MUST discussion session

1. Detector response - Klaus, Radek, Saikat
2. Data quality and monitoring - Sachin, Tobias
3. Modification of Modules - David/Stefan
4. Gas system - open issue
5. Cooling water - open issue
6. Installation of MUCH/MUST - Anand/Shreya, Tassos
7. Platform
8. Absorbers for MUCH - P. Gasik

Slides for Gas system

Refs : Performance of the LHCb Outer Tracker 2014 JINST 9 P01002

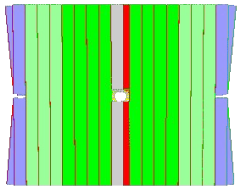
Gas System Overview (LHCb OT 2014)

Keep LHCb OT gas mixture for MUST

- LHCb OT gas mixture: Ar / CO_2 / O_2 = 70 / 28.5 / 1.5
- O_2 added to improve ageing behaviour & long-term stability
- Straw and envelope volumes connected at detector
- Modular architecture with surface (E40) and underground (E10) components

Possible upgrades for MUST

- Closed loop gas system
- Gas recuperation and recirculation



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Operational Parameters (L_{HCb} 20_{14})

Gas flow: 800–850 l/h (spec < 1000 l/h)

Detector overpressure: 1.6 mbar (spec < 5 mbar)

H_2O impurity < 100 ppm

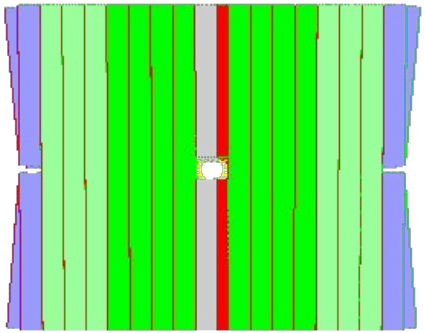

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Table 1 Main parameters of the Outer Tracker gas system

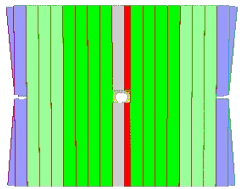
Gas mixture:		Ar/CO2 70%/30%
Total volume:	Straws	2.7 m3
	Envelops	1.0 m3
Total nom. circulation flow:		~ 3.2 m^3/h
Max. circulation flow:		~ 5.0 m^3/h
Nominal replenishing flow:		~ 0.1 to 0.2 m^3/h
Max. replenishing flow		0.8 m^3/h
Chamber pressure		0.5 - 2.0 mbar
Hydrostatic Diff.		~ 0.5 mbar
Max. overpressure		5 mbar
No. of Channels		36
No. of Sub-Dis. Units		2
No. of UX Racks		2
Impurities		O_2 < 100ppm H_2O < 100 ppm

Gas Volume

Straw gas volume: ~2.70 m³ (LHCb OT)

MUST is 60% of LHCb OT

Straw gas volume: ~1.62 m³ (MUST)
MUST Envelope gas volume: ~0.6 m³
Straw and envelope volumes connected
MUST total detector gas volume ~2.22 m³



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Gas Tightness

Detector modules tested to be sufficiently gas-tight

Leak rate < 1.25×10^{-4} l/s

Corresponds to ~5% gas loss every 2 hours

Ageing Control

Low gas flow chosen to prevent ageing effects

Ageing effects observed in laboratory measurements