EcoGas weekly meeting
Report on resistivity measurement and system status

***Luca Quaglia*[1]**

[1]INFN Torino

19/09/2024

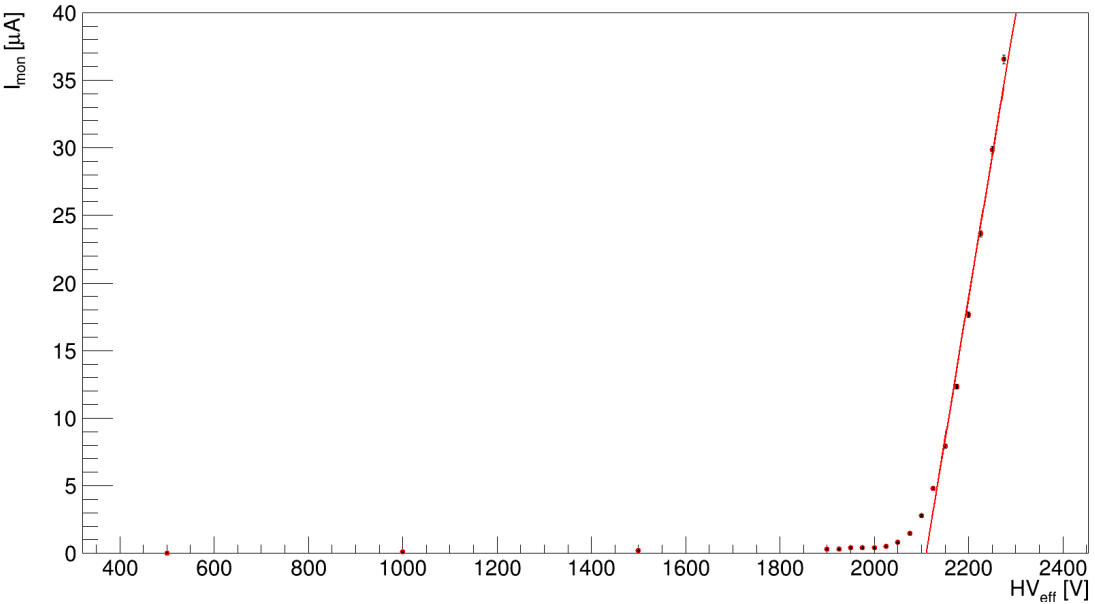
System status and plans

- TB ongoing (EP-DT taking data with RPC 25)
- Currently flushing with STD mixture since Monday
- Resistivity measurements performed last week with humidified argon
- After TB, resuming aging with ECO2
- 5 new HFO bottles have been delivered to GIF++
  - During YETS they will install a dedicated HFO line from the GIF++ general gas supply (Giuseppe will update us on the progress)

Dataset

- **Resistivity studies**
  - Scans taken from the start of the aging studies with ECO2 (after scan #254)
  - All plots are in this folder (on our CERNbox)
  - New measurements taken last week with humidified argon
    - Scan 980 (source ON)
    - Scan 981 (source ON)
    - Scan 982 (source OFF)

Resistivity calculation



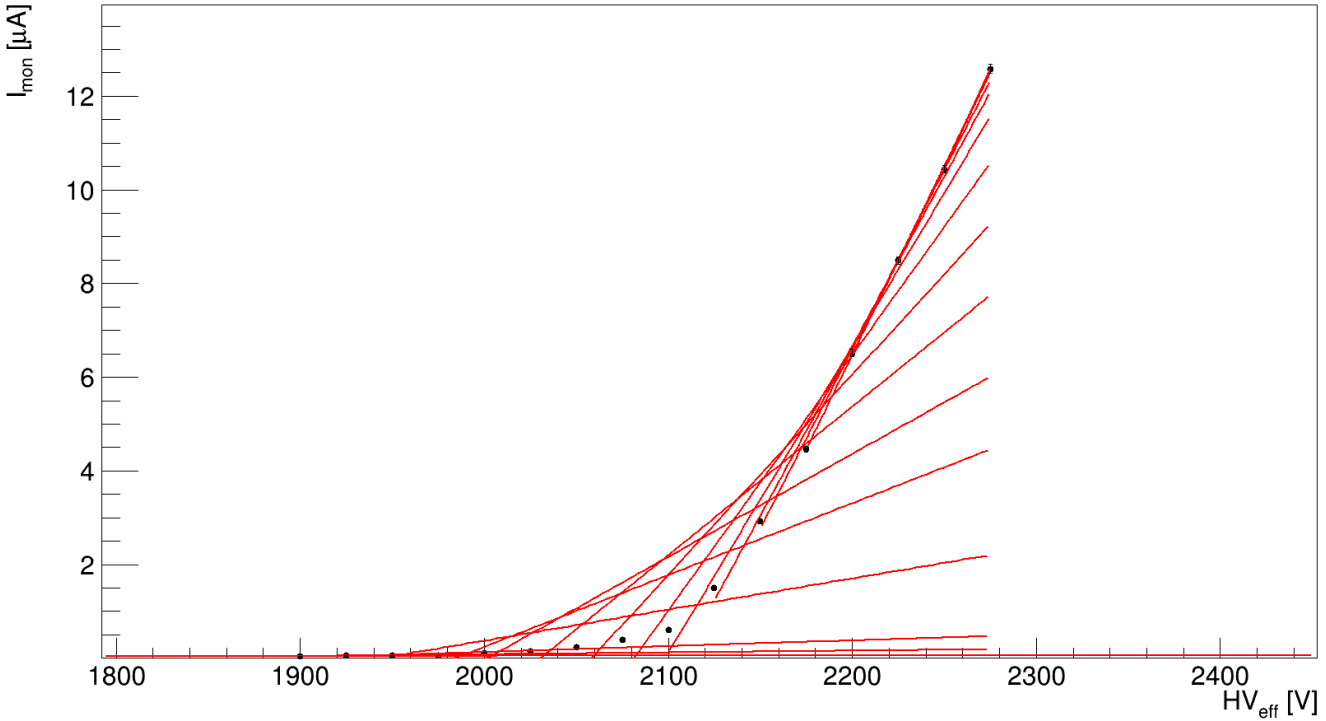
- Linear fit to the ohmic part of the I(V) curve
- Starting point of the fit is decided according to procedure in the following slide
- Function used y = a + bx

