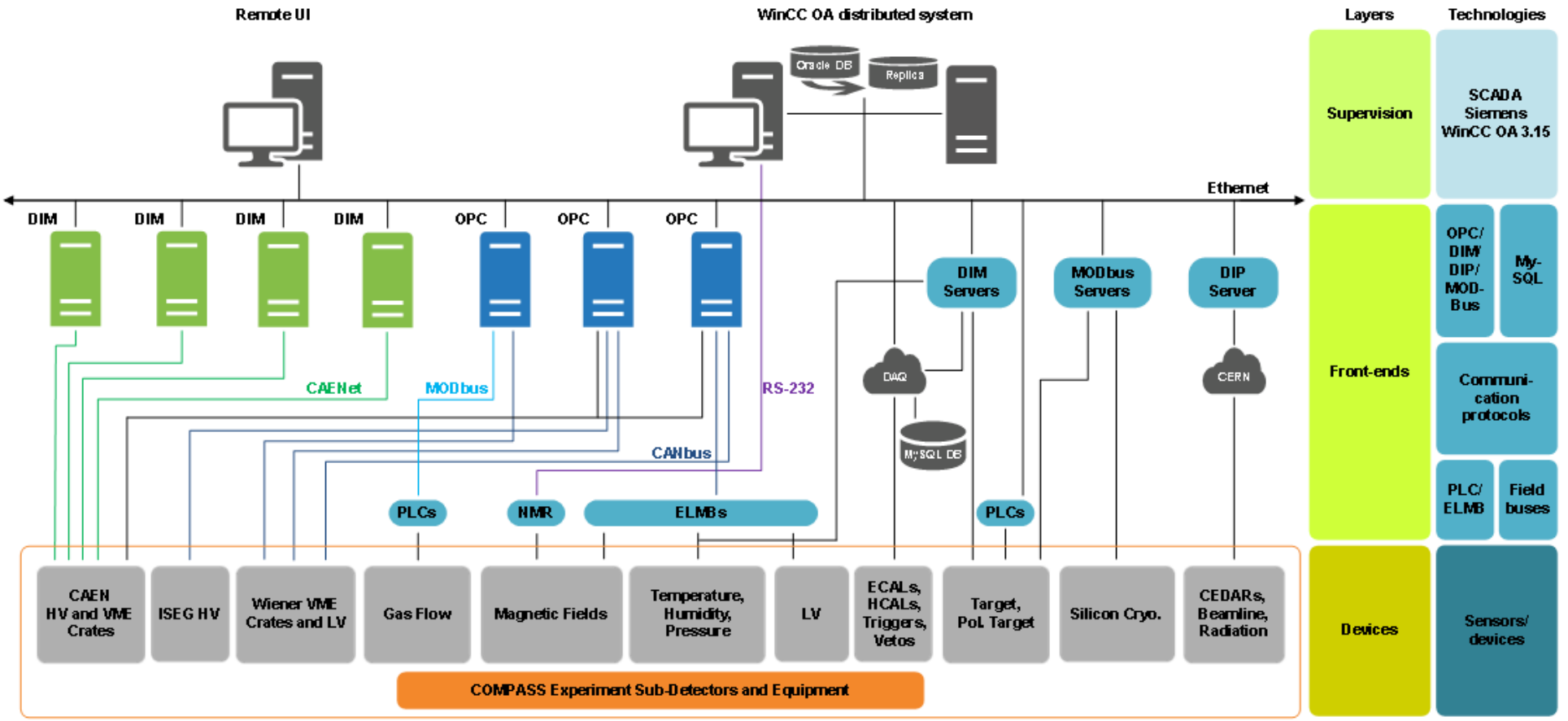
COMPASS Detector Control System

Jornadas LIP 2018, Évora

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

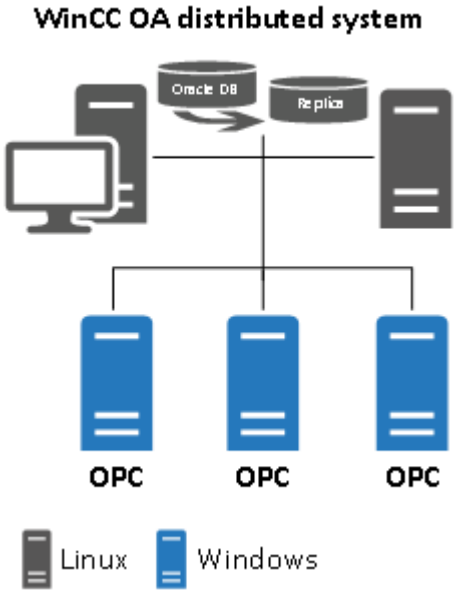
CERN/FIS-NUC/0017/2015
CERN/FIS-PAR/007/2017

