Wendelstein 7-X

IPP Max-Planck-Institut für Plasmaphysik

Report 11/19/2020

P. Hacker

HELMHOLTZ SPITZENFORSCHUNG FÜR GROSSE HERAUSFORDERUNGEN

EUROfusion

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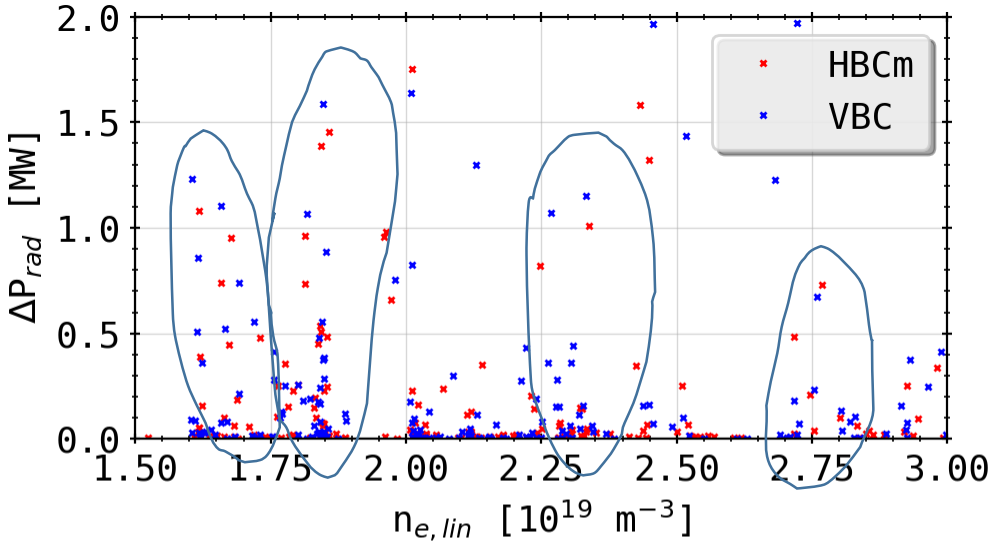
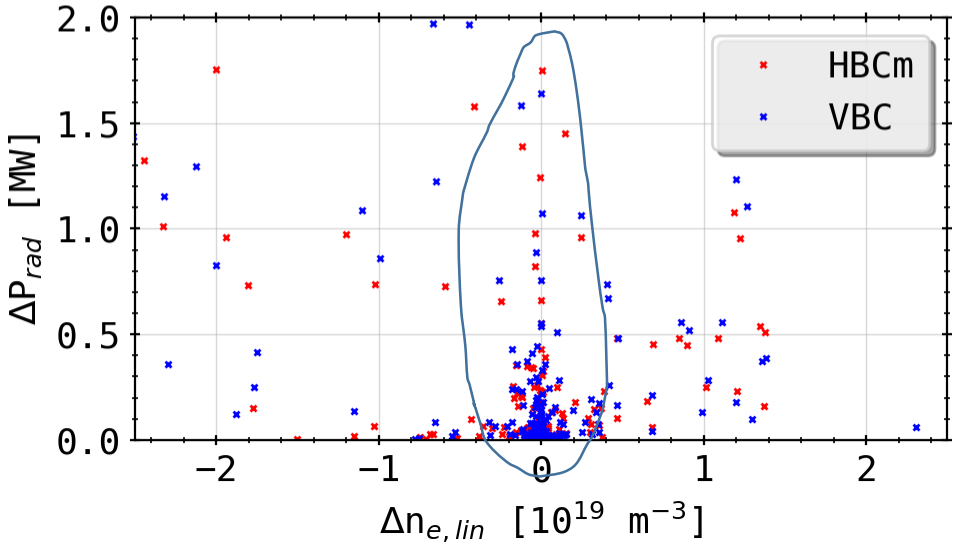
Peak Database: Plasma Parameters





- looking up general plasma parameters, where possible, at time points 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, i.e. *continuous* spectrum of set density for change in power loss
- assuming at given density, larger range of radiation increase possible

