RPC ECOGAS study @ GIF++

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GAS MIXTURE COMPARED

- STD mix	95.2 / 4.5 / 0.3 → C2H2F4 / iC4h10 / SF6
- Ecomix-1	45 / 50 / 4/ 1 → HFO / CO2 / iC4h10 / SF6
- Ecomix-2	35 / 60 / 4/ 1 → HFO / CO2 / iC4h10 / SF6

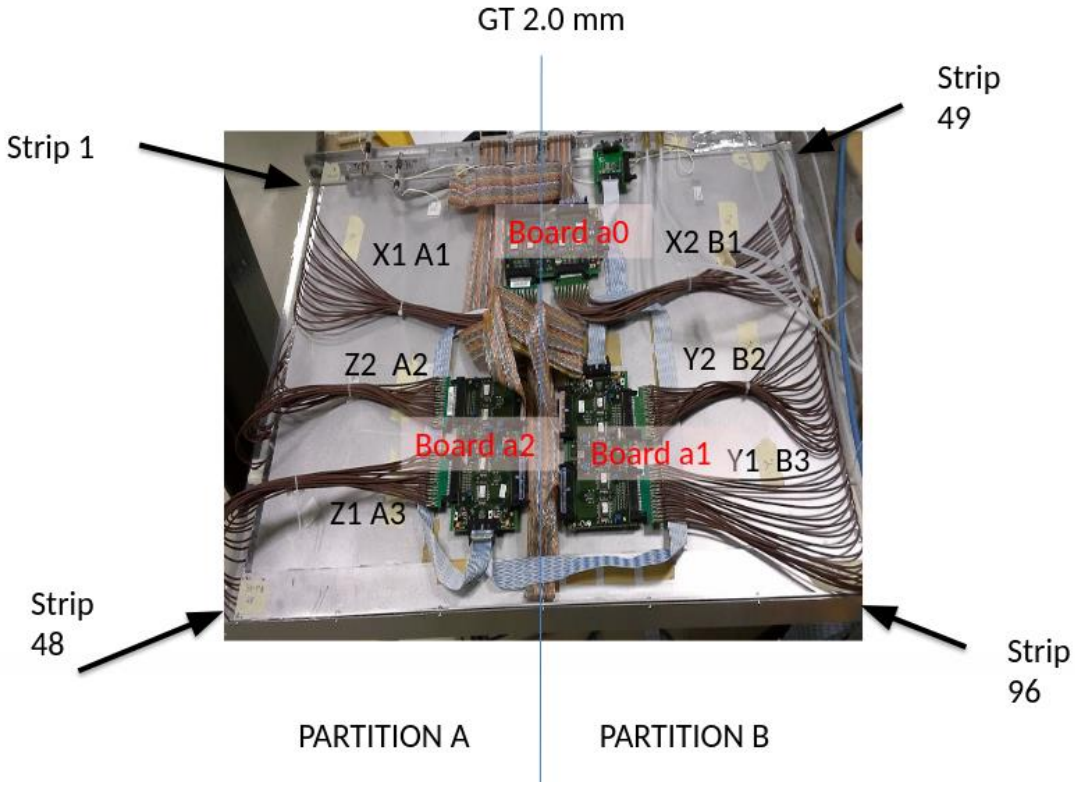
