

EPJ plus focus point paper update

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Overview

- General info on the paper
- Paper structure overview
- Results we would like to show
- Paper status, where we are and what is missing
- Conclusions

General info on the paper

- Following the Erice workshop on eco-friendly alternative gas mixtures we were asked by Marco Garbini to submit a title and abstract for a paper to be published in a special EPJ plus focus point on ecogases
- We submitted a paper proposal with title: *Preliminary results on the long term operation of RPCs with ecological gas mixtures under irradiation at the CERN Gamma Irradiation Facility*
- Paper in progress on Overleaf at [this link](#)
- Folder for the paper in our Cernbox project at [this other link](#)
→ This folder contains the excel table to be filled with the data as well as a folder for the plots that we produce and want to insert in the paper
- The idea in this paper is not to necessarily compare results across detectors in the same conditions (as we did in the previous paper) but it is more to show the results from different detectors to provide a full picture of the ecogas studies thus far
- We already circulated some emails asking for data and already got some feedback from different groups and some data is already in the excel file

Paper structure overview - 1

- Introduction
 - Description of the environmental issues with the current RPC gas mixture
 - RPC [EcoGas@GIF++](#) collaboration and modus operandi (full replacement of R134a with HFO+CO₂)
 - Quick description of the EcoGas effort, i.e. beam tests + aging studies
- Experimental setup
 - Description of the GIF++ (irradiator and muon beam)
 - Description of the different detectors of the collaboration
 - Quick notes about the gas/HV systems and webdcs + small excursus on scintillators setup for the beam tests
- Beam test results
 - Introduction to methodology and aim of the 2022 beam test campaigns + description of the tested mixtures
 - Results with source OFF (in details in later slide)
 - Results with source ON (in details in later slide)

Paper structure overview - 2

- Preliminary aging studies results
 - Description of the general methodology for aging studies + introduction of the integrated charge and how we calculate it
 - Results from aging studies, yet to understand what and how to show them
- Conclusions
 - Yet to be decided

Paper status - 1

- Introduction → **written**
 - Description of the environmental issues with the current RPC gas mixture
 - RPC **EcoGas@GIF++** collaboration and modus operandi (full replacement of R134a with HFO+CO₂)
 - Quick description of the EcoGas effort, i.e. beam tests + aging studies
- Experimental setup → **written**
 - Description of the GIF++ (irradiator and muon beam)
 - Description of the different detectors of the collaboration
 - Quick notes about the gas/HV systems and webdcs + small excursus on scintillators setup for the beam tests
- Beam test results → **to be completed**
 - Introduction to methodology and aim of the 2022 beam test campaigns + description of the tested mixtures → **written**
 - Results with source OFF (in details in later slide) → **missing**
 - Results with source ON (in details in later slide) → **missing**

Paper status - 2

- Preliminary aging studies results → **to be completed**
 - Description of the general methodology for aging studies + introduction of the integrated charge and how we calculate it → **written**
 - Results from aging studies, yet to understand what and how to show them → **missing**
- Conclusions → **missing**
 - Yet to be decided

Beam test results

- Source OFF
 - Bari-1p0 → efficiency vs HV for the HFO/CO₂ scan (to show the shift of the eff curves according to HFO concentration) and current vs HV for the HFO/CO₂ scan (to show decrease of beam-induced current if HFO concentration increases)
 - ALICE → prompt charge spectrum at wp and streamer probability vs HV for HFO/CO₂ scan
 - ATLAS BIS 7/8 → efficiency vs HV for ECO55/65 to compare difference with 1 mm single gap from Bari
 - ATLAS small → efficiency and current vs HV for STD+ECO₂+ECO₃
- Source ON
 - ATLAS small → efficiency vs HV for different gamma cluster rates (to show shift of curves under irradiation). Possibly one low, one medium and one high values of cluster rate
 - EP-DT and Bari-1p0 → muon cluster size at WP vs gamma cluster rate (measured at working point) for STD+ECO₂+ECO₃
 - Maybe add something from CMS? What is available?

What we have

- Source OFF
 - Bari-1p0 → efficiency vs HV for the HFO/CO₂ scan (to show the shift of the eff curves according to HFO concentration) and current vs HV for the HFO/CO₂ scan (to show decrease of beam-induced current if HFO concentration increases) → **part of the data missing**
 - ALICE → prompt charge spectrum at wp and streamer probability vs HV for HFO/CO₂ scan → **yes**
 - ATLAS BIS 7/8 → efficiency vs HV for ECO55/65 to compare difference with 1 mm single gap from Bari → **missing**
 - ATLAS small → efficiency and current vs HV for STD+ECO₂+ECO₃ → **part of the data missing**
- Source ON
 - ATLAS small → efficiency vs HV for different gamma cluster rates (to show shift of curves under irradiation). Possibly one low, one medium and one high values of cluster rate → **missing**
 - EP-DT and Bari-1p0 → muon cluster size at WP vs gamma cluster rate (measured at working point) for STD+ECO₂+ECO₃ → **Bari only**
 - Maybe add something from CMS? **What is available?**

Aging studies results

- Not sure yet what we want to show, we are producing the plots and understanding if a clear message can be drawn
- **For sure** results from CMS, LHCb-SHiP
- **For sure** up to the stability run #169 (15/06/2023, before TB 2023)
- **Maybe** ALICE and EPDT
- What we can show:
 - 1) Trend of the absorbed current as a function of the integrated charge
 - 2) Trend of the integrated charge as a function of time to show the progress of each chamber
 - 3) Trend of the dark current at working point (Ohmic and total) as a function of the integrated charge
- We have the scripts to analyze data from all chambers so we can produce all the needed plots

Other notes

- I had a look at the the author list and sent out an updated version of it
- Edited a new .tex file which can be added to any project to produce the author list (authors.tex) and also another one that can be compiled standalone for testing purposes (List of Authors [UPDATED Aug 2023].tex)
→ Both of them have been updated in the middle of August so please check if some information can be updated and let me know
- On my side I have removed a couple of people from ALICE who are no longer in the collaboration (and have not been since before 2022) and added Saraa Garetti, our new master student
- The deadline for paper submission is the end of September, we aim to finish earlier to give you some time to read through the article and give us your comments

Conclusions

- Paper writing is proceeding and we are looking forward to the submission
- We will let you know when the paper is more structured and you can start to have a read
- We will send out reminder emails to please put the required data in the excel table on cernbox
- We also need some more specific information from each group (for example on the electronics/readout of your detector) → we will also ask for that
- We will continue writing and producing plots, aim to show preliminary plots **next week** so please send us your data ASAP

**Thank you for your
attention!**