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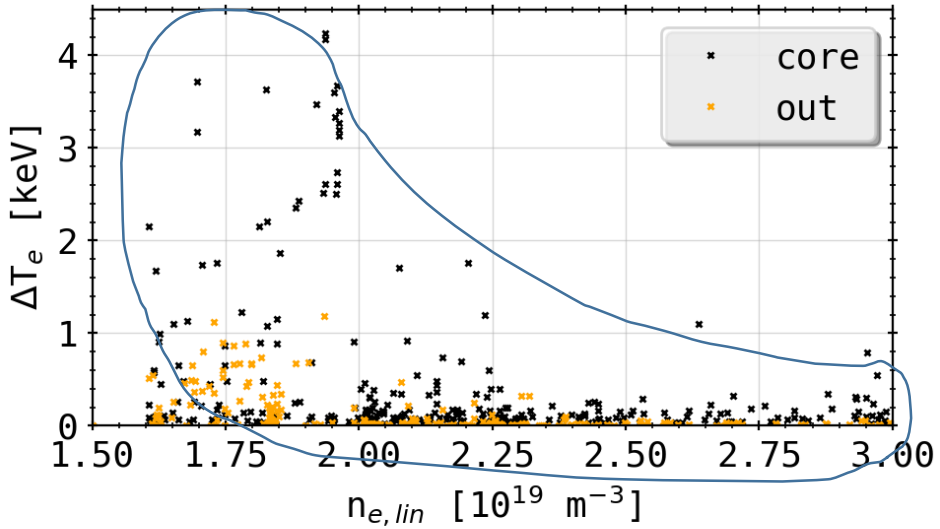

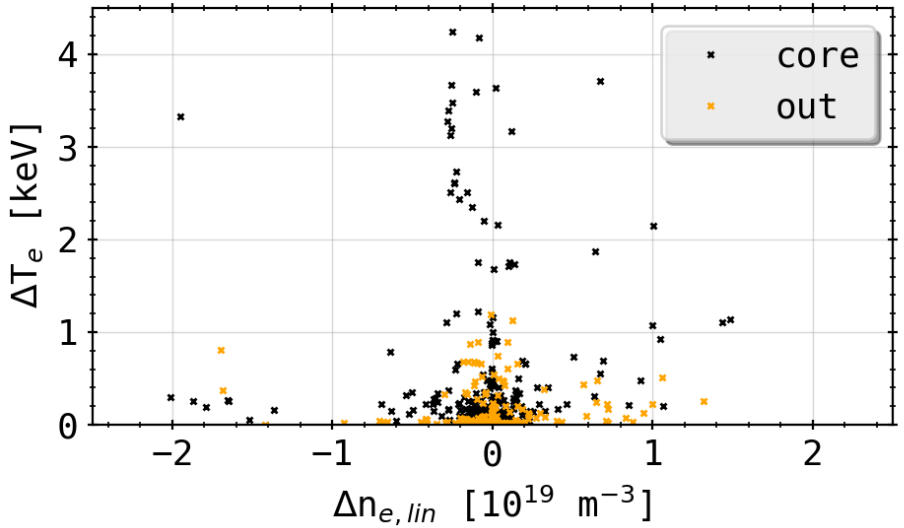

- increase/decrease in plasma temperature over plasma density
- similarly no grouping of parameters obvious
- decreasing temperature delta at increasing density; relative puff to amount of plasma may lead to less of an impact on store energy?

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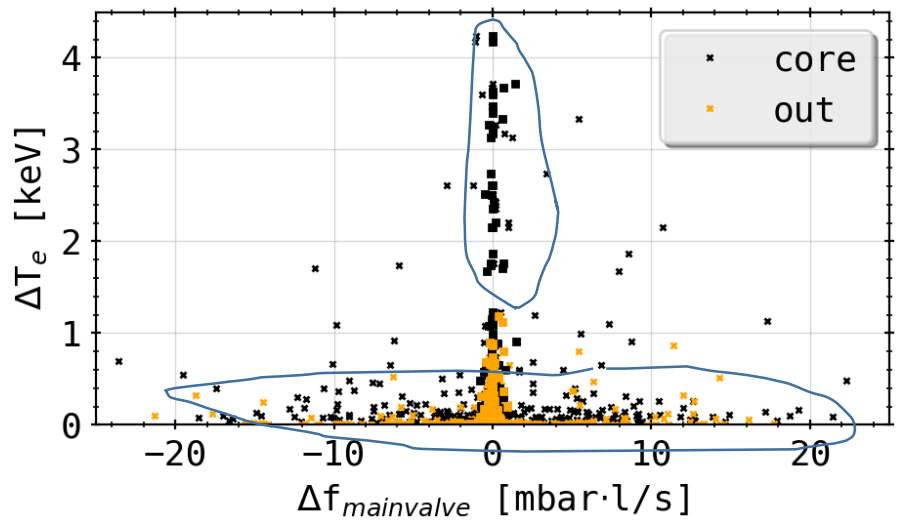