The COMPASS DCS is an exclusive responsibility of the LIP Lisbon group – since 2003



Allows to monitor and control equipment from all detectors and related external systems

General Activities



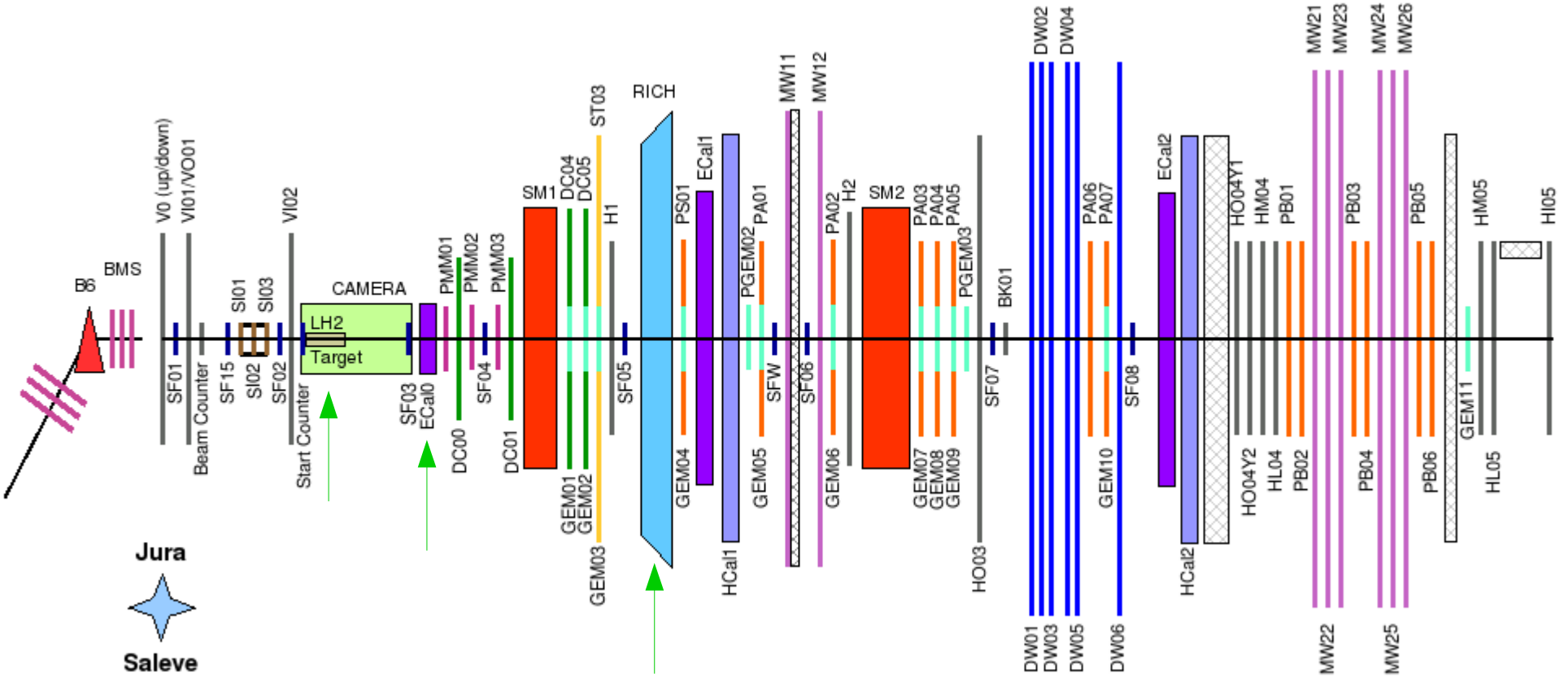
WinCC OA 3.11 deprecated after Extended Year-End Technical Stop (EYETS) 2017

- Upgrade to WinCC OA 3.15*
  - Test and validation
    - Individual components
    - Whole system
    - Migration of production project

*Installation of CERN CentOS 7 on Linux machines
- SLC6 not supported

General improvements:
- Scientific notation added to trending plots linear scale
- HV scan settings tools/procedures
- Radiation environment monitoring
- Beam line monitoring

