

Prof. Dr.-Ing. Dieter Brillert

Chair of Turbomachinery

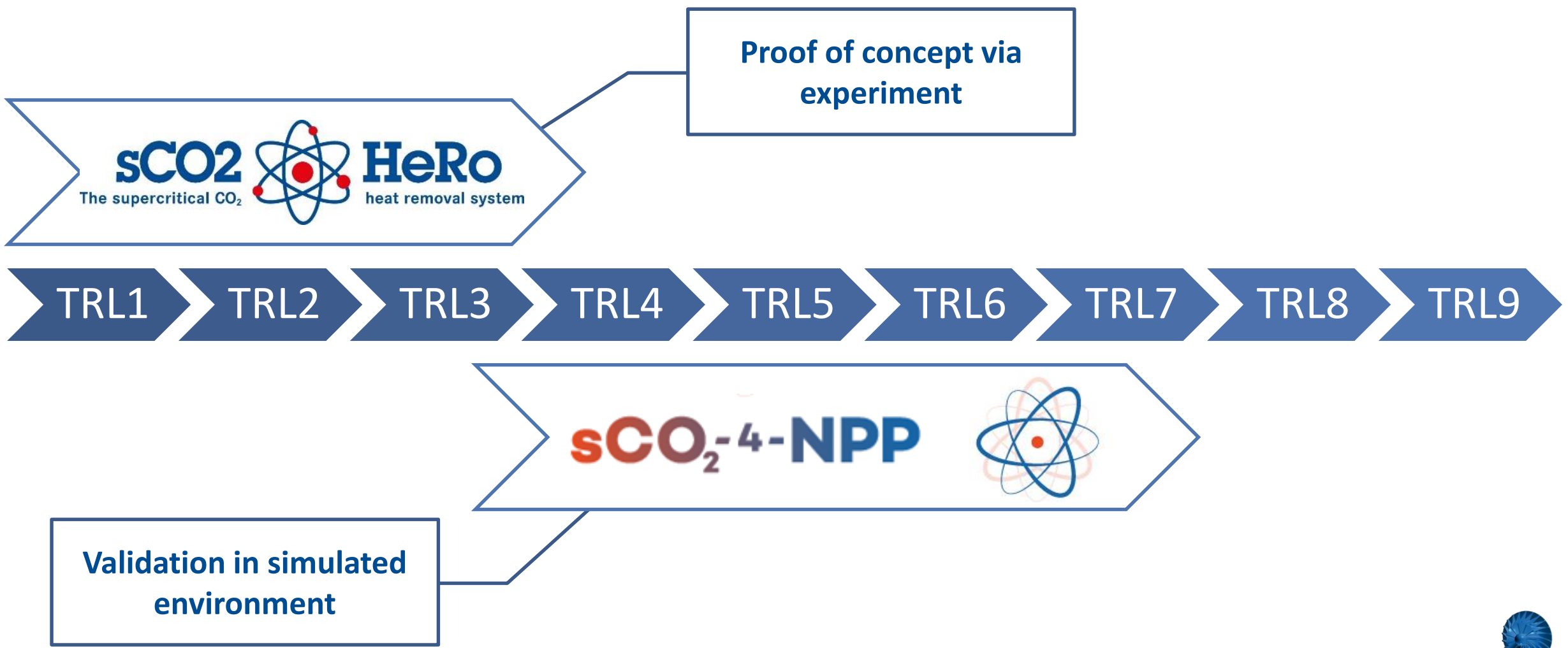
Lessons from testing the sCO₂-HeRo turbo-compressor-system