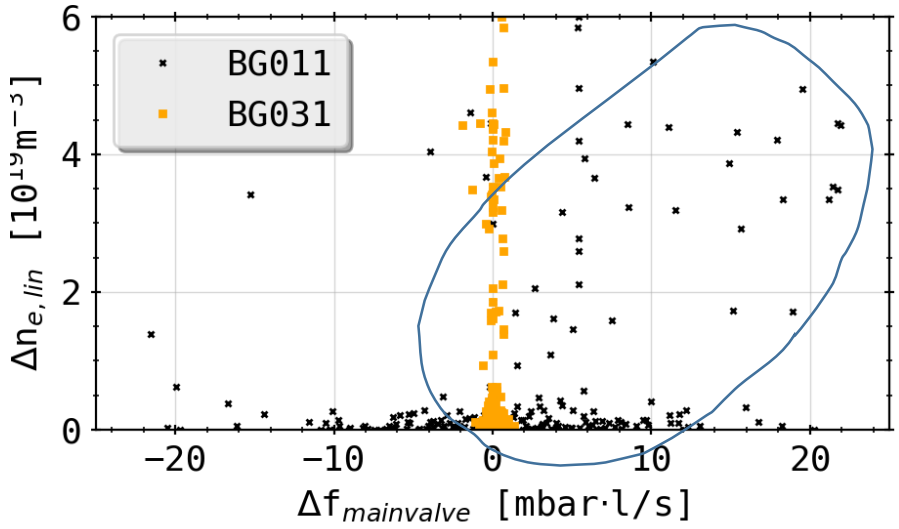

- change of density and temperature in relation to change in gas flow from main gas valves (any gas)
- larger decrease in temperature for core temperature (ECE) than outward
- at flow change ~10 mbar l/s around 0.5 keV decrease in temperature to be expected consistently?
- for larger flows from BG011 proportional response of density, though not BG031?

