RICH radiator gas

Fulvio Tessarotto (I.N.F.N. – Trieste)
The filling was performed using the gas in the reservoir: we decided to stop it when 90% of C4F10 in the RICH was reached (instead of the 95 -97 %).

Having a bit of C4F10 in liquid form is essential for the RICH “breathing”

at the beginning of COMPASS physics data taking we secured the RICH operation by adding 2 m$^3$ of N$_2$ in the vessel because there was no liquid any more in the reservoir. (2.5% decrease of C$_4$F$_{10}$ fraction)

With the present leak (~6 l/h) we will need extra gas (either C$_4$F$_{10}$ or N$_2$ within two weeks)

We will need further filling in the near future: the operation of MAPMTs is almost unaffected, not so the gas-based PDs
RICH-1 radiator gas

The recovery was performed at the end of the run: 62 m³ were recovered.
The density of C4F10 in gas phase is 11.21 g/l at stp, in liquid phase it is 1.594 kg/l.

About 700 kg of “clean” C4F10 are presently in the COMPASS tank.

We need 1500 kg of C₄F₁₀ for 2021:

- ~ 1000 at the beginning
- ~ 400 kg consumption
  (~6l/h leak for 240 d, filters regeneration, measurements, …)
- ~ 100 kg spare

⇒ 800 kg of clean C₄F₁₀ have to be provided.

LHCb agreement: exchange of ~400 kg of C₄F₁₀ from which
300 kg of clean C₄F₁₀ will be obtained

⇒ We need to purchase 500 kg

CERN, 04/12/2017 - COMPASS Technical Board Meeting
new $C_4F_{10}$ radiator gas

Few producers in the world; 3M confirmed they do not have it.

Only one producer confirmed to be able to provide it in large quantities (F2 Chemicals). No one offered a quotation for C4F8O

Quoted price: 110 £/kg.
Today exchange rate is ~1.32 CHF/£
If we order now 700 kg of C4F10 it would cost 100 kCHF

We continue to search for the best solution.

we plan to ask COMPASS to foresee a purchasing of C4F10 for the 2021 run well in advance.