Haikun Ren, M.Sc. ■ 02-24-2022



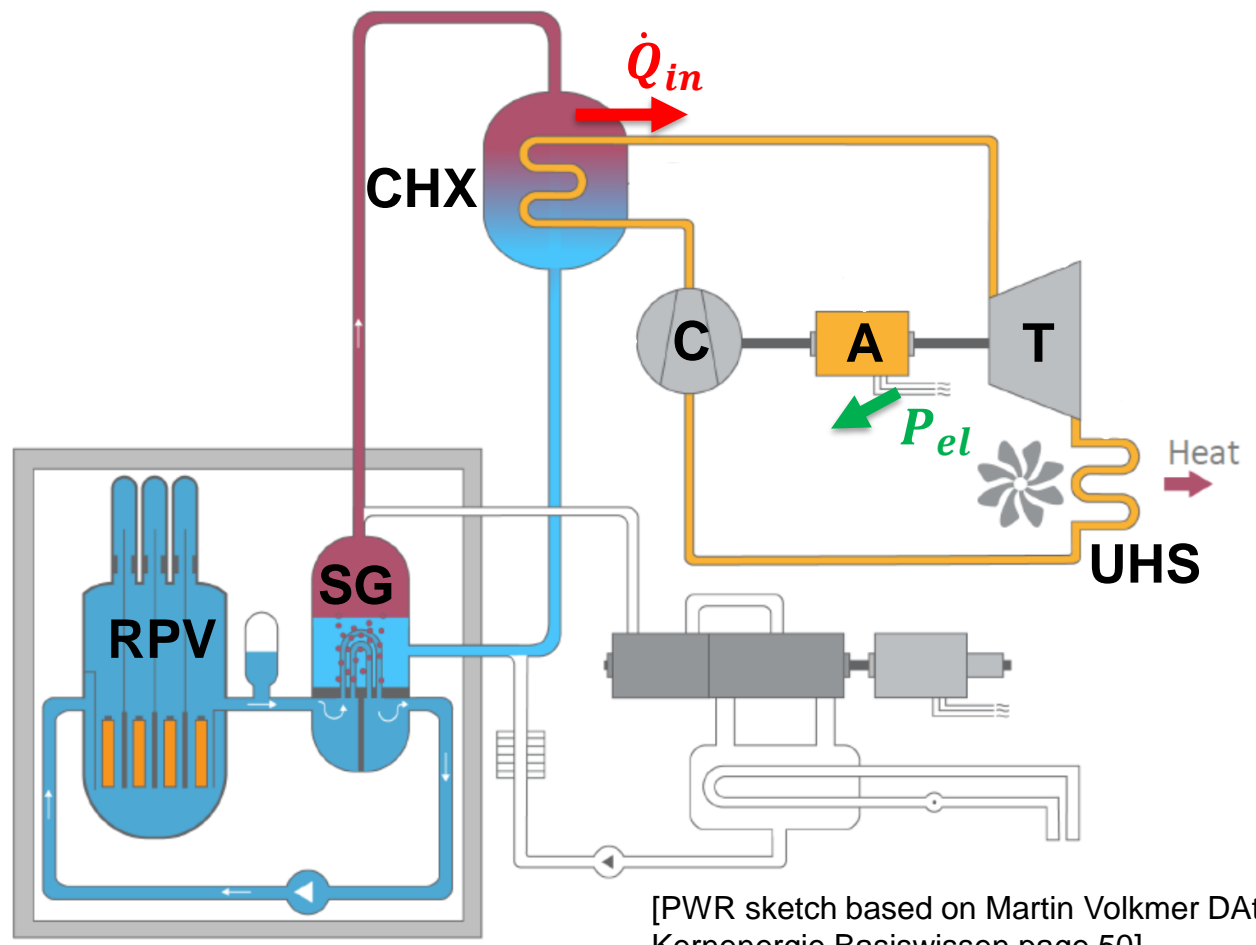
sCO₂-4-NPP

Bring sCO₂-Brayton-cycle technology to market (in terms of NPP)

