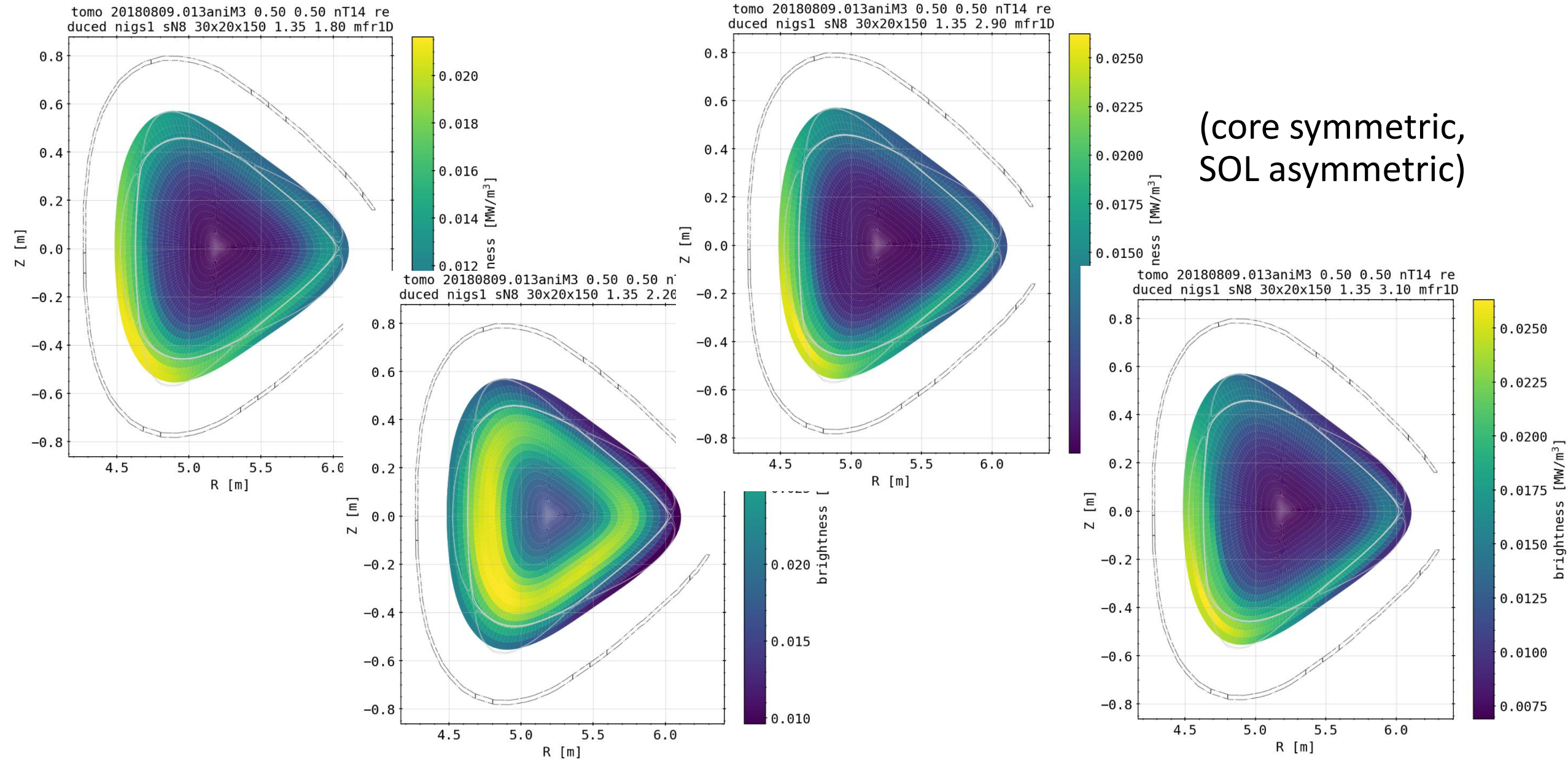
outside symmetry,
assuming asymmetry



Asymmetry Propagation: 20180809.013

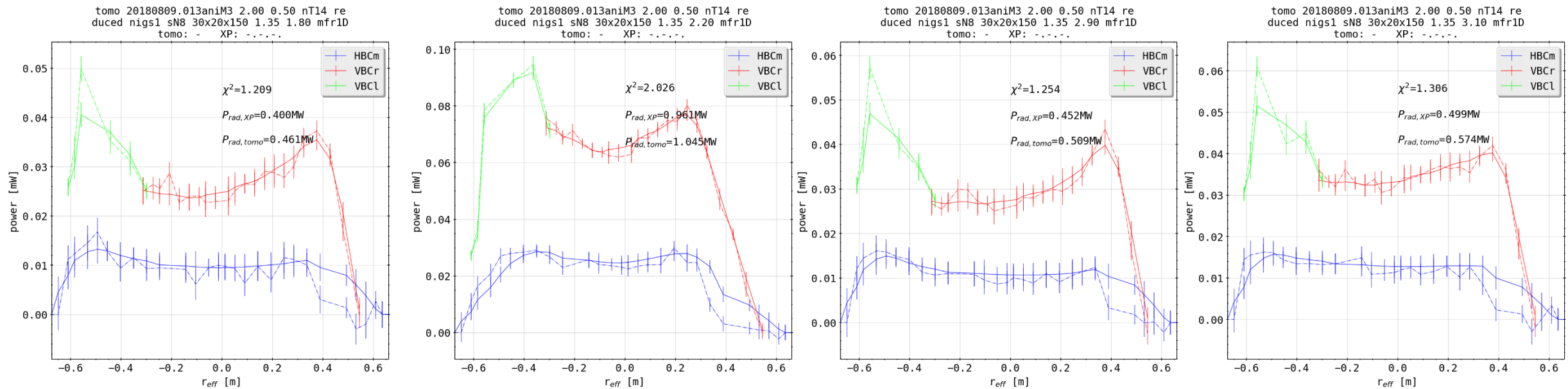


Asymmetry Propagation: 20180809.013



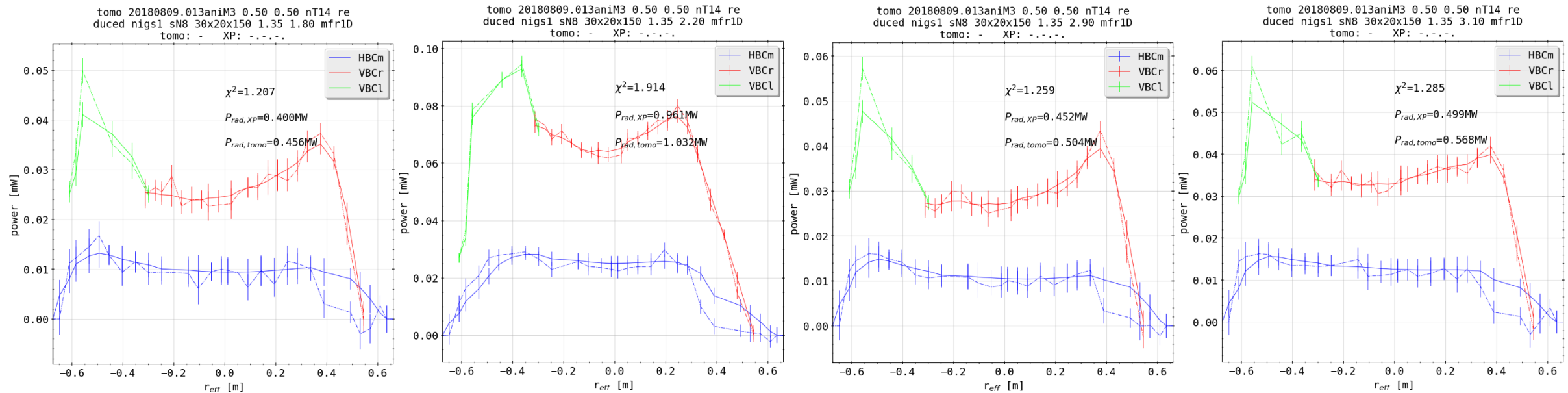