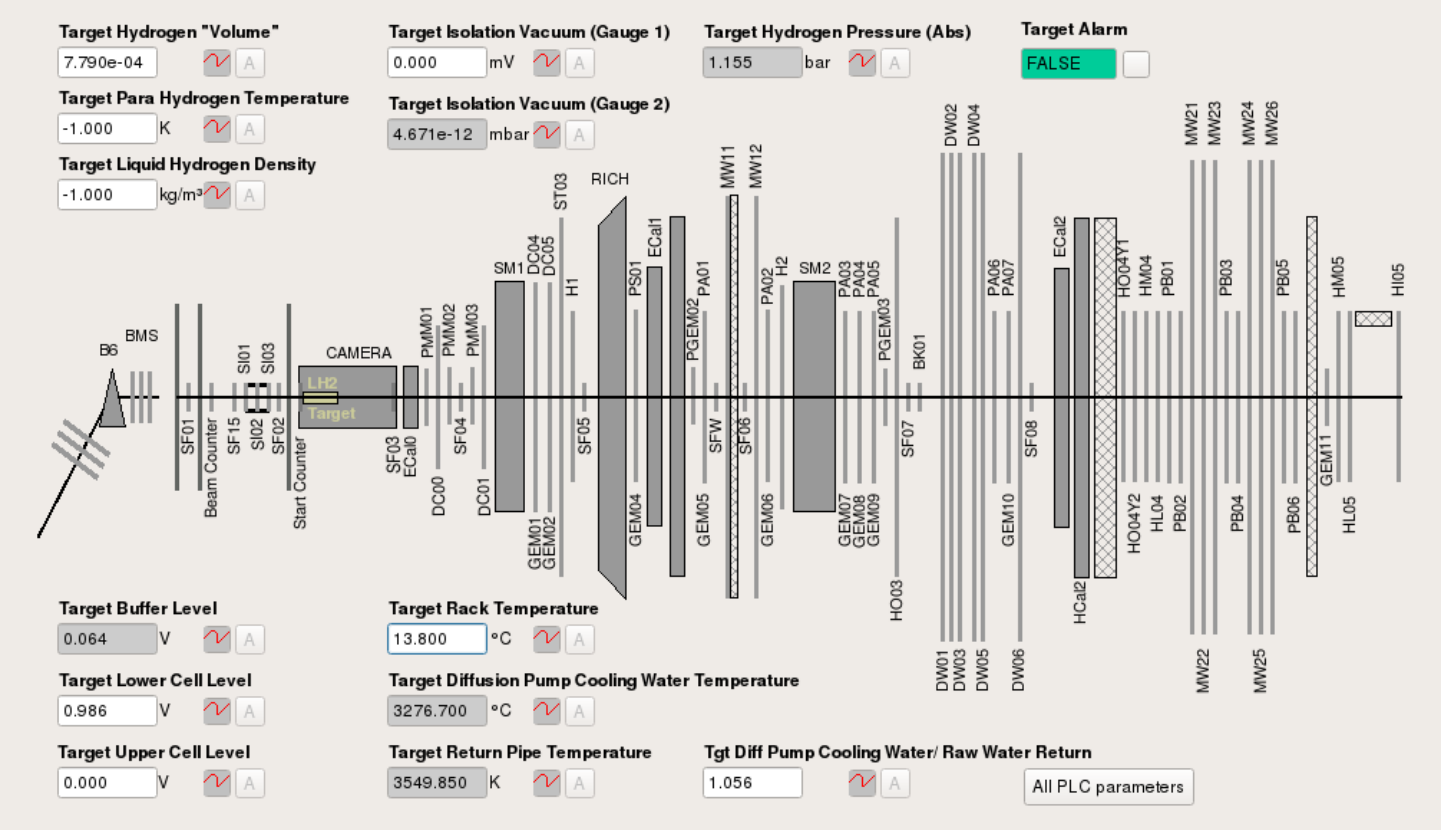
2016 - 2017: Deep Virtual Compton Scattering (DVCS) data taking



