



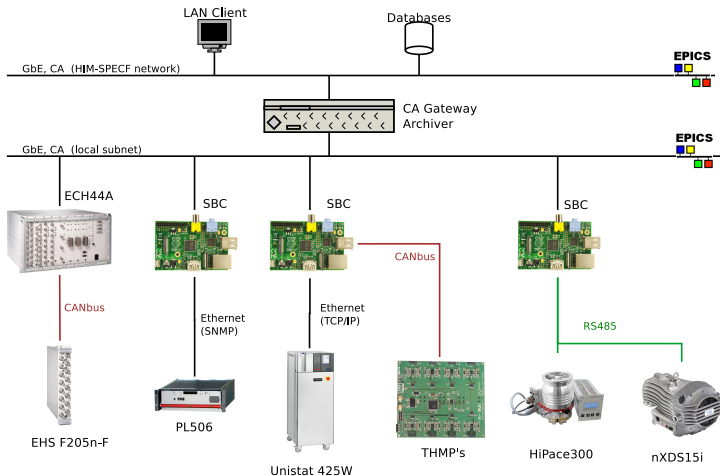
Status of the Detector Control and Vacuum Systems

PANDA Collaboration Meeting 18/1

Florian Feldbauer

Ruhr-Universität Bochum - Experimentalphysik I AG

Current Setup in our Lab



- IOCs running on Single Board Computer (SBC)
- Structure in our lab according to final PANDA scheme

Current Setup in our Lab

What is ready:

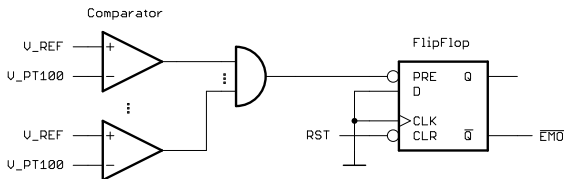
- Power Supplies: HV, LV
- Vacuum System: Pumps, Gauges, Valves
- Cooling: Chiller, Temperature Sensors (THMP, PT100)

What is missing:

- PLC for vacuum system (equipment safety)
- Linear Shift Mechanism: (Motor control, distance sensors)
- Modification of THMP Temp-PBB for NTC thermistor read-out
- MuPix configuration

Equipment Safety I

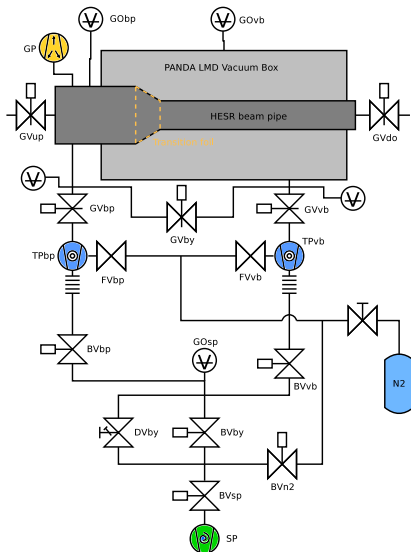
- Electronics operated inside vacuum
⇒ only cooling by holding structure
⇒ Need to switch off LV and HV in case of failure of cooling
- Two PT100 per holding structure plus two on each PCB
- Comparing voltage drop over PT100 with reference voltage



- If temperature too high ⇒ emergency off signal for LV and HV
signal is active low to be fail safe