- Parameter b = 1/R (R = resistance of the electrodes)
- ρ(resistivity) = R*S(surface)/2d(electrode thickness) = 1/b*S/2d
- Resistivity values shown in the following are normalized to **T_0 = 20°C** using the following formula:

$$\rho(T) = \rho(T_0) * 4.4^{\frac{T_0 - T}{12\,^\circ C}}$$

From: *https://doi.org/10.1016/S0168-9002(00)00979-7*

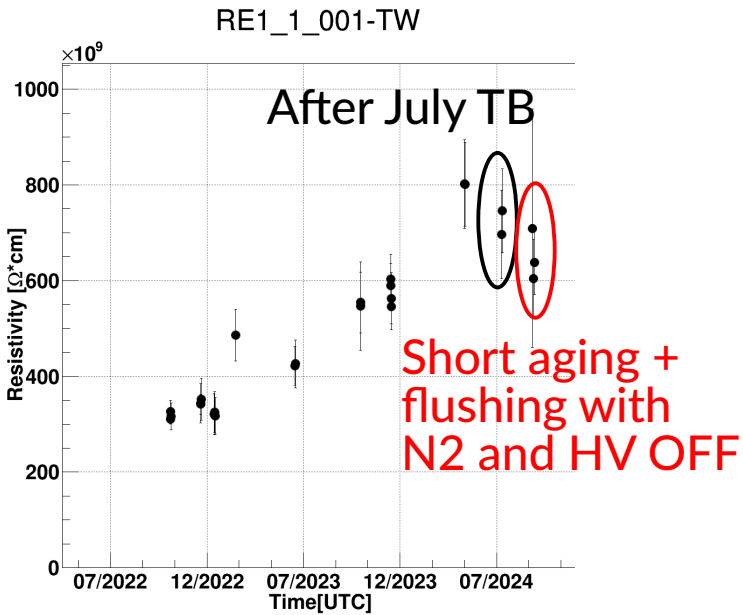
Resistivity calculation

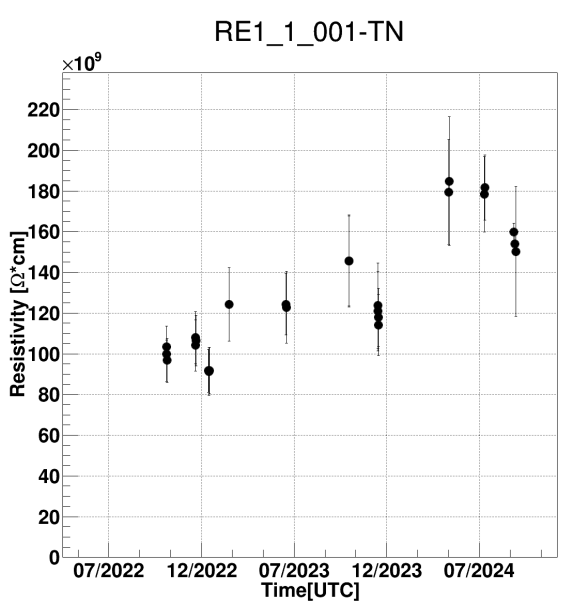


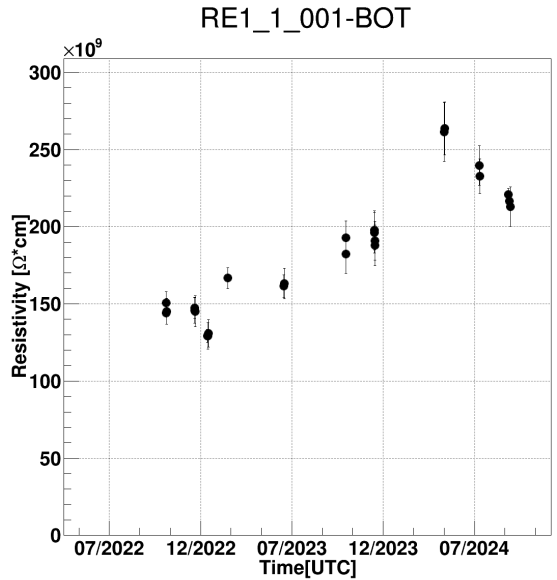
First point 2250 last point 2275 chiSq 61702.5
First point 2225 last point 2275 chiSq 2.55757e-14
First point 2200 last point 2275 chiSq 0.880579
First point 2175 last point 2275 chiSq 1.25192
First point 2150 last point 2275 chiSq 1.3321
First point 2125 last point 2275 chiSq 34.4608
First point 2100 last point 2275 chiSq 125.108
First point 2075 last point 2275 chiSq 574.374
.....
First point 500 last point 2275 chiSq 61702.5

- Linear fit executed from last HV point backwards
- Adding one point at a time
- Calculate chi square for all the ranges and take **minimum value** (if there are at least 3 HV points in the range)