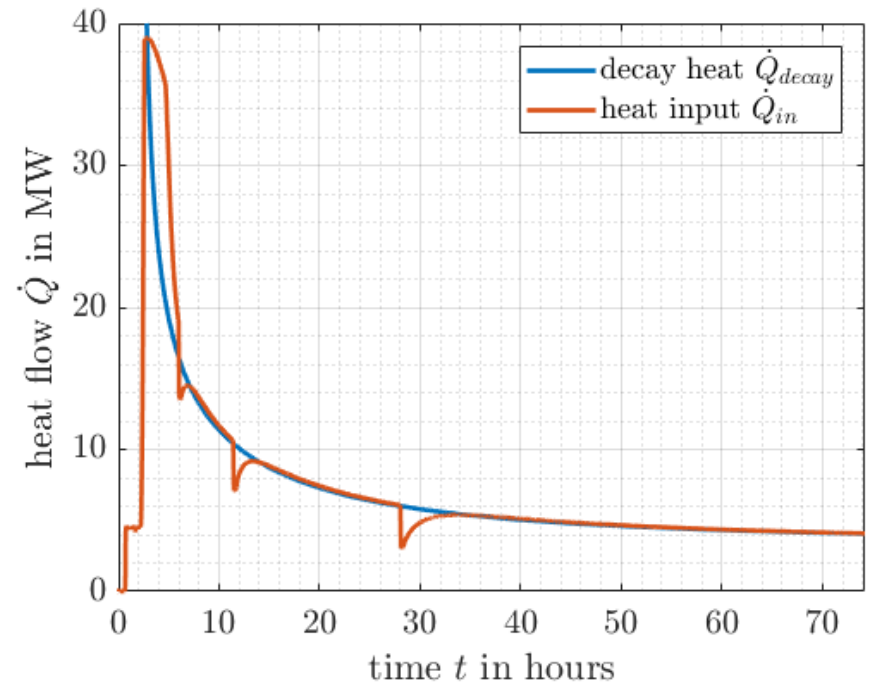


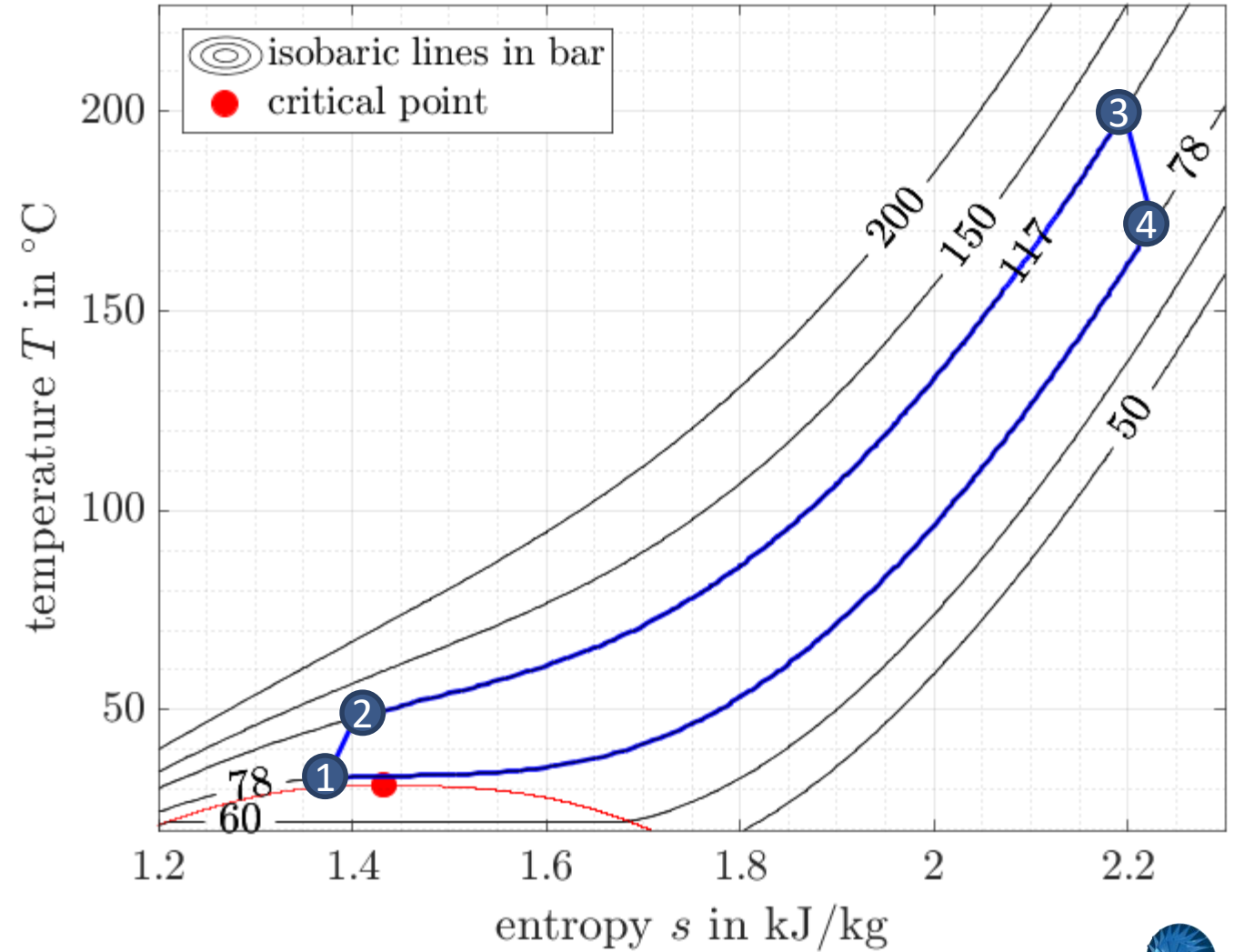