SET UP

Chamber tested: CMS-RPC GT
Gas gap thickness: 2mm
Electrodes thickness: 2mm

Electronics: CMS-RPC
Threshold: 220mV → 150 fC

2 partition (left - right)
3 CMS feb
96 strips → 32 channels each FEB

Strip pitch 1.5 cm

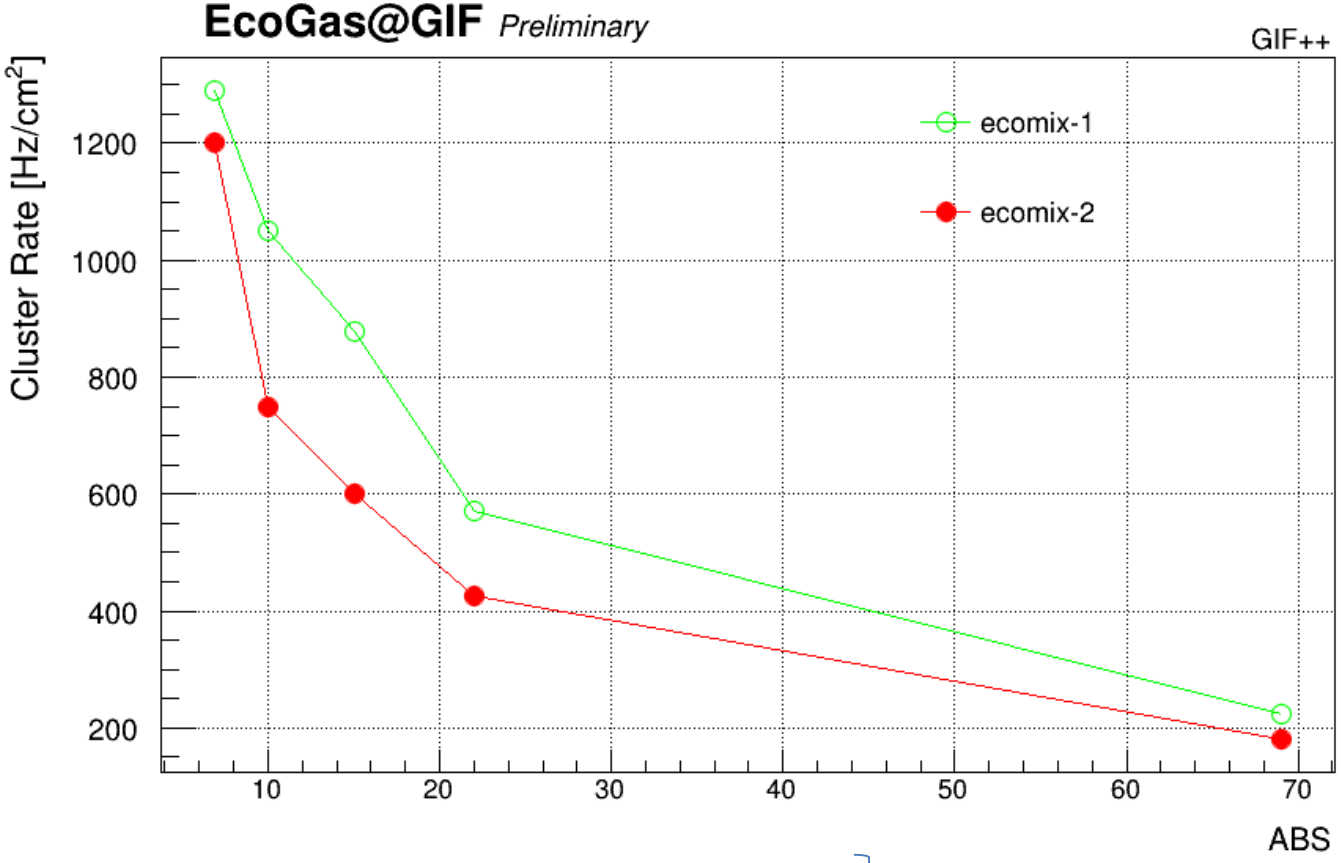


CLUSTER RATE @ WPγ VS ABS