2016: 210 days with beam
2017: 168 days with beam

→ Stable DCS

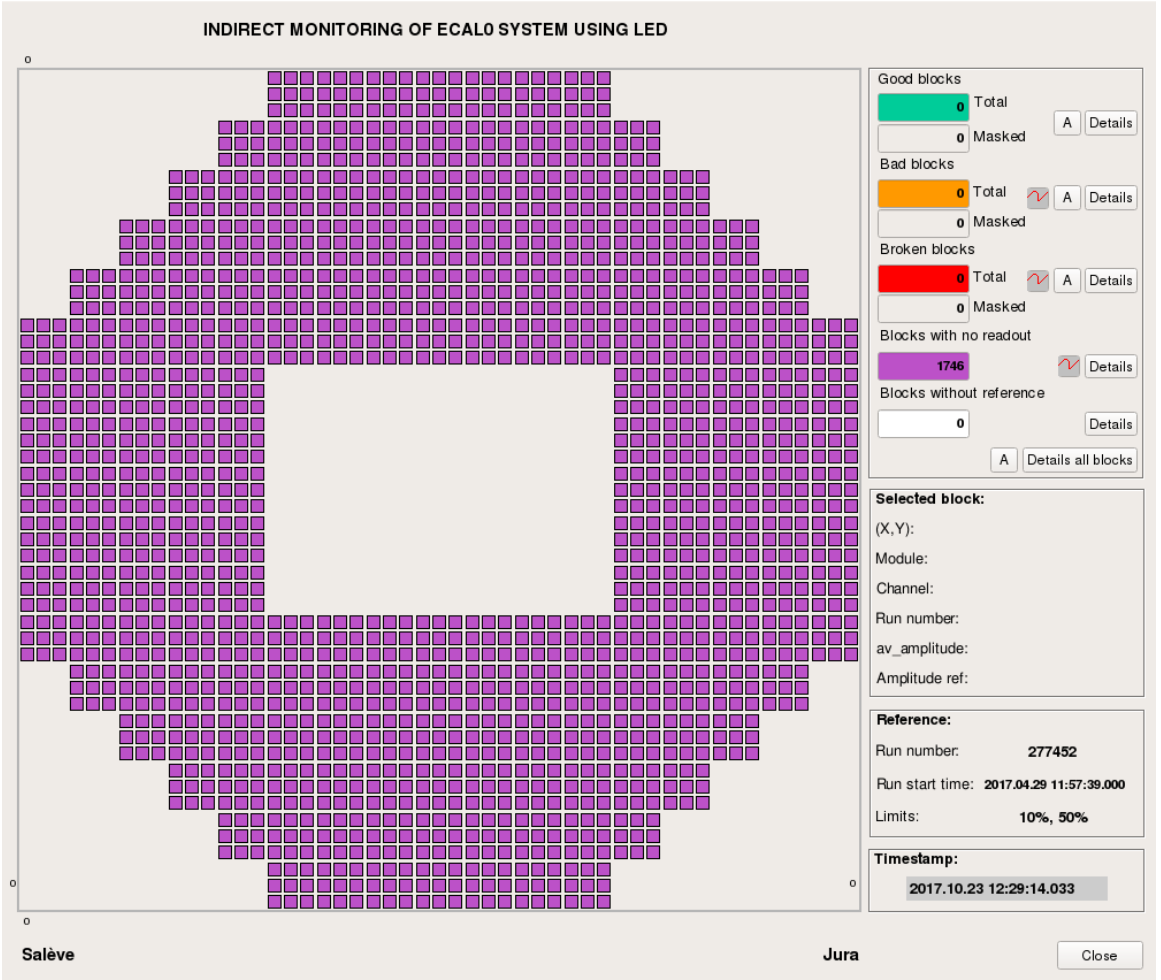
DVCS: LH_2 Target



Connection to Siemens S7-1200 PLC via S7 driver

Alerts and SMSs → Useful for the diffusion pump/isolation vacuum incident in 2016!!!

DVCS: ECal0



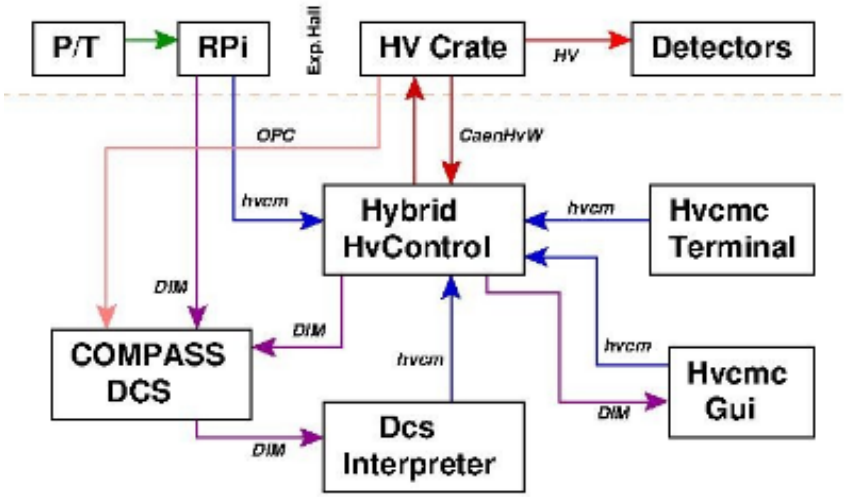
Cooling and ventilation system
- Control and monitoring
- Connection to Schneider PLC via OPC-DA Server