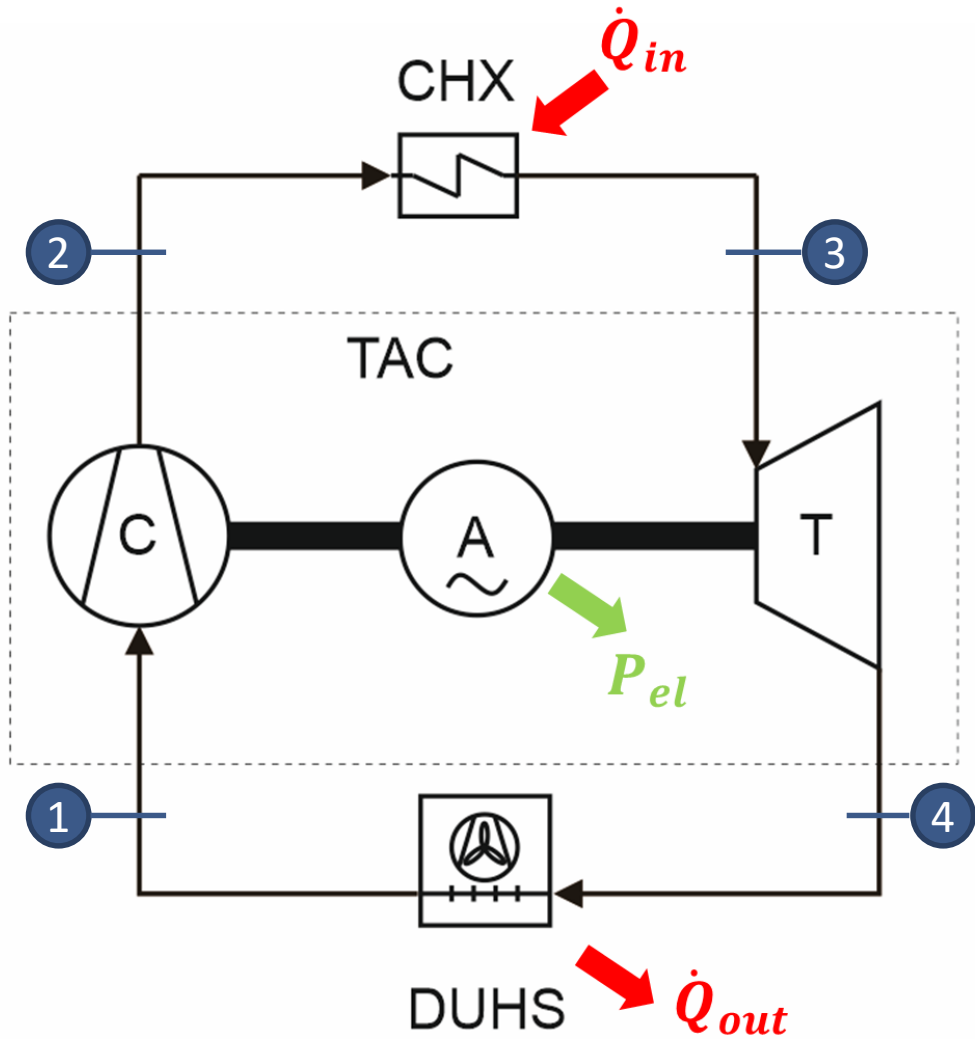
sCO₂ heat removal system