Working point: Voltage estimated at the cl. rate plateau

WP_γ = ~ WP_μ + 400 V

Cluster rate = $\frac{hit\ rate}{Cluster\ size}$

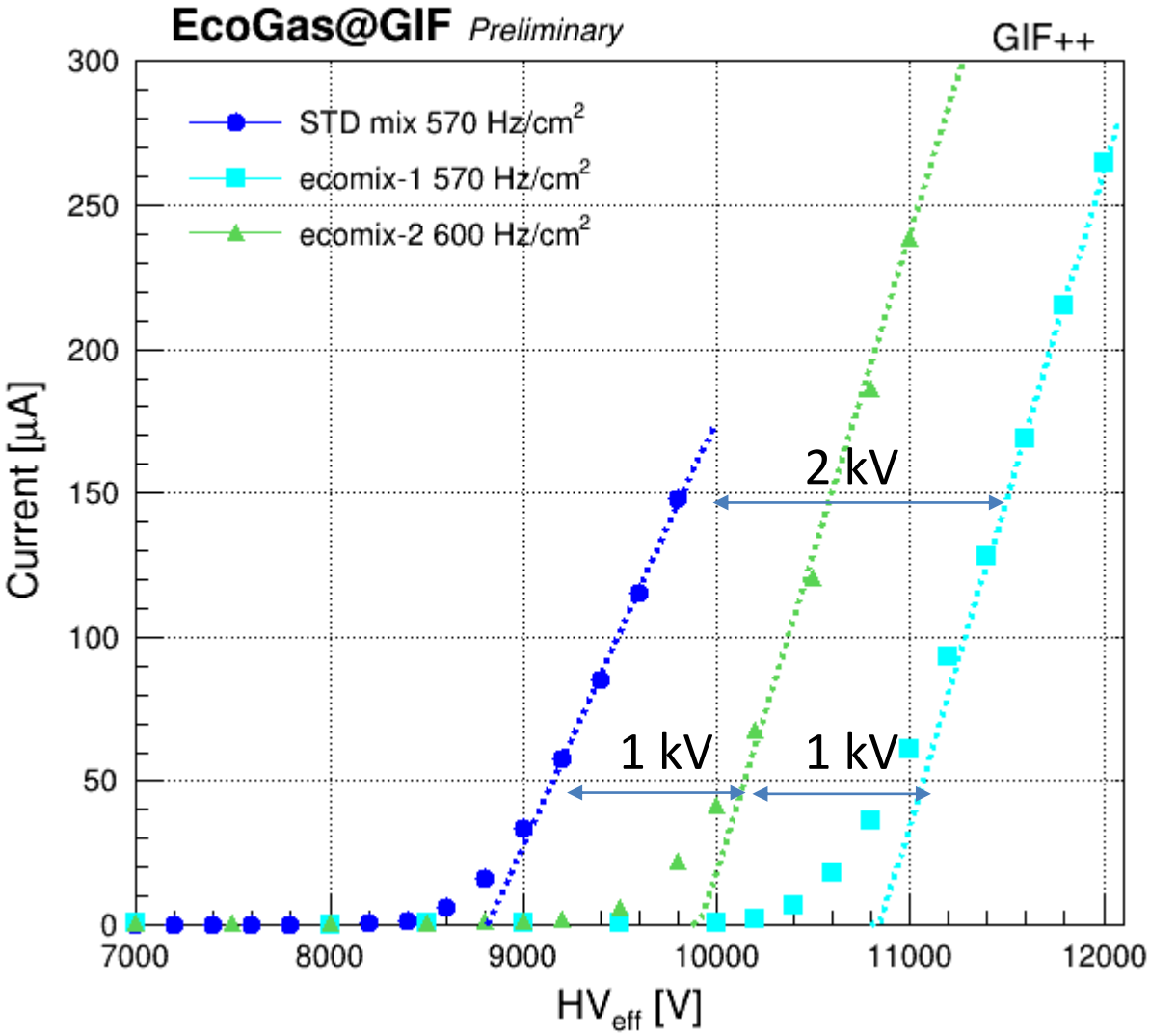


Ecomix-1 → before GIF++ bunker extension

Ecomix-2 → after GIF++ bunker extension

Trolley distance wrt the source:
Almost the same (+ ~ 0.5m)