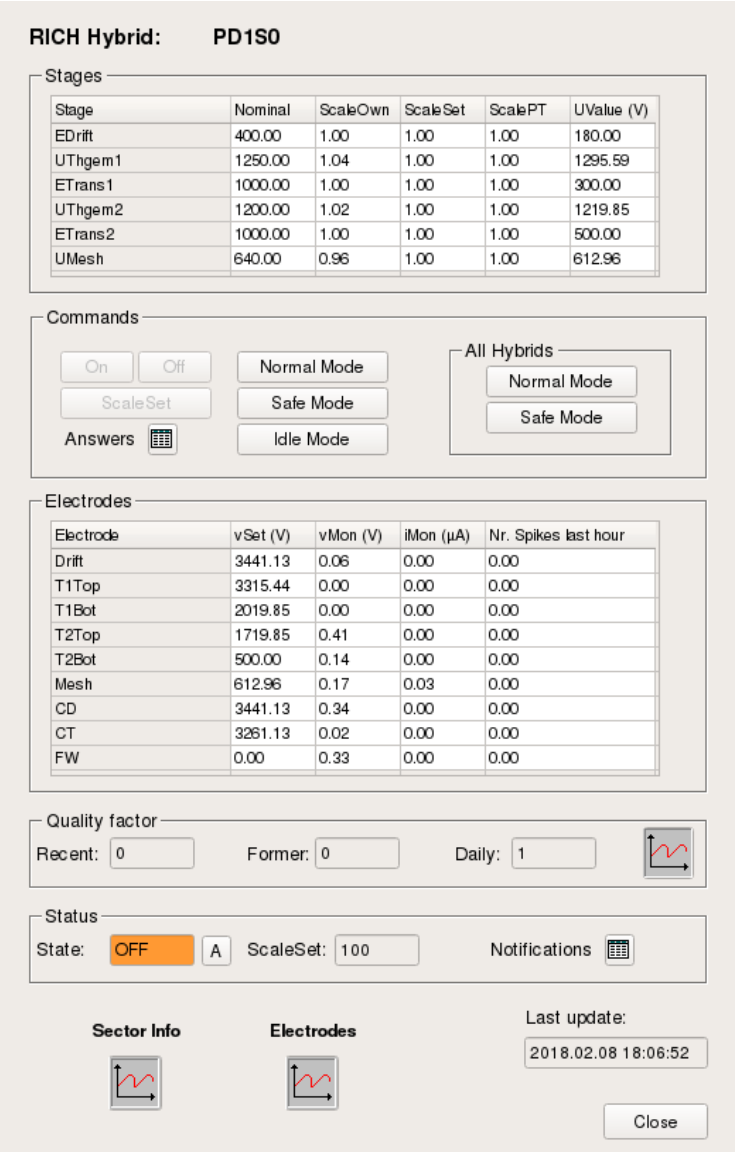
HV, temperature, LED
- Monitoring only
- Regular SQL queries and HTTP GET requests to different systems