- SBO scenario
- Back-up cooling system based on sCO₂-Brayton cycle

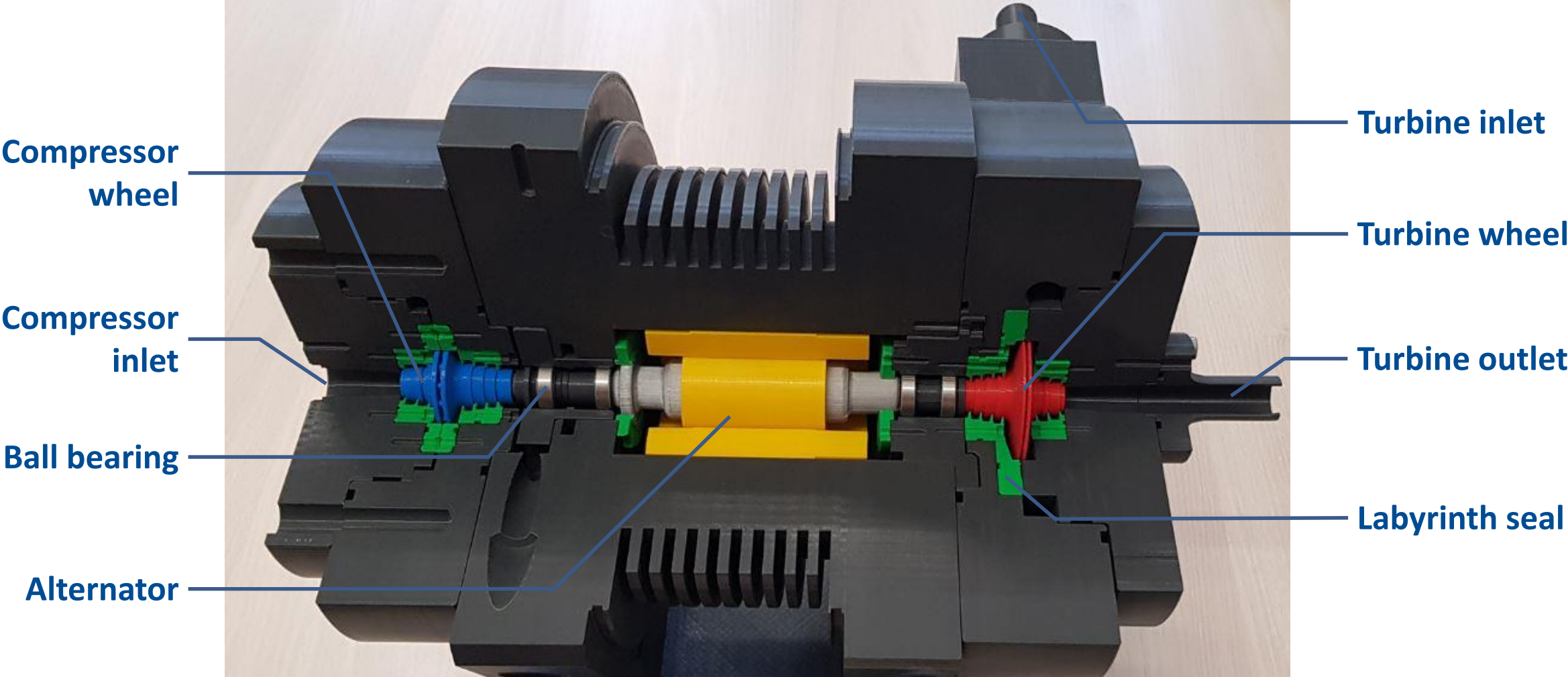


[PWR sketch based on Martin Volkmer DAtF Deutsches Atomforum e.V. Kernenergie Basiswissen page 50]





The sCO₂-HeRo turbomachine



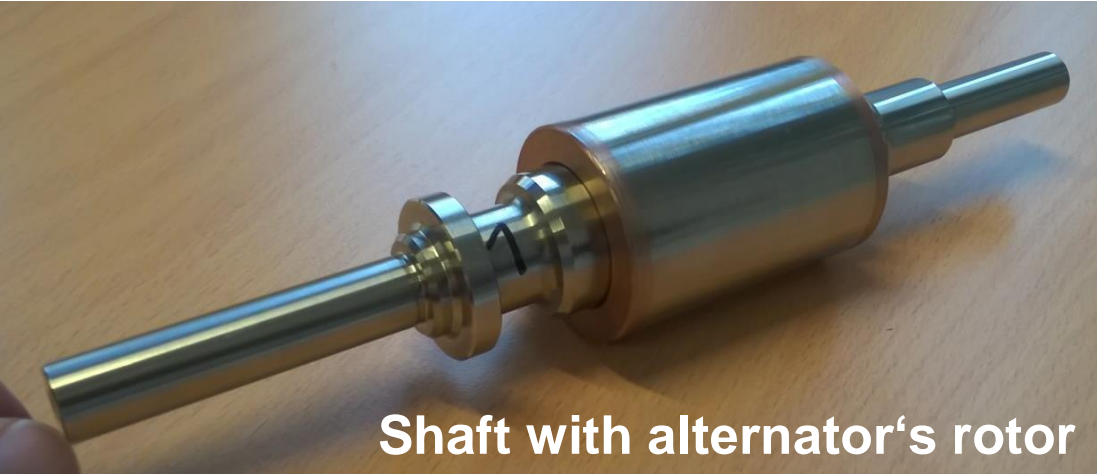
Manufacturing of the turbomachine elements



