WPPWIE SP-F

Weekly meeting 25.5.2021

Input assumptions

Simplified picture to save computational time:

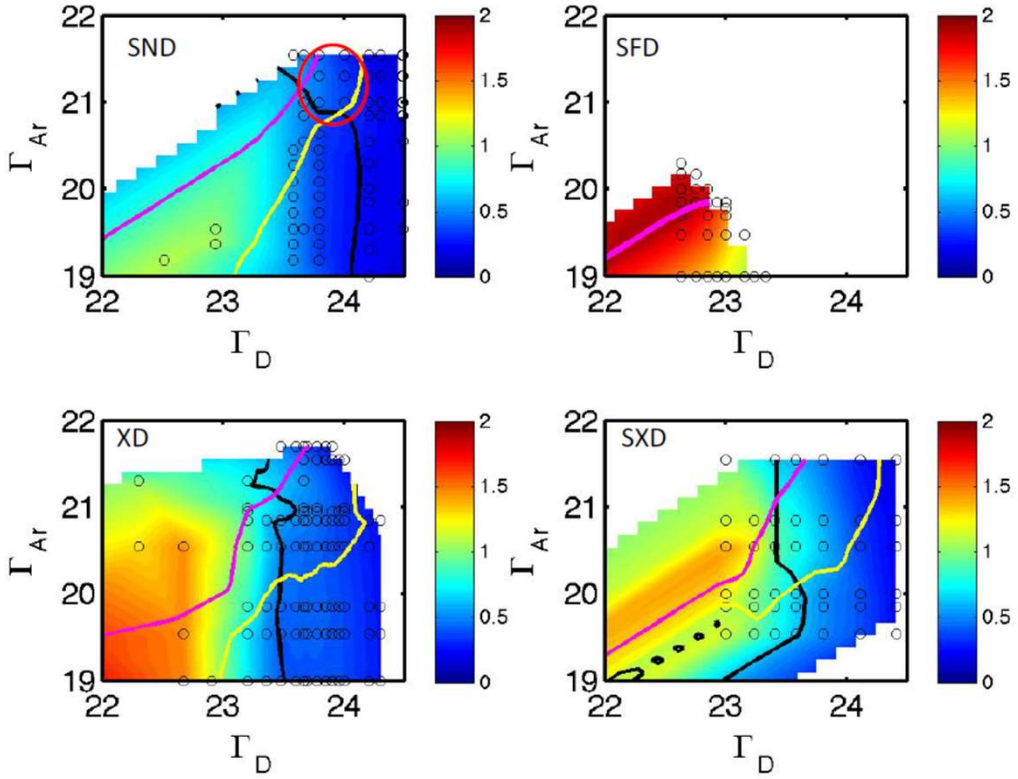
- P_{heat} = 300 MW (brems. & synchr. losses corrected)
  - PROCESS predicts 150 MW core radiation
  - This leaves P_{sep} = 150 MW (just above the H-mode power threshold 110-135MW)
  - Simple model: P_{in} = 150 MW, only low-Z impurities (up to Ar) included in the simulation
- Reduced physics simulations (D. Coster)
  - No drifts
  - Fluid neutrals (1% PFR absorption)
  - Bundled impurities (Ar, 3 charge groups considered)
- Radially varying, poloidally constant transport coefficients (λ_q~3mm)

Documentation:

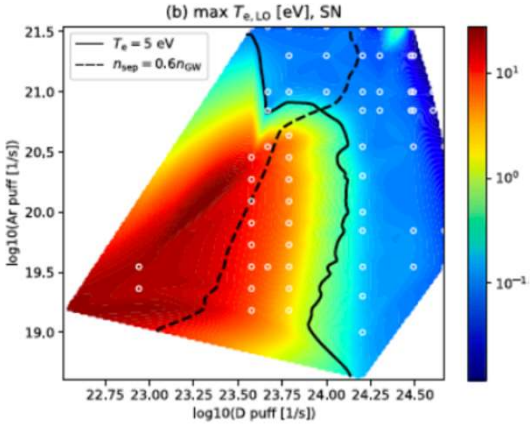
- Summary of modelling meeting 2019
- Final report 2019
- Final report 2020

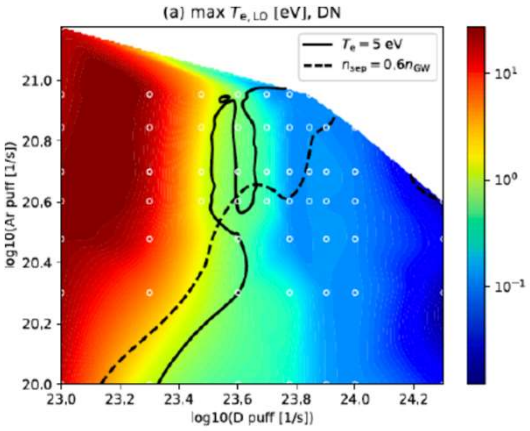
matrix scans, examples

He concentration:



Outer target T_e:

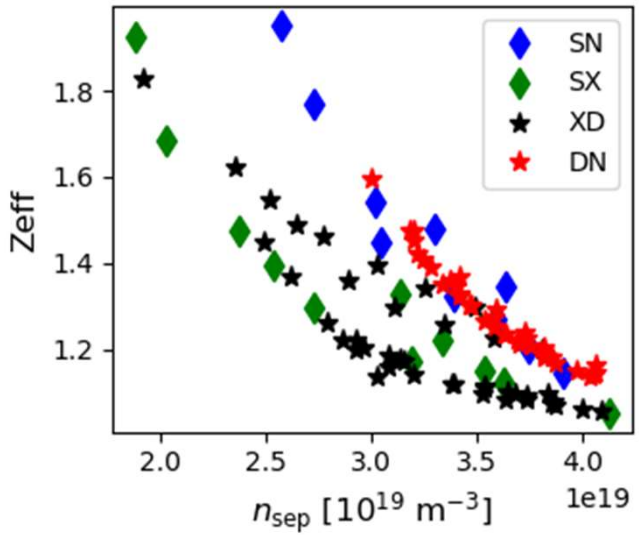


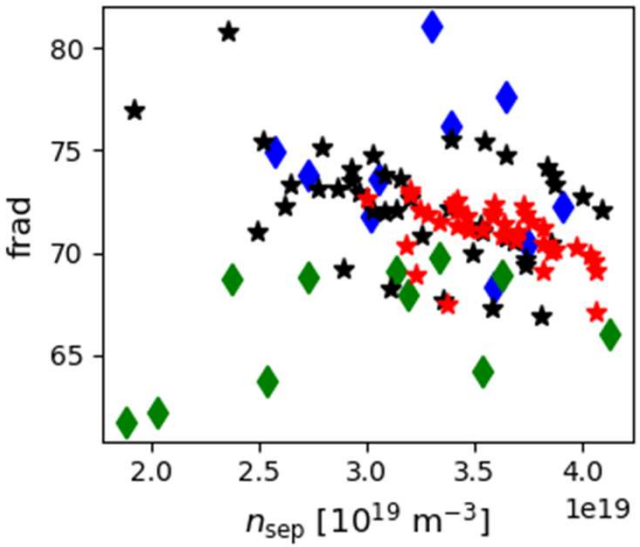


See list of mdsplus indices in the excel file

Operating space

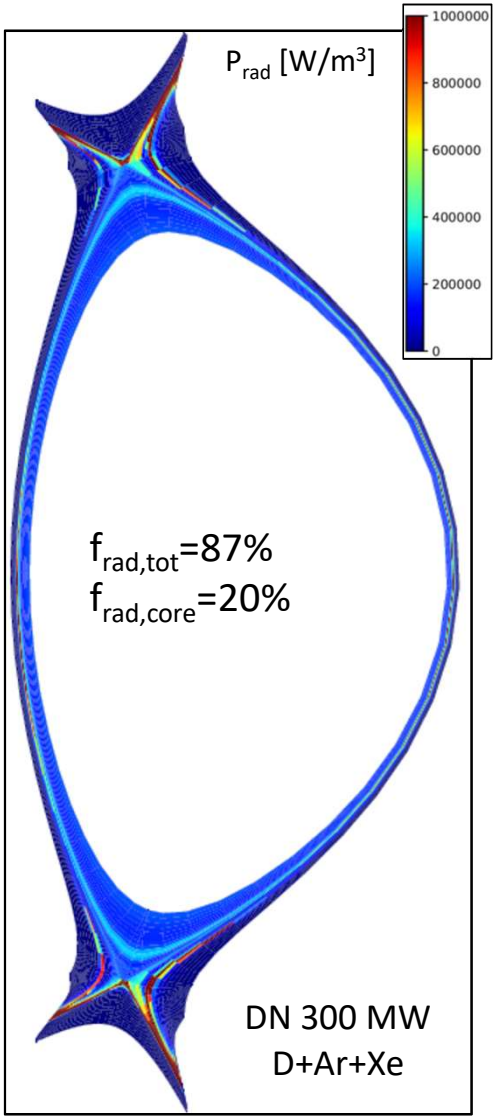
- $n_{omp} < 4.2e19\ m^{-3}$ (60% n_{GW})
- $T_{div} < 5$ eV
- $q_{div} < 10\ MW/m^2$





Example analyses:

- maximum radiated power fraction
- total heat fluxes at the divertor entrances
- peak target temperatures
- peak target heat loads
- neutral pressure
- He enrichment in the PFR
- He enrichment in the divertor legs
- Z_{eff} in the core
- Ar enrichment in the PFR
- Ar enrichment in the divertor legs
- Ar and He concentrations on the last core ring just before the separatrix
- W sputtering yield
- Ionization sources
- Neutral sources



Publications:

- H Reimerdes et al, NF 2020
- F Subba et al, NME 2017
- F Subba et al, PPCF 2018
- L Aho-Mantila et al, NME 2021
- F Militello et al, NME 2021
- L Xiang et al, NF 2021
- L Xiang et al, IAEA FEC 2021
- L Aho-Mantila et al, IAEA FEC 2021
- F Militello et al, IAEA FEC 2021

Teams

XD, SX
F. Subba
G. Rubino
P. Chmielewski

SF-
O. Pan
H. Reimerdes

Reduced models / connection to experiments
A. Järvinen, H. Reimerdes, L. Aho-Mantila

Neutrals (XD, SX)
Leuven team

DN
L. Aho-Mantila

SN WPDES
F. Subba
L. Aho-Mantila

Next steps

Until next week:

- Check access to data
- Check computational resources
- Start reading the documentation

During the next 5 weeks:

- Clarify work that should be done in June-August

July-August:

- Independent work / work in smaller teams

September->:

- Weekly meetings continue, reviews and next steps