DVCS: RICH Upgrade

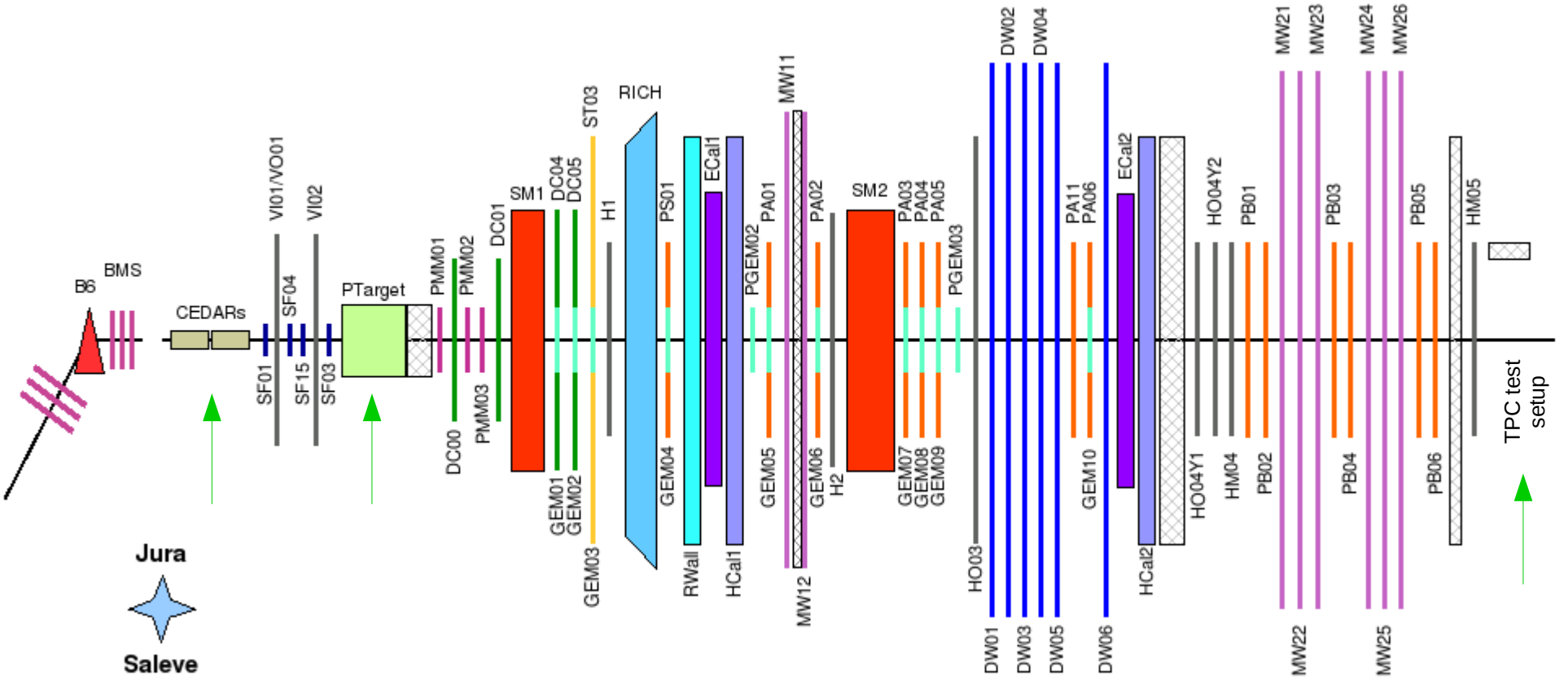
Scope
- 4 new photon detectors
  - Multistaged THGEM-MM
  - Continuous HV adjustment related to T and P