Alternator



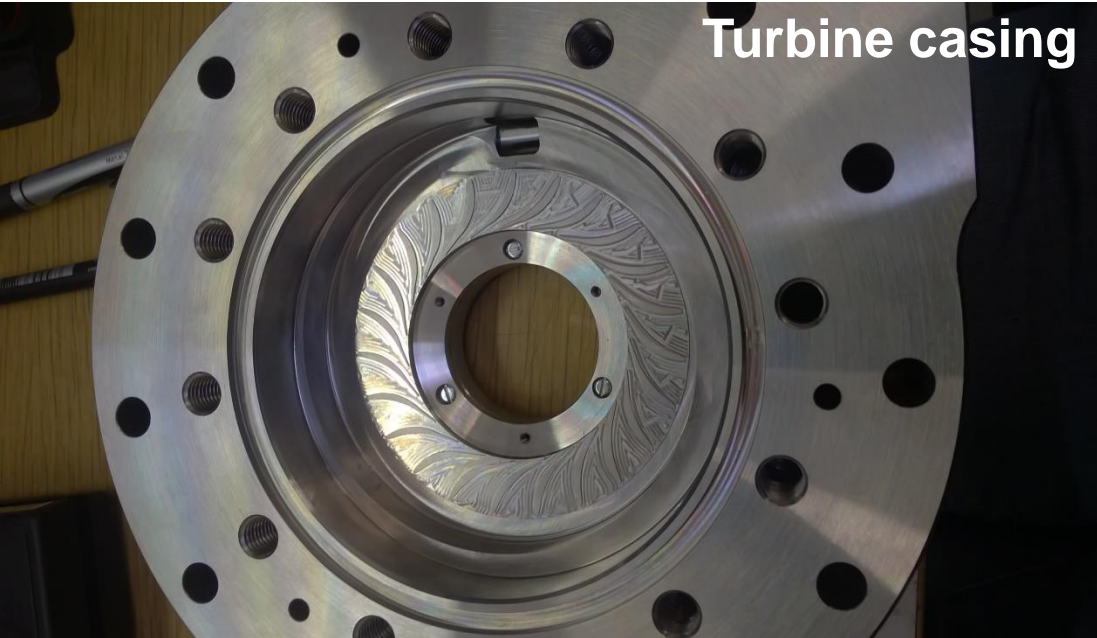
Compressor wheel



Shaft with alternator's rotor

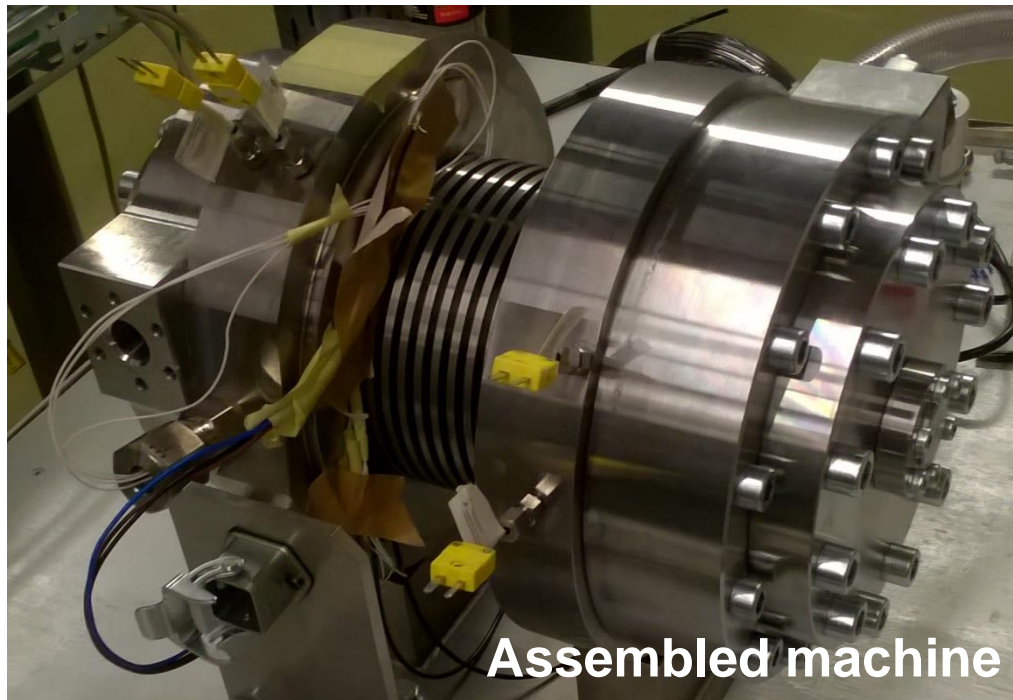


