

Mechanics and Cooling

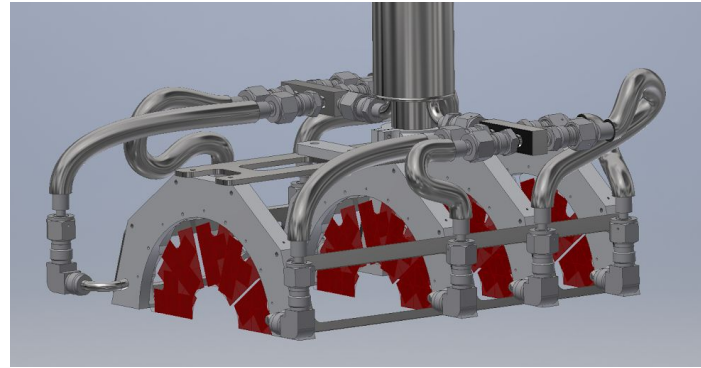
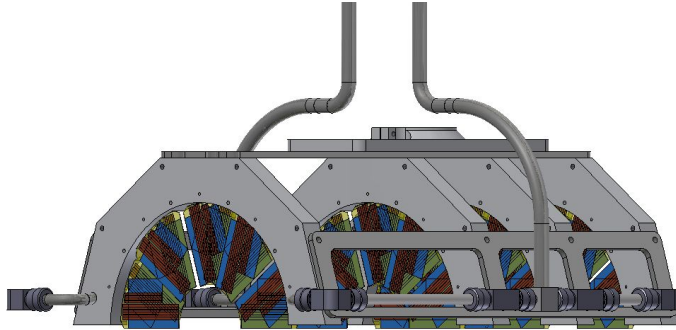
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PANDA Collaboration Meeting
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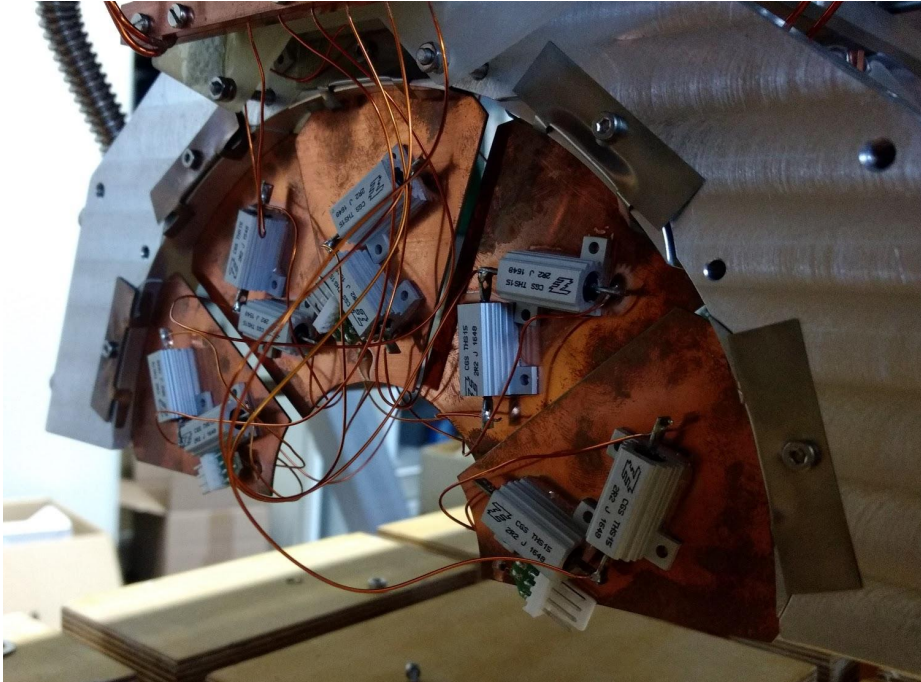
Cooling system: General setup



	sensors	LDO regulators	resistance in flexcables	additional electronics
worst case	1120 W	320 W	160 W	~100 W
likely case	370 W	110 W	20 W	~100 W

