Contribution ID: **63** Type: **Oral Contribution**

Development of new gas recuperation and recirculation systems for RPC detectors

Thursday, February 13, 2020 4:10 PM (20 minutes)

The large RPC systems at the CERN-LHC experiments are operated with a gas mixture containing C2H2F4 (R134a), SF6 and iC4H10. The first two gasses have a very high global warming potential (GWP) and their availability, as well as price, might be subject to Fluorinated gas Regulations in the near future.

Several gas mixtures based on new environmentally friendly gases are being tested by RPC community to look for a suitable replacement of R134a. Nevertheless, these R&D studies are still ongoing, and a clear positive conclusion seems to be difficult to achieve in a short timescale.

The reduction of GHG emissions, from all research activities, i.e. not only RPC, is an objective of paramount importance for CERN. Four different strategies have been identified to achieve it.
Concerning the LHC RPC systems, GHG reduction can be achieved by optimizing the existing gas recirculation systems and with the development of recuperation systems for R134a and SF6.
During Run 2 the gas mixture recirculation rate of the RPC detector systems was limited to 85–90% due to the presence of leaks at the detector level. LS2 will give a unique chance to repair as many leaks as possible as well as to study possible upgrade of the gas systems to compensate for the observed detector fragility. Several tests have been performed on different modules.
A prototype system for R134a recuperation has been developed and successfully tested at the end of Run 2 for the ATLAS RPC gas system and it is nowadays installed in the CMS experiments for validation at higher flow, storage and re-use of recuperated gas. Final test will be concerning the effectiveness in the separation of RPC specific impurities.
The development of small gas recirculation units for laboratory purposes continued.

The present contribution describes the different strategies, the on-going developments and the achievements for the reduction of GHG emissions of the LHC RPC gas systems.

Primary authors: GUIDA, Roberto (CERN); MANDELLI, Beatrice (CERN)

Co-authors: CORBETTA, Mara; RIGOLETTI, Gianluca (CERN)

Presenter: GUIDA, Roberto (CERN)

Session Classification: Ageing and Gas Studies