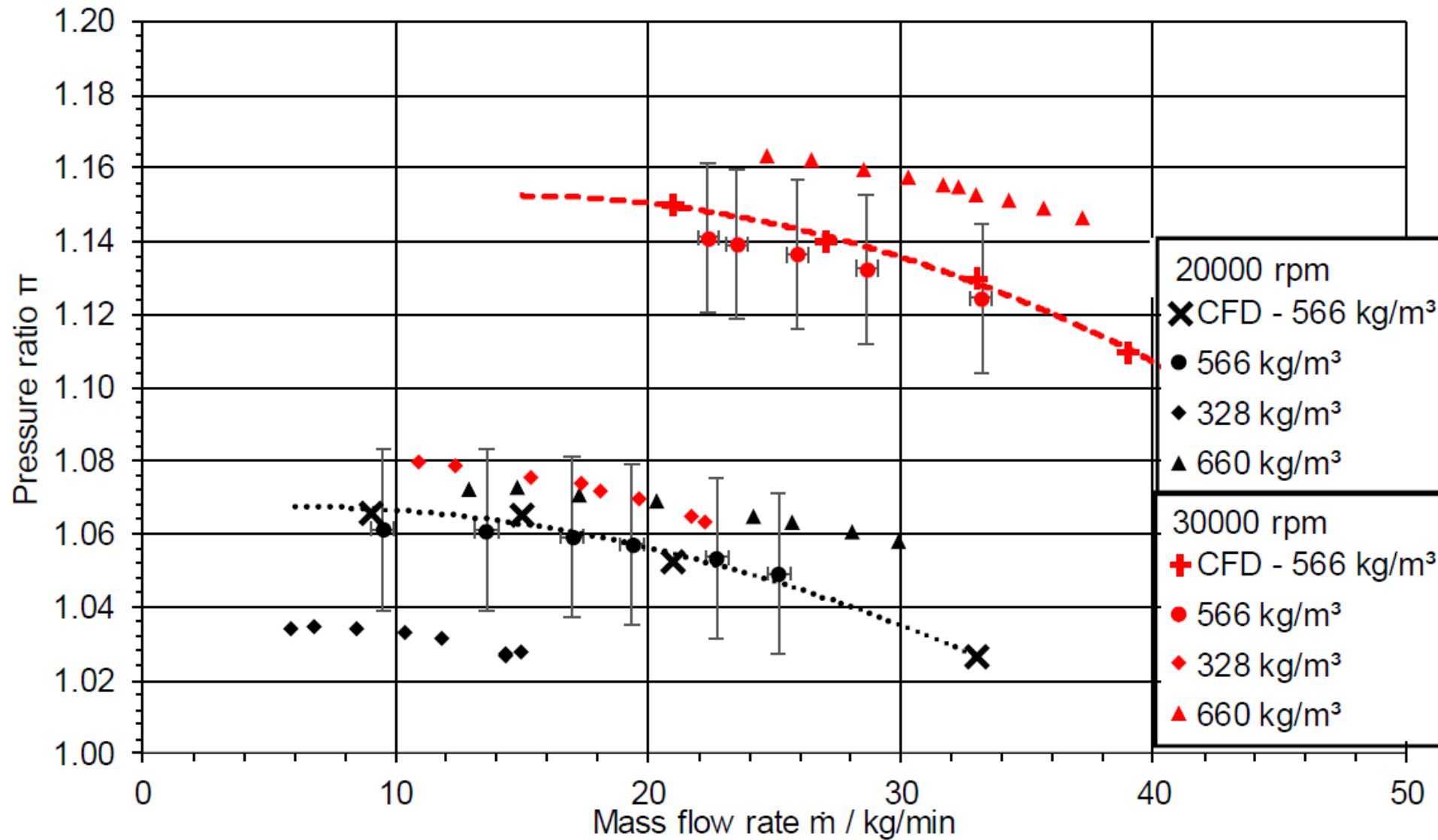
Turbine wheel



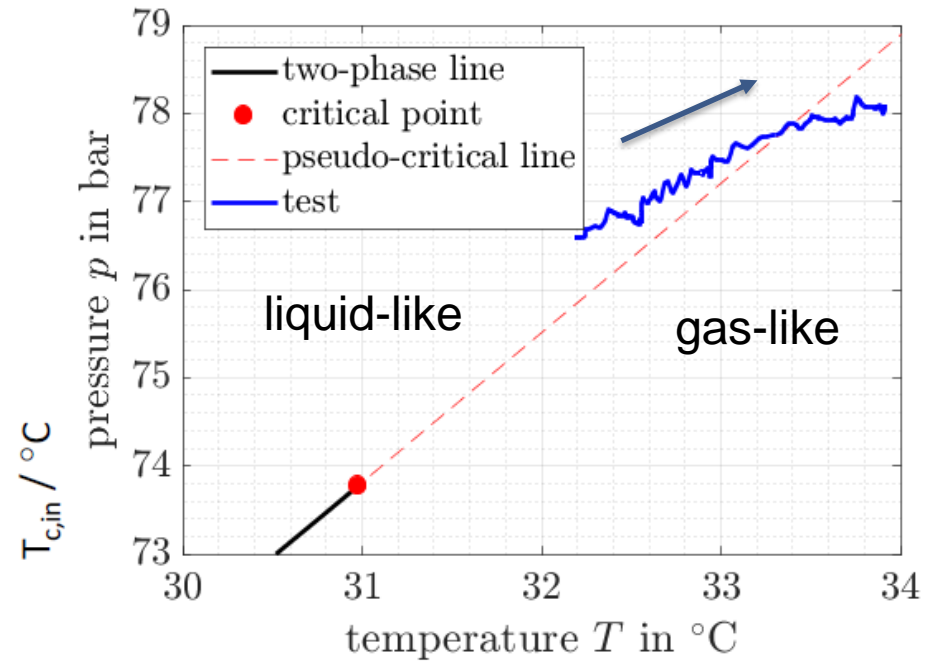
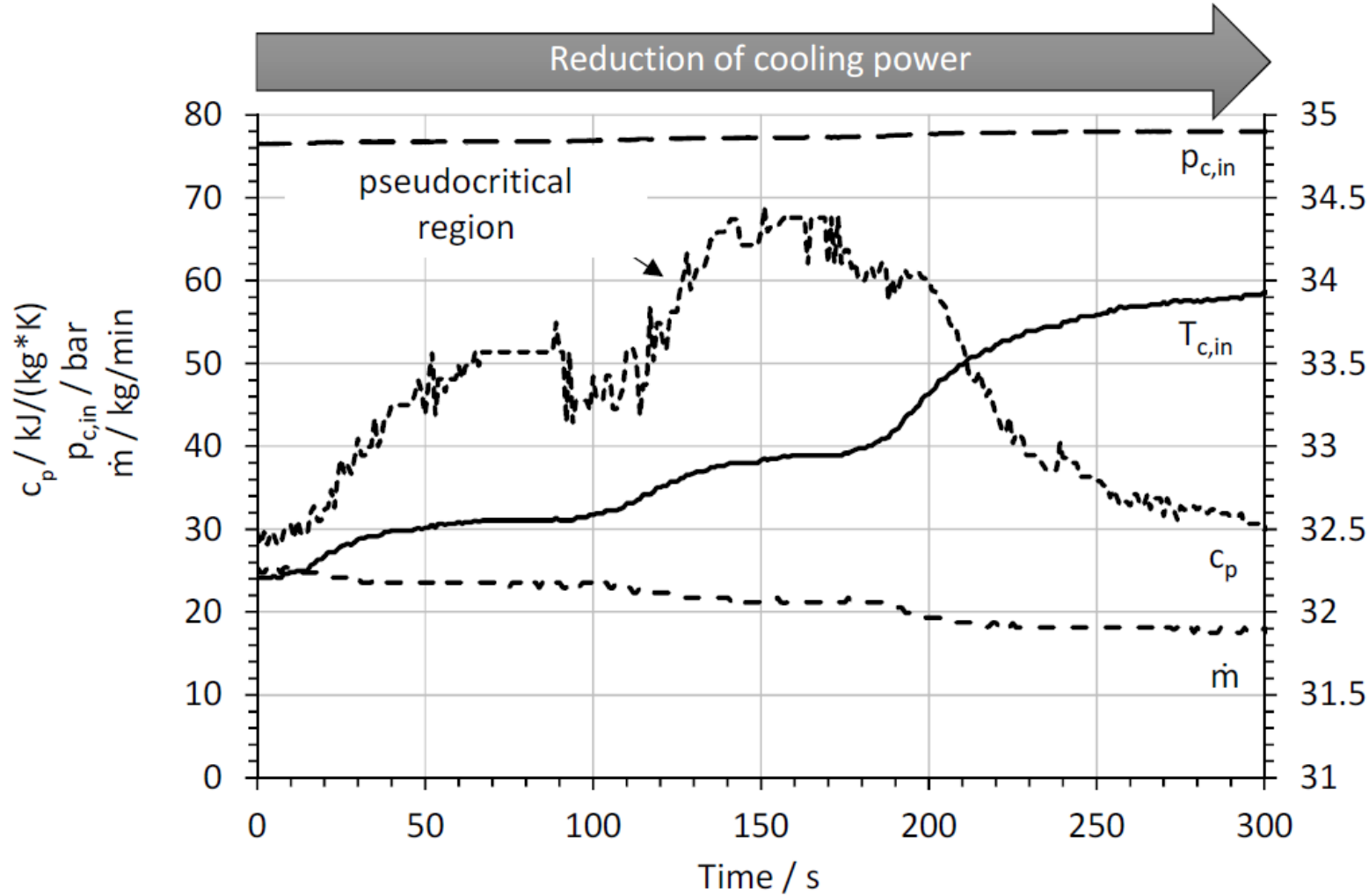
Turbine casing