DCS
- Gas system
- Temperature and pressure
- HV



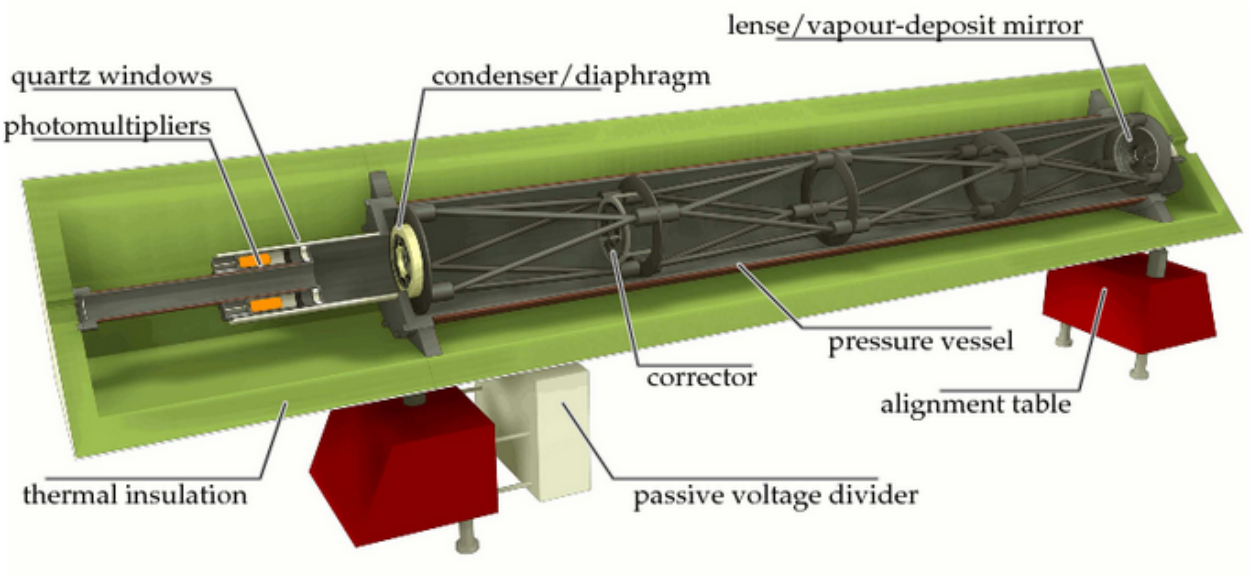


2018: Polarized Drell Yan data taking



2018: 217 days with beam expected

Polarized Drell Yan: CEDARs Upgrade

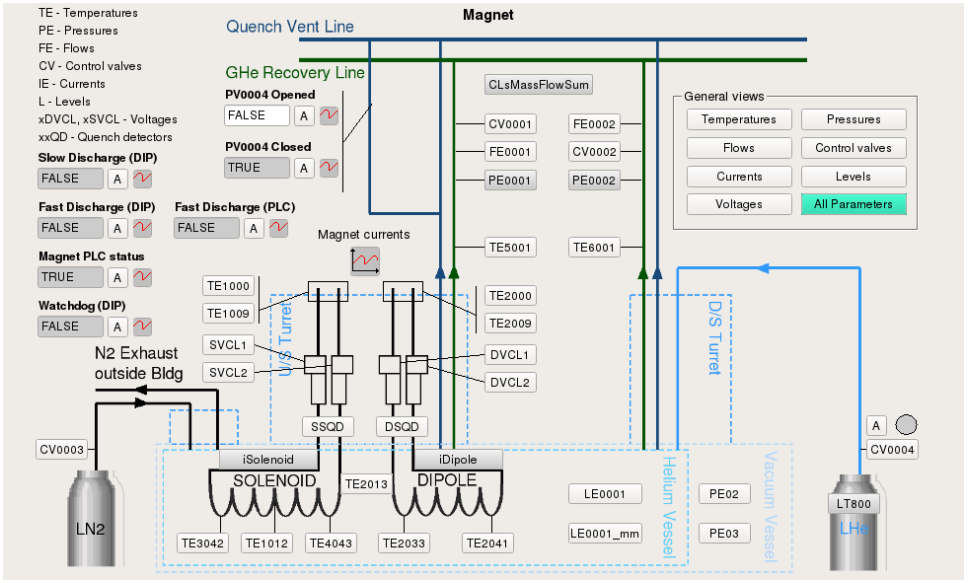


Project scope:
PMTs, gain monitor, readout
Thermal system

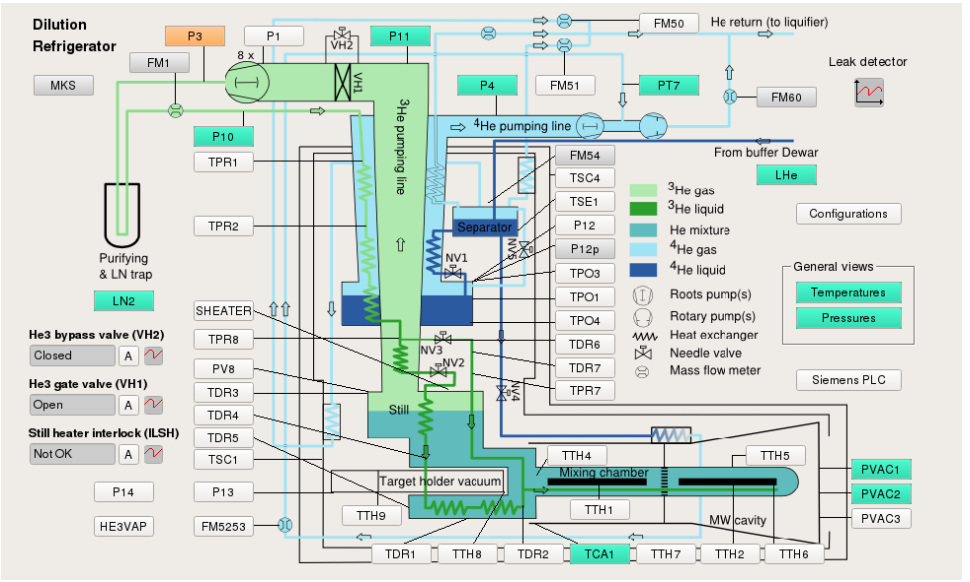
Purpose of the project:
withstand higher rate
(~10^8 particles/s)

DCS to be updated!!!