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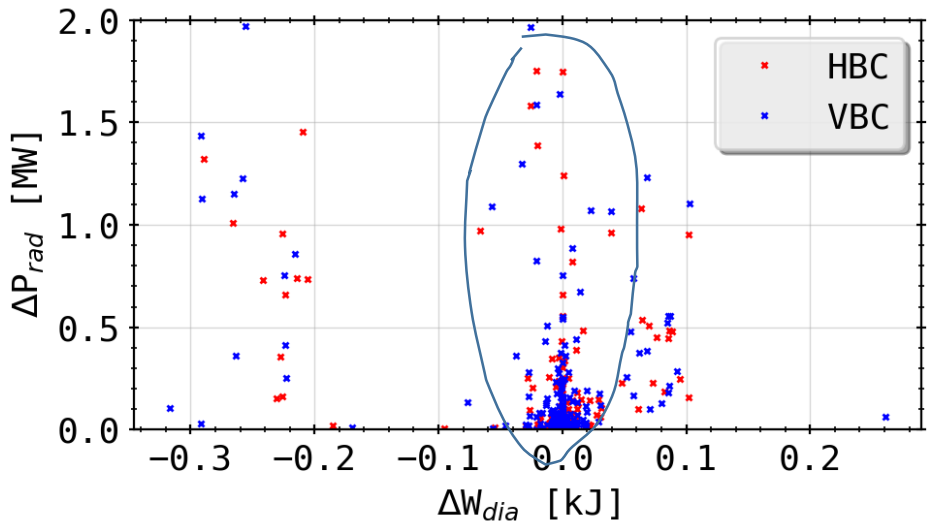
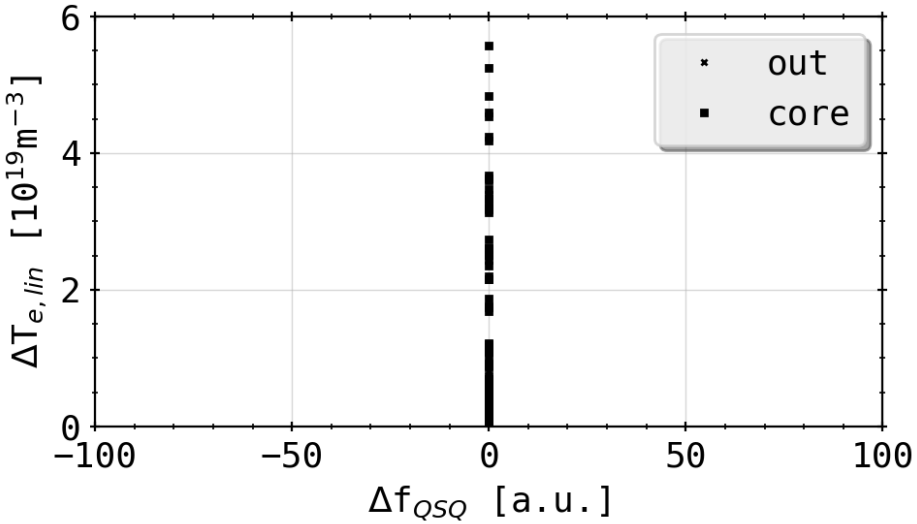
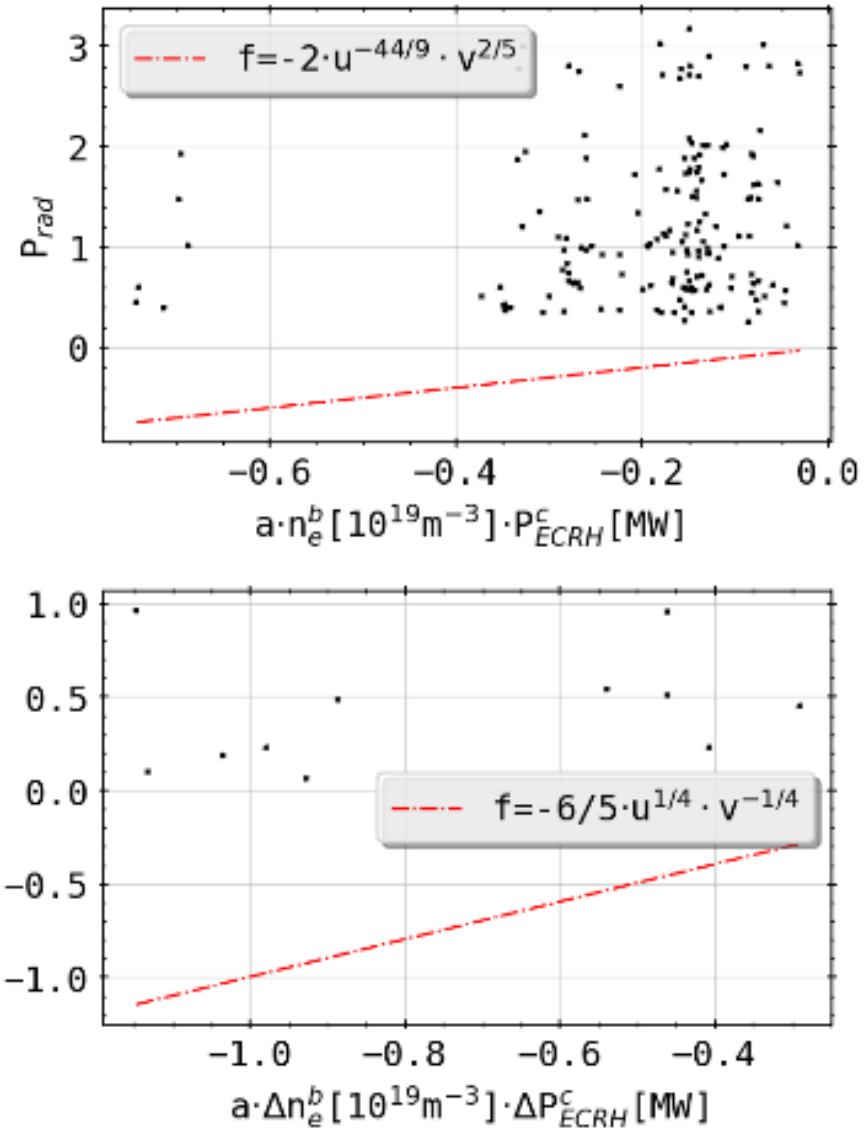