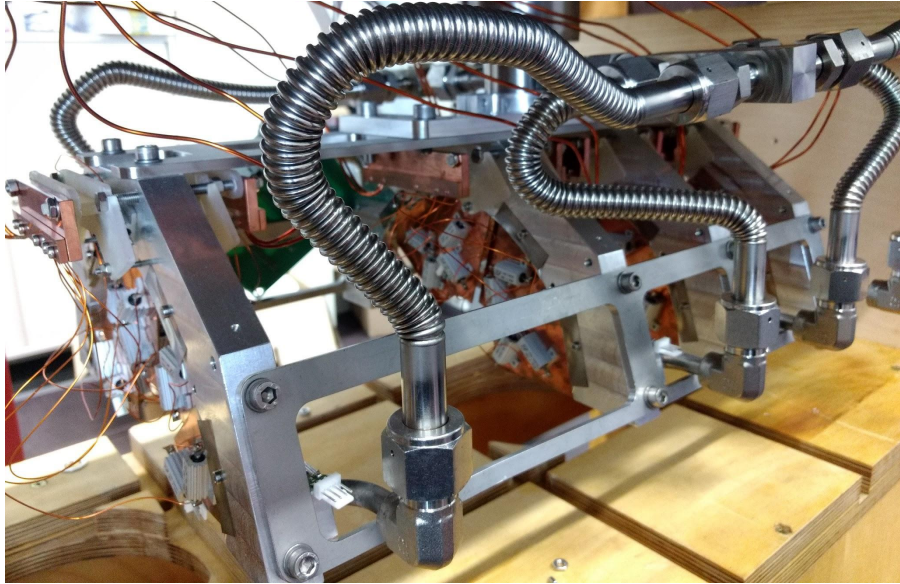
Total estimated heat load per half detector: ~350 W

Cooling test



- For cooling test: copper dummies and high power resistors
- Temperature sensor on each module
- Additional temperature sensors on the half planes

Cooling test



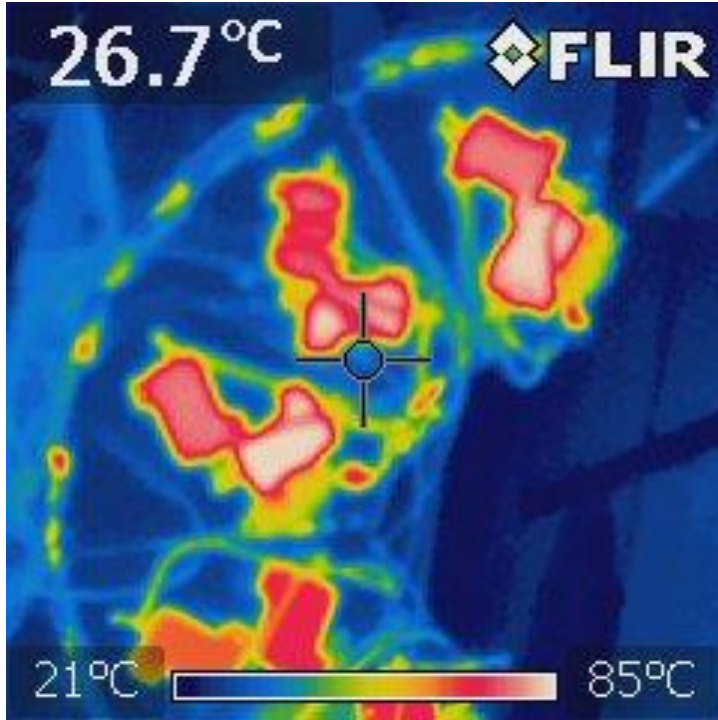
- Complete half detector equipt
- Cooling liquid: Ethanol at $-20\text{ }^{\circ}\text{C}$
- Heat load: 25 W per module

→ Delay due to problems with temperature monitoring:

- Production of necessary PCBs
- Readout of the THMP

→ Test will be done in the next weeks

First test



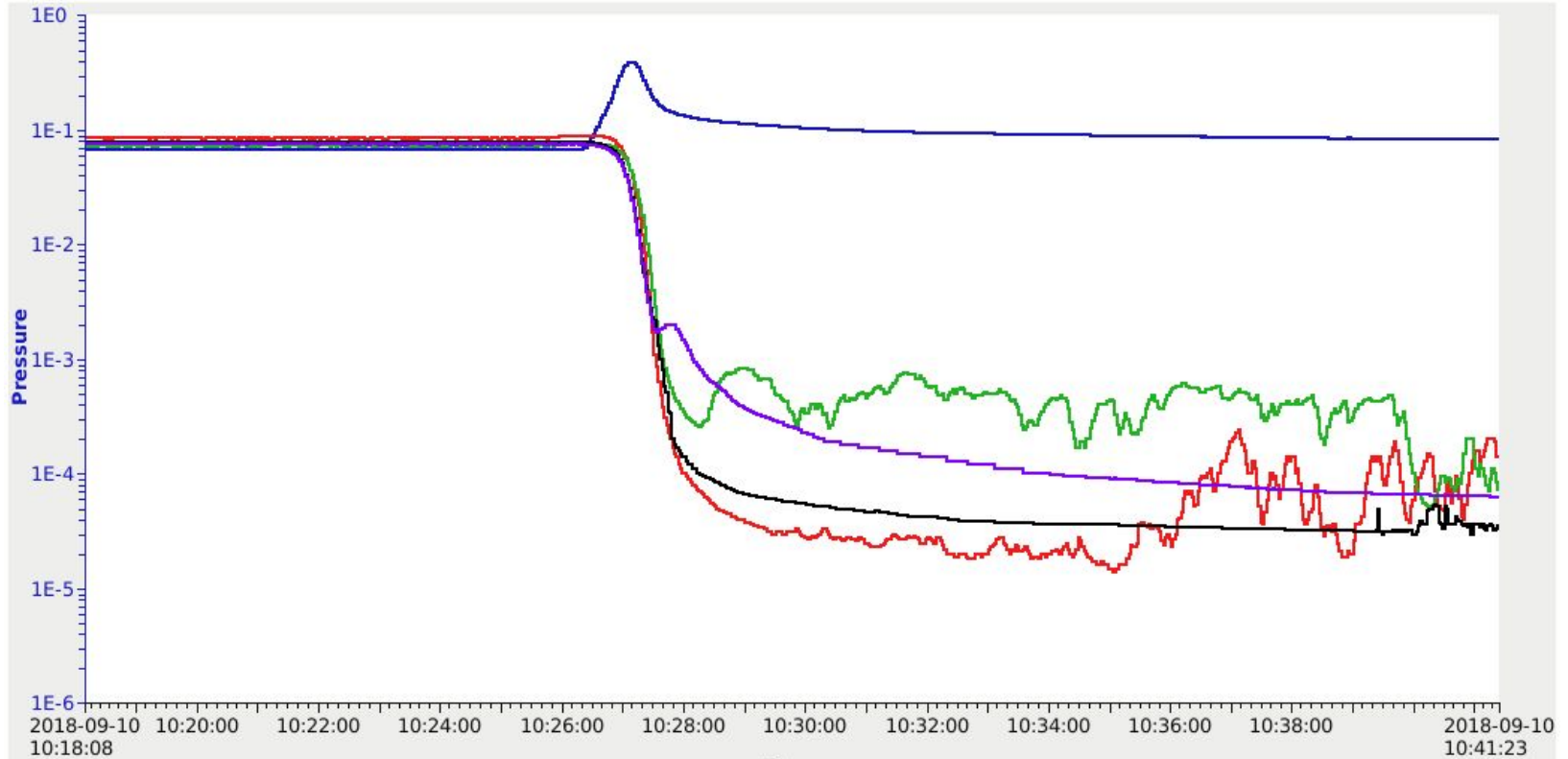
- Test of the cooling and heating elements (resistors) in air
- Total power: ~ 500 W
- Measurement with thermal camera:
 - Resistors: $T \sim 100$ °C
 - Copper dummies: $T \sim 20$ °C