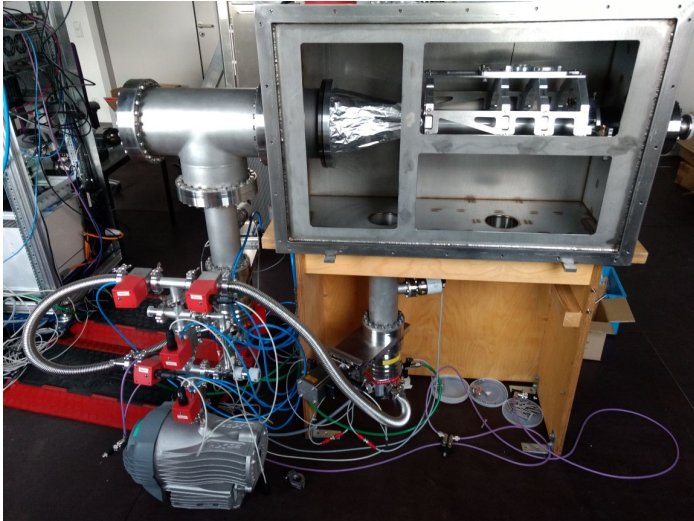
Differential Pumping Scheme

- Thin transition foil
- ⇒ Vacuum in Box required
- Differential pumping to avoid large pressure differences
- Requirement
 - ▶ Beam pipe: $1 \cdot 10^{-9}$ mbar
 - ▶ Vacuum box: $1 \cdot 10^{-6}$ mbar
- First test results
 - ▶ Beam pipe: $6 \cdot 10^{-8}$ mbar
 - ▶ Vacuum box: $4 \cdot 10^{-7}$ mbar
 - ▶ Only turbo pumps



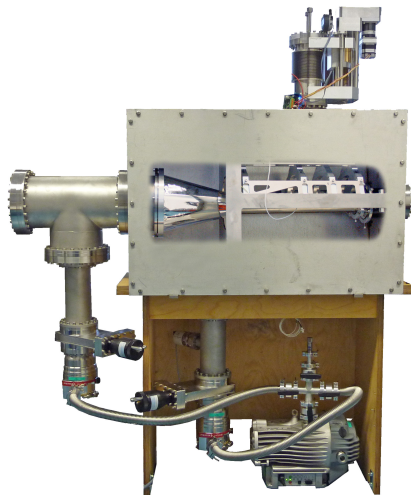
Differential Pumping Scheme

Vacuum system attached to old prototype



Stress Test

- First prototype measurements performed with manually operated valves
- Forgot to open valve *BVvb* between fore pump and turbo pump at vacuum box
- Glueing of beam pipe broke at downstream flange, foil undamaged



Control of Vacuum System

Current status

- Pumps and Gauges read out via RS485 bus
- Electro-pneumatic valves controlled via GPIOs from SBC

But: Controlling valves/pumps via multi-purpose OS is dangerous

- Software might fail
- Processor might be blocked by other processes
- Valves might be opened/closed by other processes

⇒ Equipment Protection System (EPS) needed!

Instead of controlling valves/pumps directly with EPICS use a PLC

Leakage in vacuum system

- Inform accelerator crew
- Close quick-acting gate valves to HESR
- Open a bypass valve between Vacuum Box and Inner Beam Pipe

Power Outage

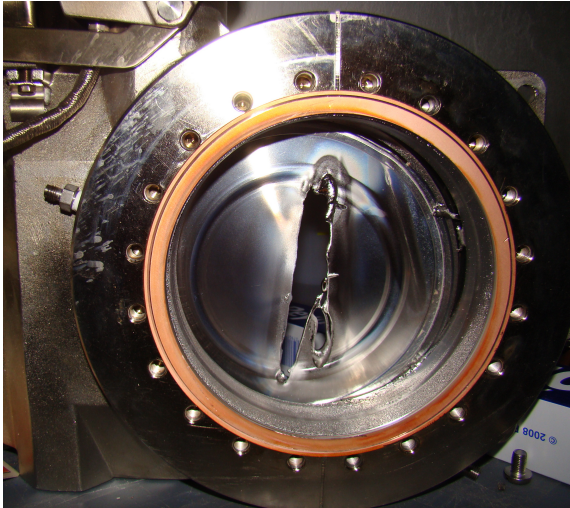
- All valves currentless closed (except bypass)
- Large hose between compressed air filters and manifold ⇒ reservoir
- Turbo pumps act as generator to safely shut down

Summary and Outlook

- DCS is mostly finished and tested
- Setup according to PANDA scheme
- First parts of PLC for Vacuum System just arrived
- Test of Vacuum System with new Prototype to be performed very soon

Backup

When "vacuum goes bad"



Valve in beamline X-16 at NSLS. Probably around 1988