Resistivity trend in time - 1

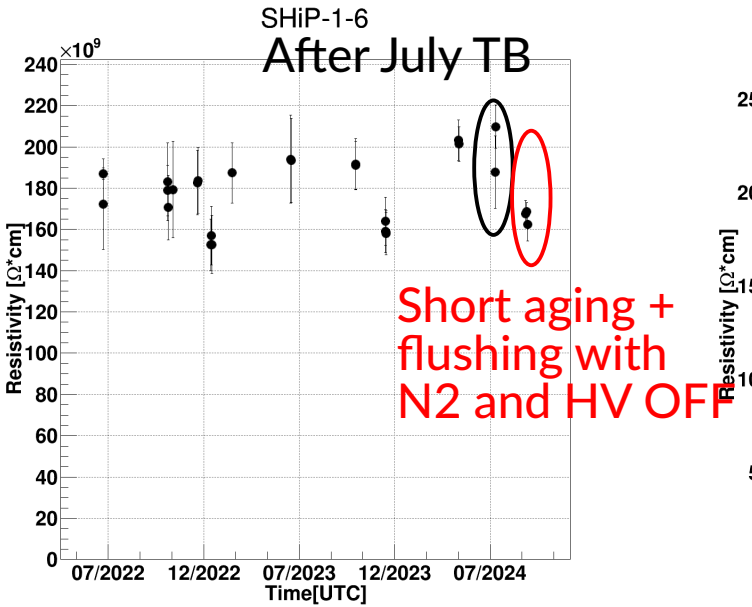




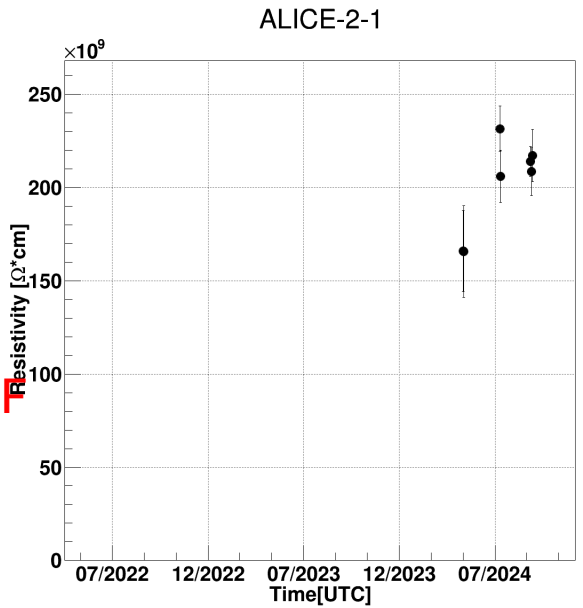


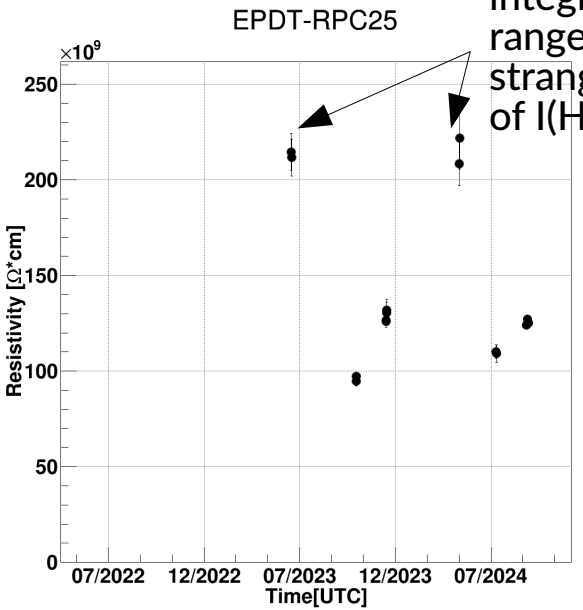
- Error on the current taken as the standard deviation of the measured values (**one measurement every 2 seconds for 4 minutes per HV point**)
- Decreasing trend in the last measurements for all the three gaps (and consistent among the different measurements, ~2 days between each)
- Large error bar since current is oscillating during the measuring time

Resistivity trend in time - 2



Short aging + flushing with N2 and HV OFF

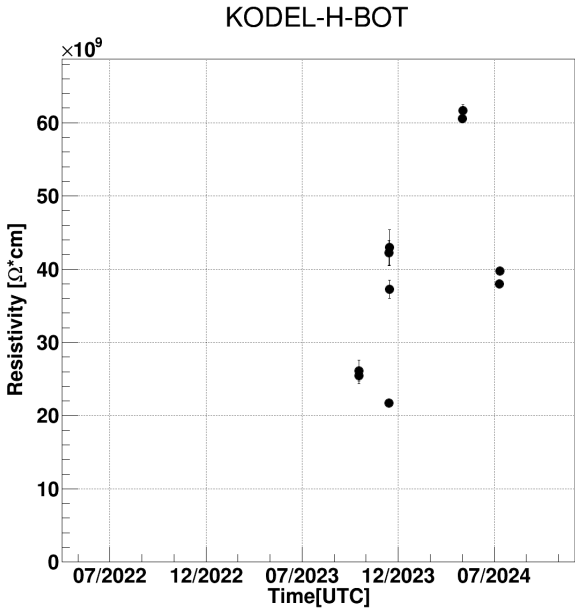