Vacuum test

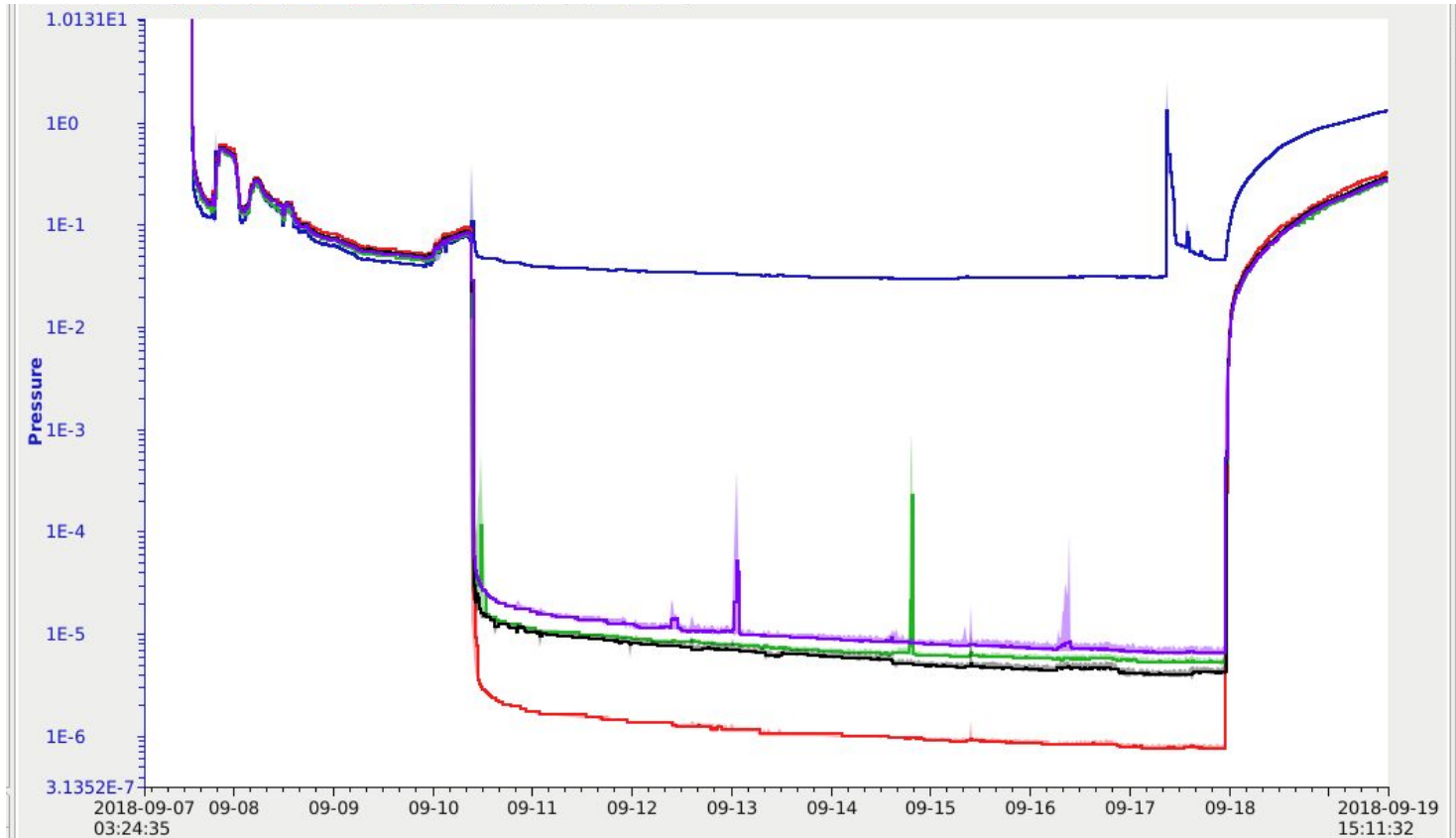


- Beam pipe installed in the box
- No cleaning of the box
- Vacuum box filled with PCBs: approximately the same amount as in the final detector
- Use of a Beagle Bone as control computer of the valves: PLC not ready

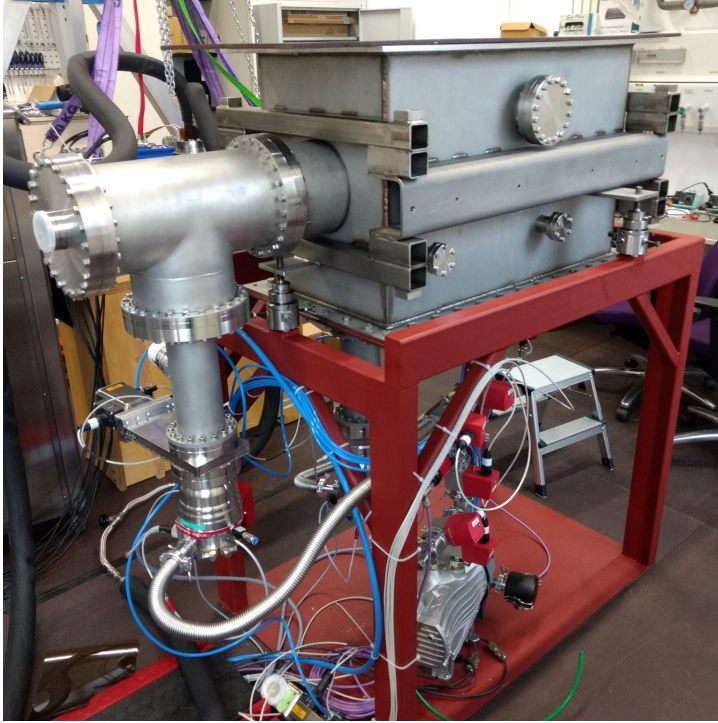
Results



Results



Accident



- Problem with the LAN programmable socket: Relays switched on and off with about 1 Hz
- Control computer has rebooted and closed all valves

Summary



- After two weeks of pumping with material in the box:
 - Vacuum box: $< 10^{-5}$ mbar
 - Beam pipe: $< 10^{-6}$ mbar
- Outgasing of PCBs visible in the pressure measurement
- Connection between vacuum box and beam pipe visible

Conclusion

- Use of an PLC for a safe operation of the vacuum system
- Use of an USV for the PLC and the fore vacuum pump
- Glueing and installation of the inner beam pipe have to be improved
 - prevention of holes in the cone foil
 - smooth surface