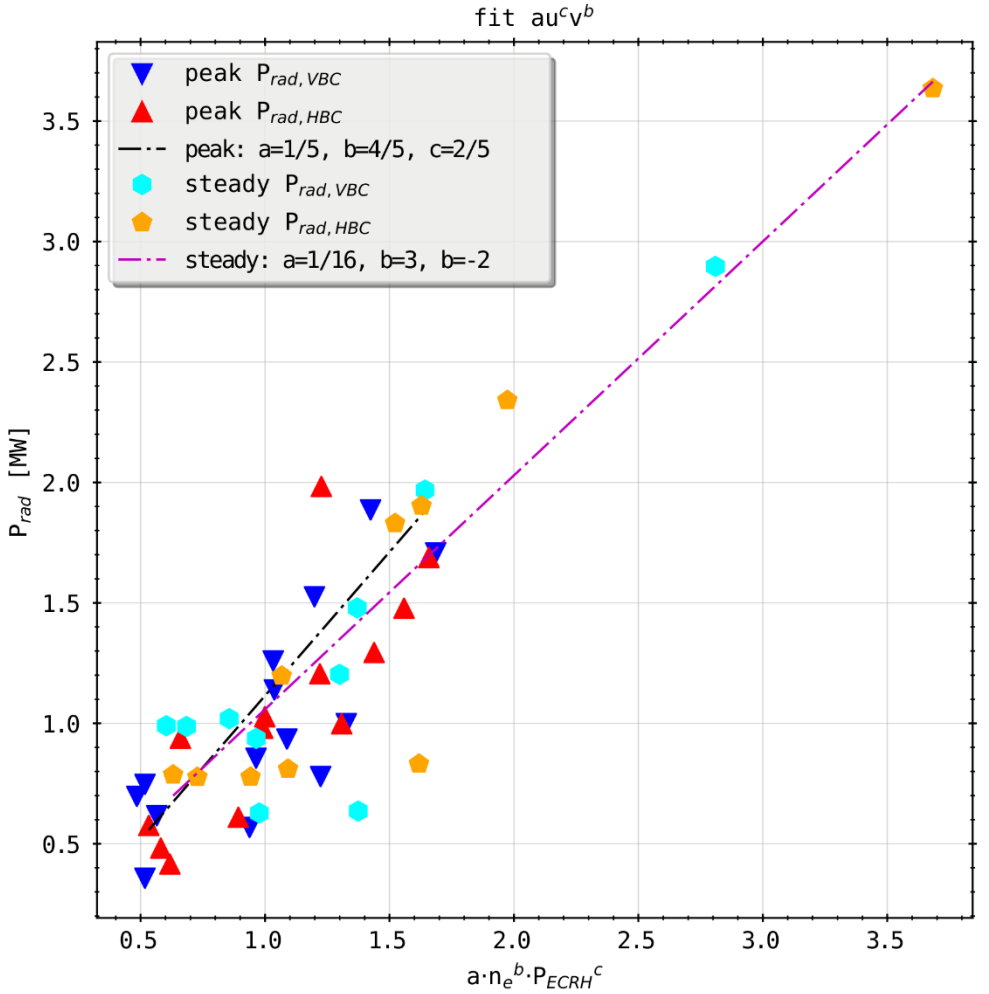
- change of radiation power loss in relation to QSQ feedback gas valve signal and plasma stored energy
- Look-up for QSQ values fails because metric appears only to know on or off, i.e. 1 or 0, hence parallel search at given time mostly returns none
- no grouping or distribution of data points for stored plasma energy like temperature

Peak Database: Plasma Parameters Fit



- looking for applicable scaling/fit between found plasma parameters at gas puffs to potentially enhance feedback performance

see:



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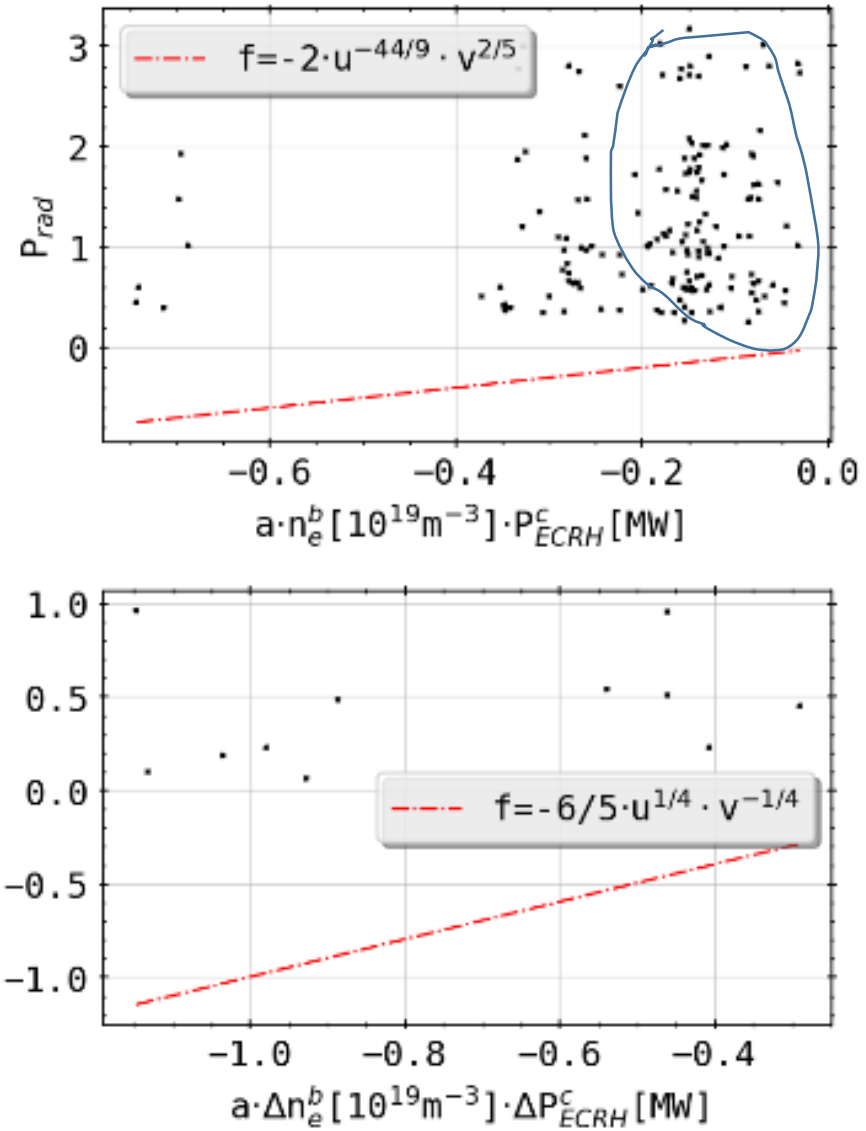

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- grouping of points for *arbitrary* fit, no obvious relation without congruence
- linear regression overall with poor results and ~100% error bar for return parameters

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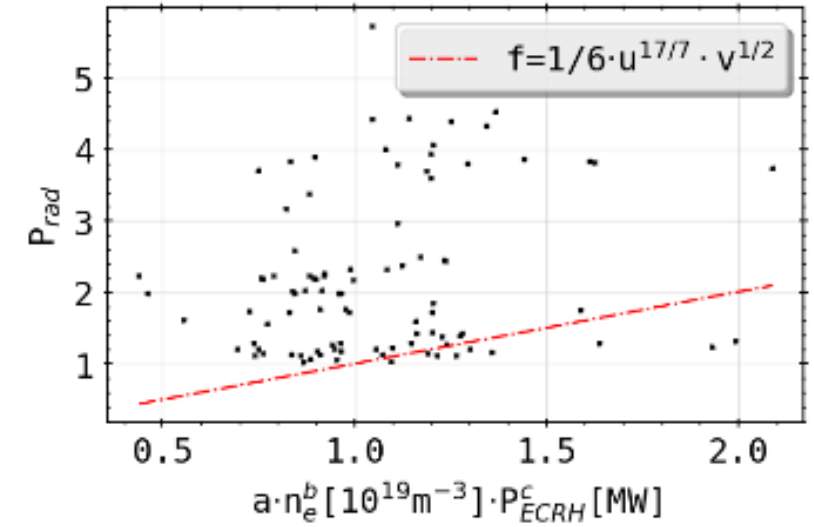