Assembly of the turbomachine

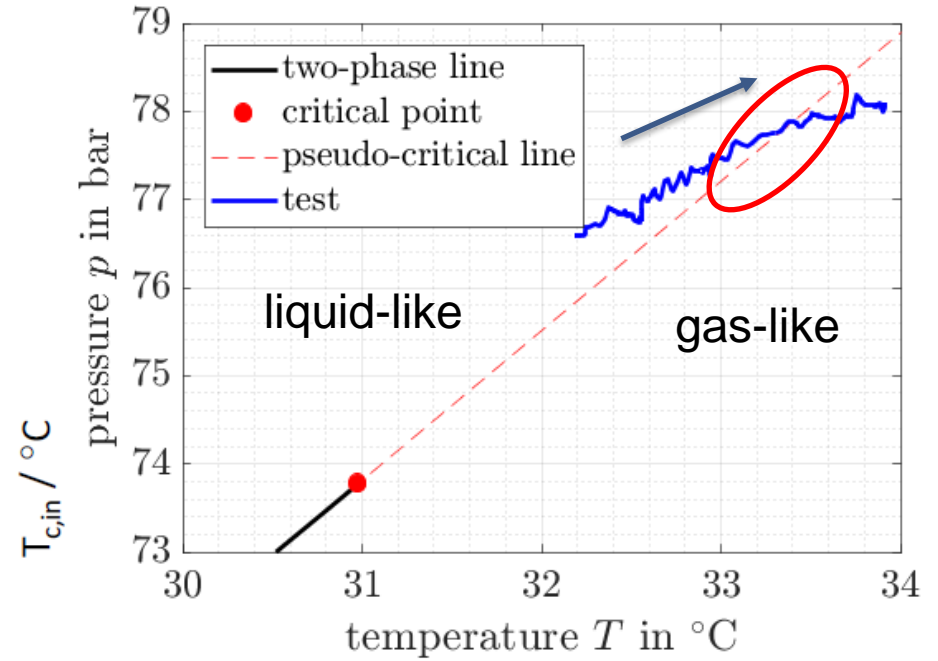
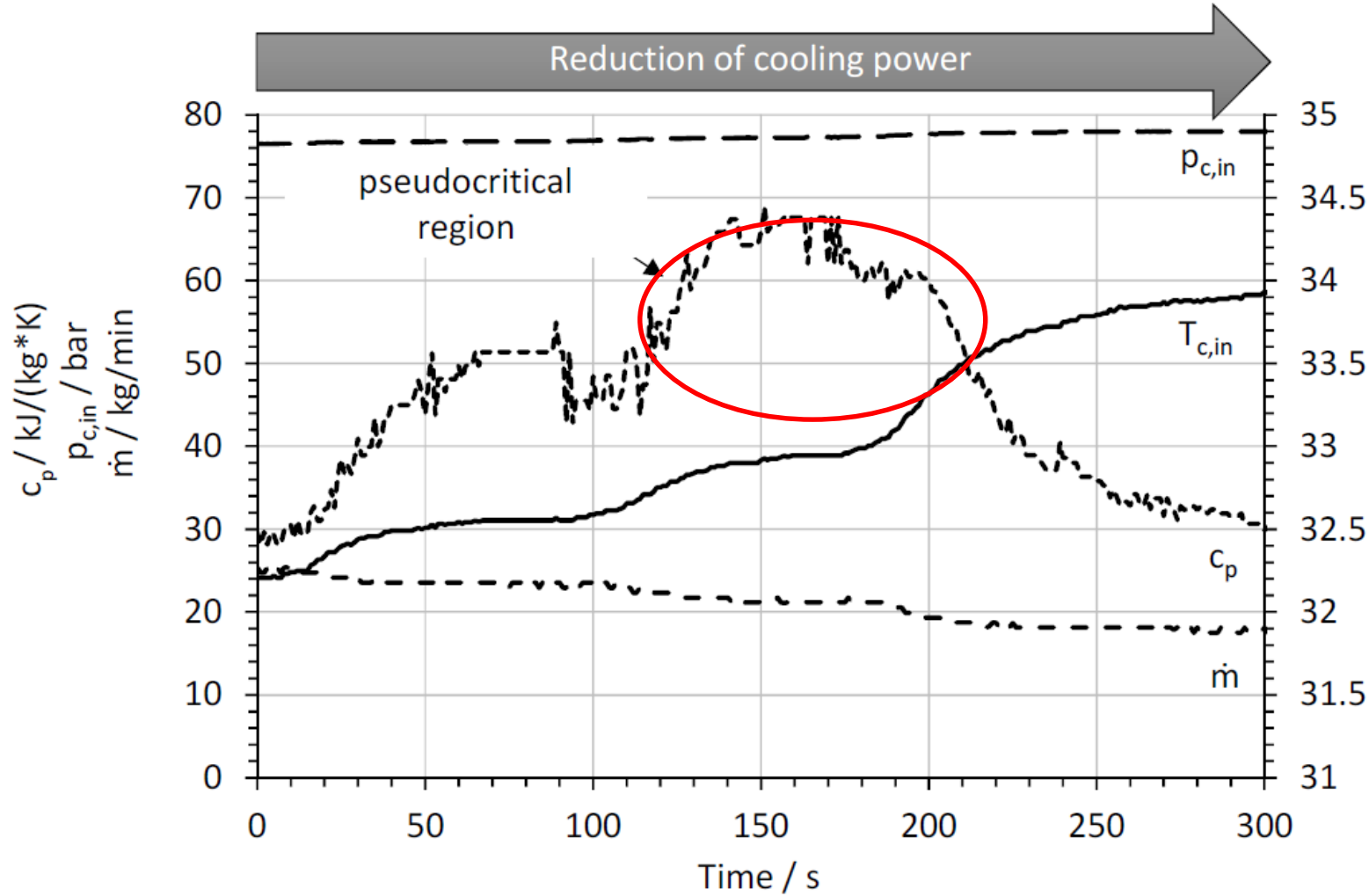




Results of the system testing



Results of the system testing



- **sCO₂-HeRo turbo-compressor-system has been tested in laboratory environment**
- **CFD prediction corresponds to measurement**
- **Influence of inlet density is investigated**
- **Stable operation for sCO₂-cycle is not an issue**



Further works

Further works in sCO₂-4-NPP:

- Further development of this technology for real NPPs
- Further tests in sCO₂-loop connected with the glass model in GfS in Essen, Germany

Potential applications:

- Concentrated Solar Power (CSP) > sCO₂-Flex
- Power generation with certain operating point (high η)



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Thank you for your kind attention!

Contact: haikun.ren@uni-due.de

s.schuster@uni-due.de