Polarized Drell Yan: Polarized Target

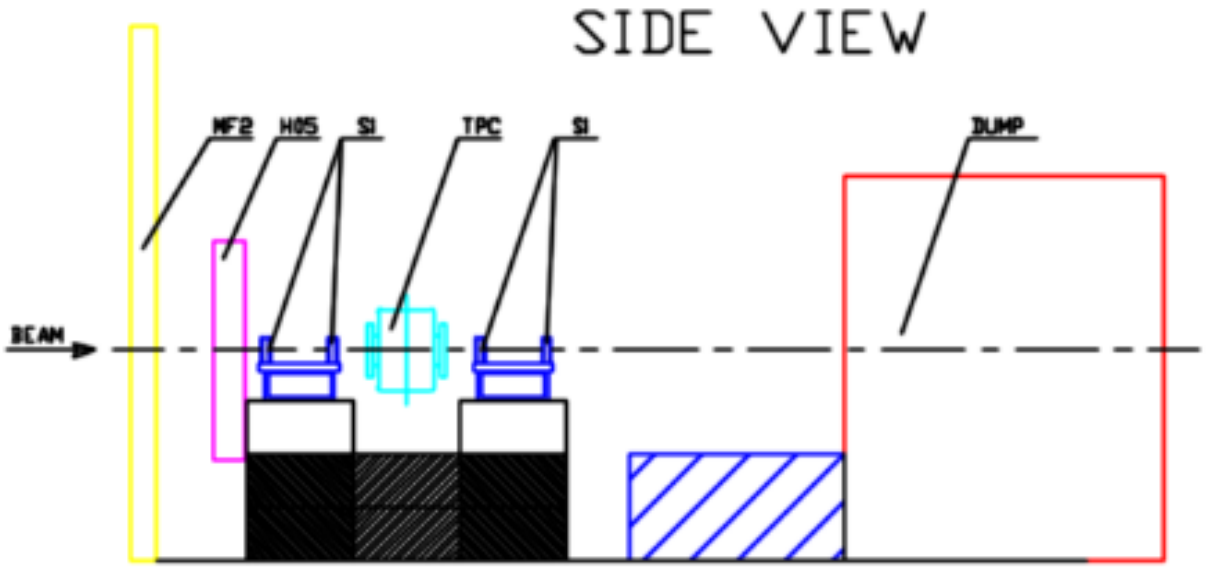


Magnet
Dilution refrigerator
Microwaves
NMR
Pumps



Monitoring and control of new parameters expected.

2018: TPC Test Setup



(downstream of the usual COMPASS setup)

Request to integrate the 4 Silicon stations in the DCS:

- HV
- LV
- Power switches for ADCs
- Temperature

What's next?

CERN Long Shutdown 2 (LS2)

- Next possible data taking in 2021
- OPC-DA is being phased out → Need to move to OPC Unified Architecture
  - CAEN, Wiener, Iseg, Schneider, CANOpen
- WinCC OA → new versions might be introduced

COMPASS DCS hardware is getting old

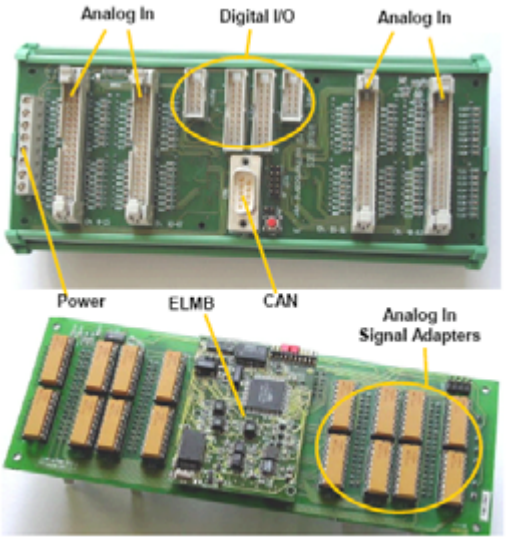
- PCs will be at least 10 years old in 2021
  - They are already close to WinCC OA 3.15 minimum requirements
  - We shall not expect them to run stably for many more years
- PCI cards being used for CAN networks
  - Phased out
  - Not supported/recommended by CERN anymore

Good opportunity to test new control solutions!

Example: Embedded Local Monitor Board (ELMB)

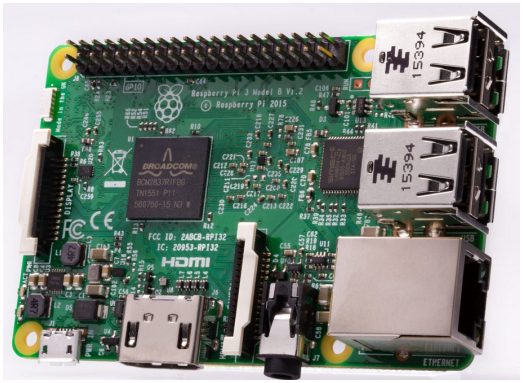
ELMB:

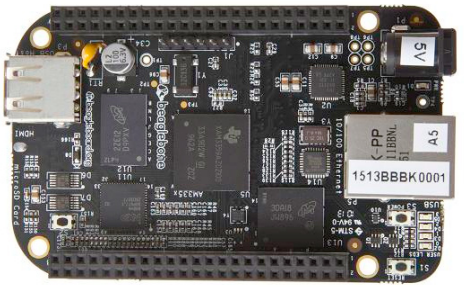
- General purpose plug-on I/O module
- CANbus industry standard
- CANOpen as high-level communication protocol
- Used to read analog inputs
  (such as temperature sensors, voltages, etc.)
  and for digital input and output.



Nowadays, other boards exist on the market

- Raspberry Pi, BeagleBone, etc





Opportunity to test such boards during LS2

→ LIP Competence Center in Monitoring and Controls (CCMC)

The COMPASS DCS is essential for the COMPASS data taking operation

Current COMPASS DCS is getting old and needs to be upgraded

CERN LS2 will be a good opportunity to develop new control solutions

Close collaboration with LIP CCMC and other LIP groups shall be considered

Thank you