Asymmetry Propagation: 20180809.013

(core symmetric,
SOL asymmetric)

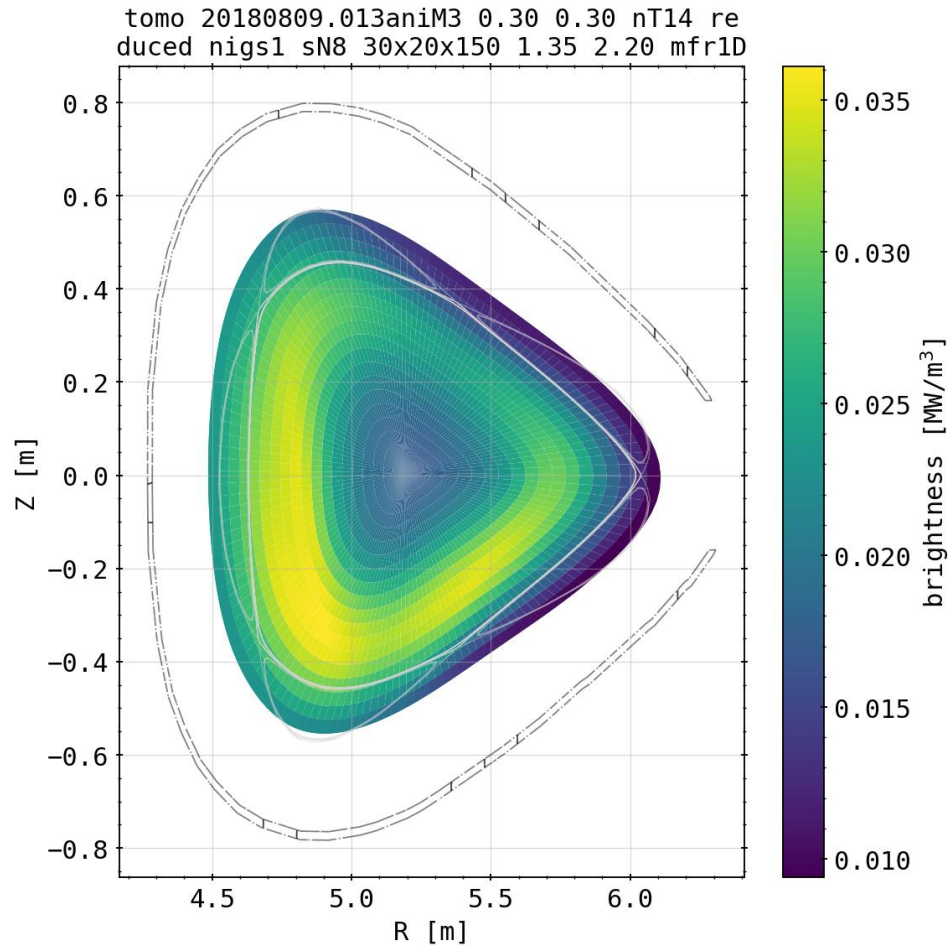


Asymmetry Propagation: 20180809.013

(core asymmetric,
SOL asymmetric)



Asymmetry Propagation: 20180809.013



(core asymmetric,
SOL asymmetric)

