Status and Plans for the DCS of the Luminosity detector

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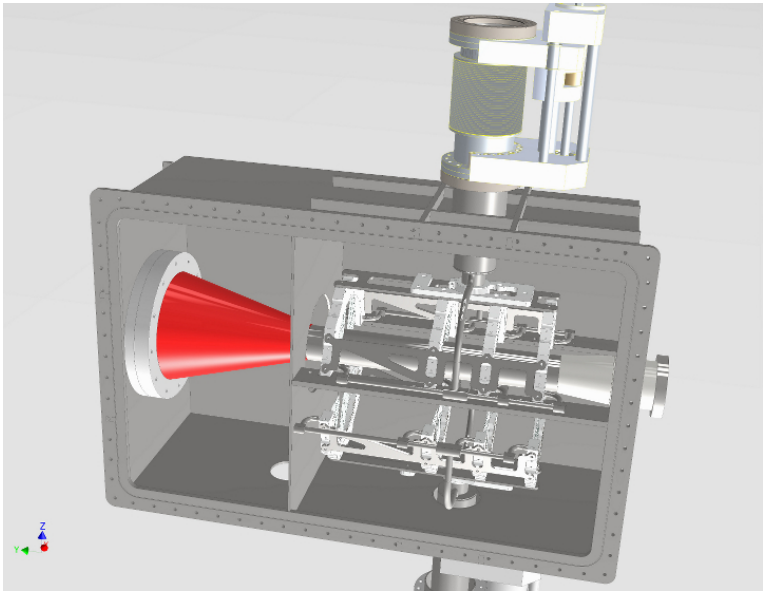
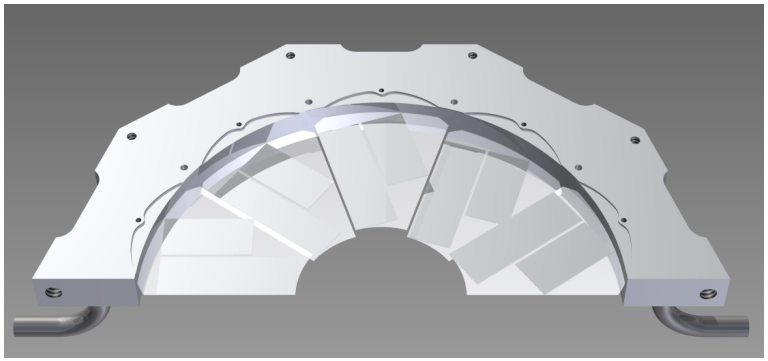
The $\overline{\text{P}}$ANDA Luminosity Detector

- Measuring tracks of elastic scattered $\overline{p}$ between 3-8 mrad
- Fitting model for elastic scatterd $\overline{p}$ to reconstructed angular distribution to determine luminosity
- Luminosity detector consists of four planes
- Each plane divided in two halfs with 5 modules
- Each module has five pixel sensors on front and back side
  $\Rightarrow$ 10 sensors per module
  $\Rightarrow$ 400 pixel sensors overall
- Detector operated inside vacuum





High Voltage Power Supply

- Pixel sensors need a high voltage power supply ($\sim 60\,\mathrm{V}$)
- High resolution in current measurement needed

$\Rightarrow$ Using ISEG EHS F2 05p-F
16 channel, 500 V, 10 mA, single channel floating-GND
50 pA resolution in current measurement for currents $< 20\,\mu\mathrm{A}$

$\Rightarrow$ *Same hardware as EMC*
(only different max output voltage/current)

Cooling

Half planes cooled down to $-20\,^{\circ}\mathrm{C}$

Hubert Unistate
425W

Cooling power @ $-20\,^{\circ}\mathrm{C}$	
1.9 kW	2.2 kW
Max pumping speed	
105 l/min	45 l/min
Max pumping pressure	
1.5 bar	2.9 bar

Water cooled
Remote control via RS232

Lauda XT 550W

Temperature and Pressure Measurement

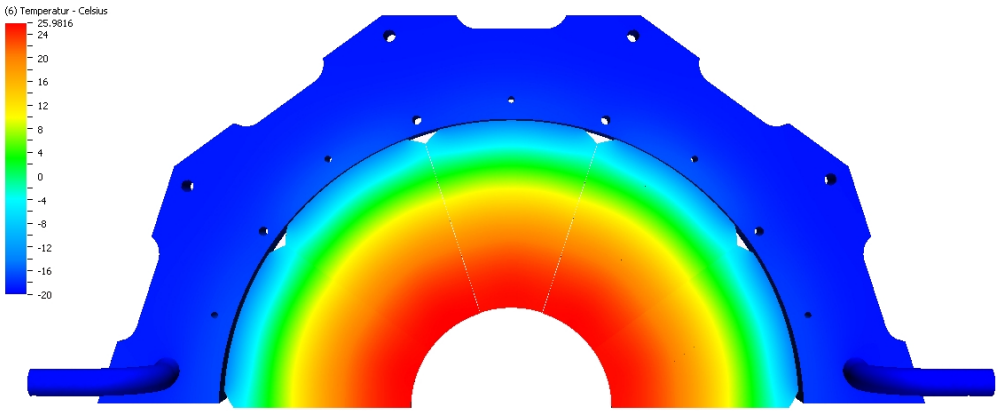
- Temperature measurement near pixel sensors needed

⇒ Using PT100 sensors

- Pressure measurement inside cooling pipes needed

⇒ Using THM$\overline{\text{P}}$ for read out of the sensors

⇒ *Same hardware as EMC!*



- Pressure measurement inside luminosity detector and beam pipe needed
- Control of Vacuum pumps needed

⇒ Details have to be discussed with engineers from HESR

Motor Driver

- During filling procedure of HESR the luminosity detector has to be moved aside.
- Using stepper motor to move half planes away from beampipe

$\Rightarrow$ Motor driver controlled with EPICS via CAN bus interface

$\Rightarrow$ EPICS device support for TMCM142-IF single axis stepper motor driver

- Precise position measurement needed (ongoing work)

Position Measurement

Ideas for precise position measurement:

- Using IBS CPL190 Capacitive Measurement System
- ± 10 V output
- Selectable bandwidth: 100 Hz, 1 kHz, 10 kHz, 15 kHz
- For read out with EPICS using ADC connected to Raspberry Pi?

Summary and Outlook

- Many parts of the DCS for the luminosity detector could be taken from EMC without the need of modifications
- Added EPICS device support for motor driver.

Summary and Outlook

- Many parts of the DCS for the luminosity detector could be taken from EMC without the need of modifications
- Added EPICS device support for motor driver.

- Have to discuss with HESR engineers which hardware to use for vacuum inside detector (pumps/measurement)
- Precise position measurement of the half planes has to be implemented