EUROfusion Brainstorming Meeting, Zoom, 10.12.2024

DEMO Central Team Perspective

[1,2]H. Zohm, [1,3]C. Bourdelle, [1,4]M. Coleman, [1,5]F. Maviglia, [1,2]M. Siccinio, [1,6]S. Wiesen

[1]DEMO Central Team
[2]MPI für Plasmaphysik, Germany
[3]CEA Cadarache, France
[4]UKAEA Culham, United Kingdom
[5]ENEA Frascati, Italy
[6]DIFFER Eindhoven, the Netherlands

This work has been carried out within the framework of the EUROfusion Consortium, funded by the European Union via the Euratom Research and Training Programme (Grant Agreement No 101052200 — EUROfusion). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the European Commission can be held responsible for them.

DEMO physics needs (a longer presentation was given @ ETASC 10.11.2024)

Core performance

- Transport in the DEMO regime (nonlinear e-m and fast particles) – **theory and experiment!**
- Fast particle MHD (*AEs)
- Hybrid core: flux pumping regime: access and robustness for DEMO – theory and experiment!
- **H-L transition / confinement close to boundary / indicator for ‚closeness to backtransition' (include control!)**

Edge physics

- Small / no-ELM regime: QCE extrapolation
- X-point radiator physics / extrapolation

Exhaust physics

- **Detachment control / sensors & actuators**
- **Detachment dynamics** (burnthrough (‚buffering'), **reattachment & countermeasures**)

Overarching: uncertainty quantification and ist effect on the DEMO operation point!

DEMO physics benefits strongly from regular discussions between DCT / WPTE / PWIE) / ETASC

VNS physics needs (beyond what is already addressed for ITER and DEMO)

Core performance

- **β-limit in the presence of high rotation and (anisotropic) fast particle pressure – ideal and resistive**
- Fast particle MHD (*AEs)

Edge and exhaust physics

- W-sputtering / influx / transport in the VNS regime (high rotation)

Intensity of studies will depend on how we will go ahead with VNS (t.b.d. @GA tomorrow ☺)