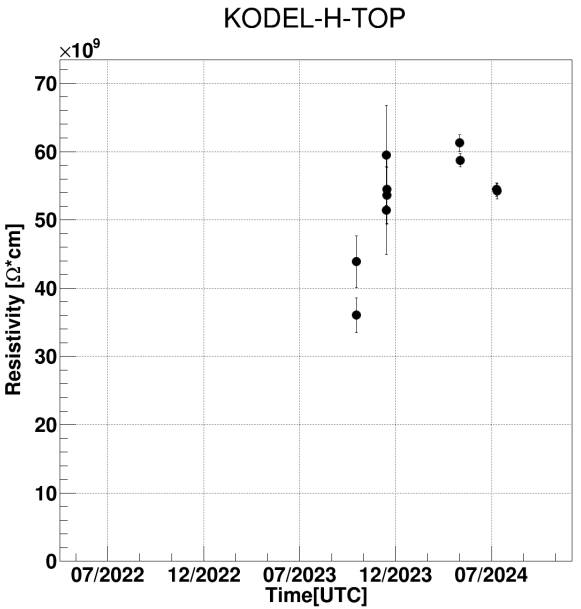


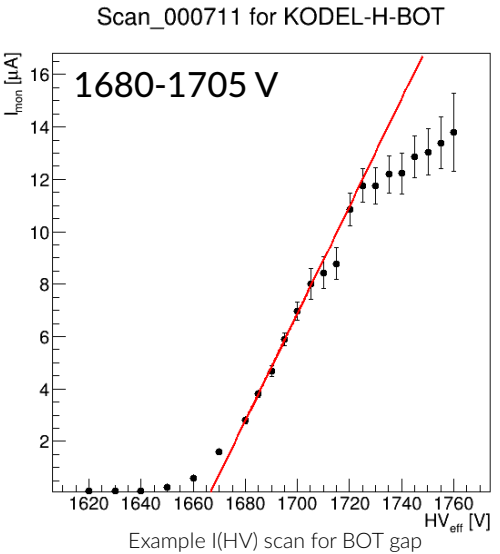
Manual integration range due to strange shape of I(HV) curve

- Large Ohmic component in ALICE and SHiP not changing between latest measurements
- Slightly more constant for EP-DT RPC 25

Resistivity trend in time - 2







Example I(HV) scan for BOT gap

- KODEL-H not included in the last measurement due to investigation on high current
- Shape of the I(HV) curve required to use a manual integration interval for almost all runs, works better for TOP gap, BOT to be re-checked, more variability in the measurements