RICH-1 Planning and updates

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Activities to update

1) The Installation of the deuterium lamp
2) Radiator gas cleaning
3) Missing sectors in the top hybrid photon detectors.
4) Miscellaneous interventions foreseen in coming days.
Installation of UV light in RICH flange

- Spectral Distribution: 115 to 400 nm (peak at ~160 nm)
- Acceptance: ± 7.5 degrees
- Air Cooled (N2 flow is ensured)
- Continuous light source
- Guaranteed life (230 nm) 1 Kh

Further technical details:

- The lens (Camera) cuts off wavelength at ~350 nm.
- Bottom detectors are more illuminated compared to the top ones.
- With available Ar:CO2 studies are foreseen.
- Data acquisition is yet to be understood.

Images taken with CLAM (1000 ISO, Highest Aperture 30s exposure)
Radiator Gas Cleaning

- New pumps for the precleaning. “Identical” to the old ones. Old ones are exhausted.
- Gas cleaning expected to start → End of February/Beginning of March.
- 2021 Status → We have cleaned and transferred 463 kg out of 606 kg of C4F10 (eff = 76.5%). We procured 630 kg.
  - From LHCb we had cleaned 154 kg (with 89% efficiency).
  - We had ~620 kg at our disposal.

- Loss due to leak (600 h) ~3600 l → 40 kg.
- Gas will be cleaned in 2022 → ~ half ton (LHCb) received about 350 kg to be cleaned → Sufficient for the run

2/8/2022
Chatterjee C., COMPASS TB Meeting, Feb 08 2022
The mechanical structures are visible (This have been observed in old data). Detailed studies were made on this feature.

The missing parts matches with the voltage sectors.

Pathologies have not been observed in data.

Possible hypothesis are floating, interventions are foreseen once we locate the origin of the problem.
4 * 108 = 432 * 4 (FEEs) = 1728 are channels $\Rightarrow$ active pads. $\Rightarrow$ These 4 FEEs are connected to one ADC via a splitter. Each detector has 3 Splitters $\Rightarrow$ Each Attached to 1 ADC. Therefore, any problem (say thresholding) will affect around 1/3$^{rd}$ of the detector.
Pedestal Run (2021 and 2017)

2021

2017

NO PATHOLOGY AS SUCH!!

Checked the ratio plot. **2021 is better than 2017** in terms of noise control.
Run 292092 → Physics Run (10% APV header error → 547 (19%))

**Typical HV values**

- -300 V
- -3400 V
- -3200 V
- -2000 V
- -1700 V
- -900 V
- 0 V
- +600 V

**HV segmentation**

- Detector
- THGEM HV segmentation
- Sector (1 HV per 4 per detector)
Miscellaneous Upcoming Interventions:

- Requalify the 3M storage tank → buffer in the gas system.
- Connect the LV power supplies for the upper PMTs.
- Connect the Rpi → Temperature Pressure control for the MWPC detectors.
- Putting the CLAM system in full operation.
- Replacement of UPS of the RICH-1 PLC.
Wrap up

I. UV lamp is installed \( \rightarrow \) CLAM pictures are promising \( \rightarrow \) further studies to help identifying pathologies and monitoring gaseous detectors.

II. Around half ton of LHCb radiator gas is available will be cleaned. \( \rightarrow \) Enough radiator gas for the run.

III. The missing sectors of the hybrid photon detectors are under investigation. Interventions will be made ASAP.

IV. Miscellaneous interventions are foreseen in coming days to address several replacements and maintenance.
Back up slides
Delta V of Top THGEMs all sectors
Delta V of Bottom THGEMs all sectors
Delta V of Mesh all sectors
Top THGEM currents