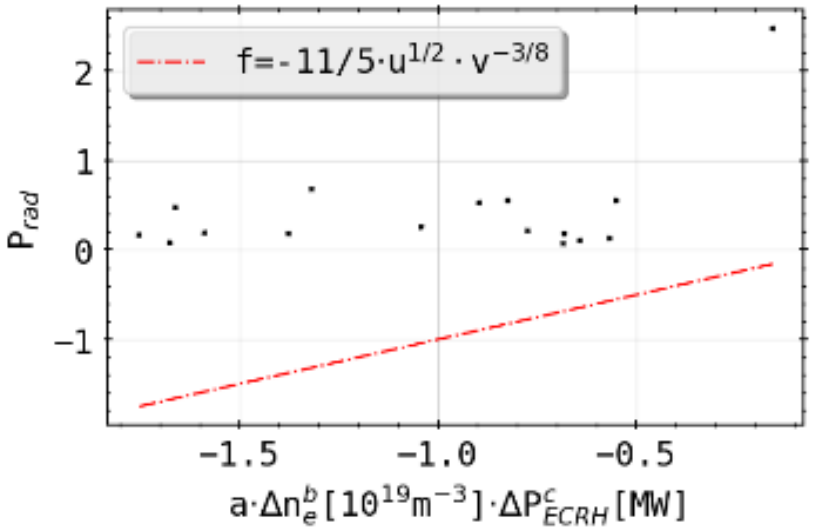

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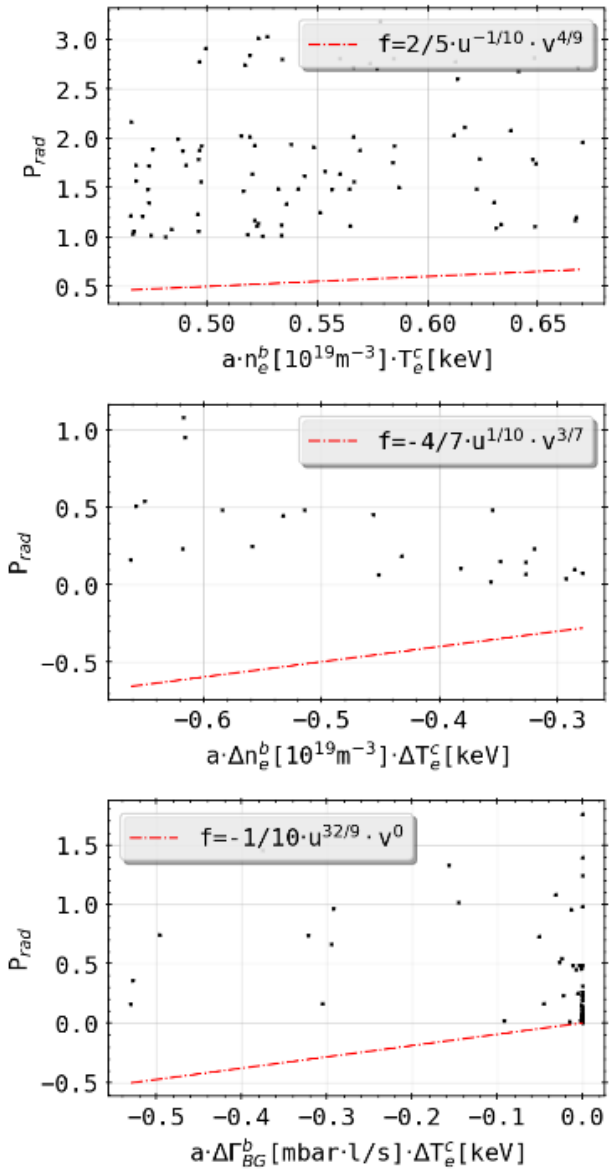

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