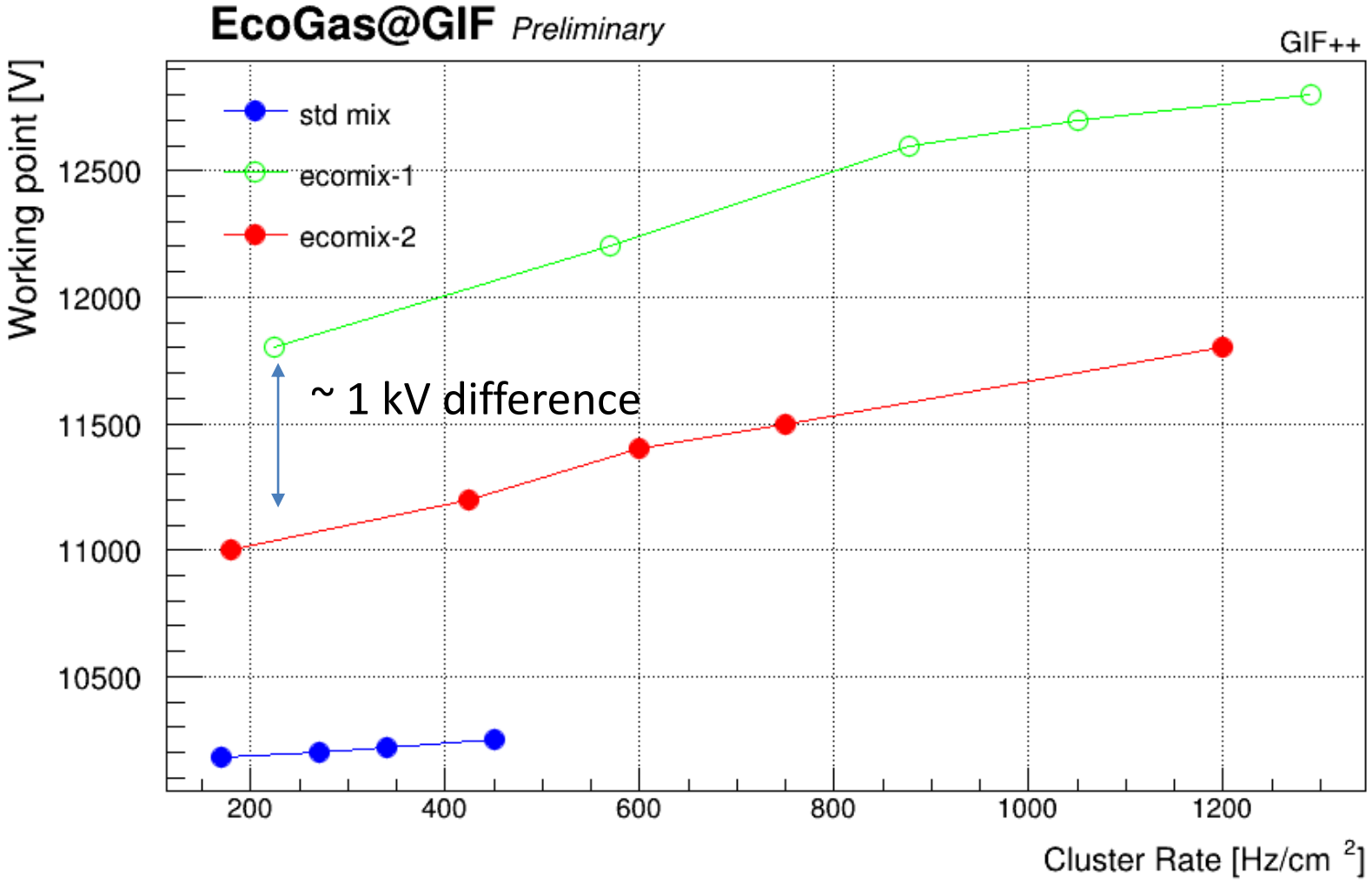
CURRENT VS HV



HV shift (linear fit intersection with the X-axis):

- ecomix1 = std + ~2kV
- ecomix2 = std + ~1kV
- ecomix2 = ecomix1 + ~1kV

WPγ VS RATE



WP shift from 200 Hz/cm^2 to 1.2 kHz/cm^2

Ecomix-1 dV : 1.7 kV

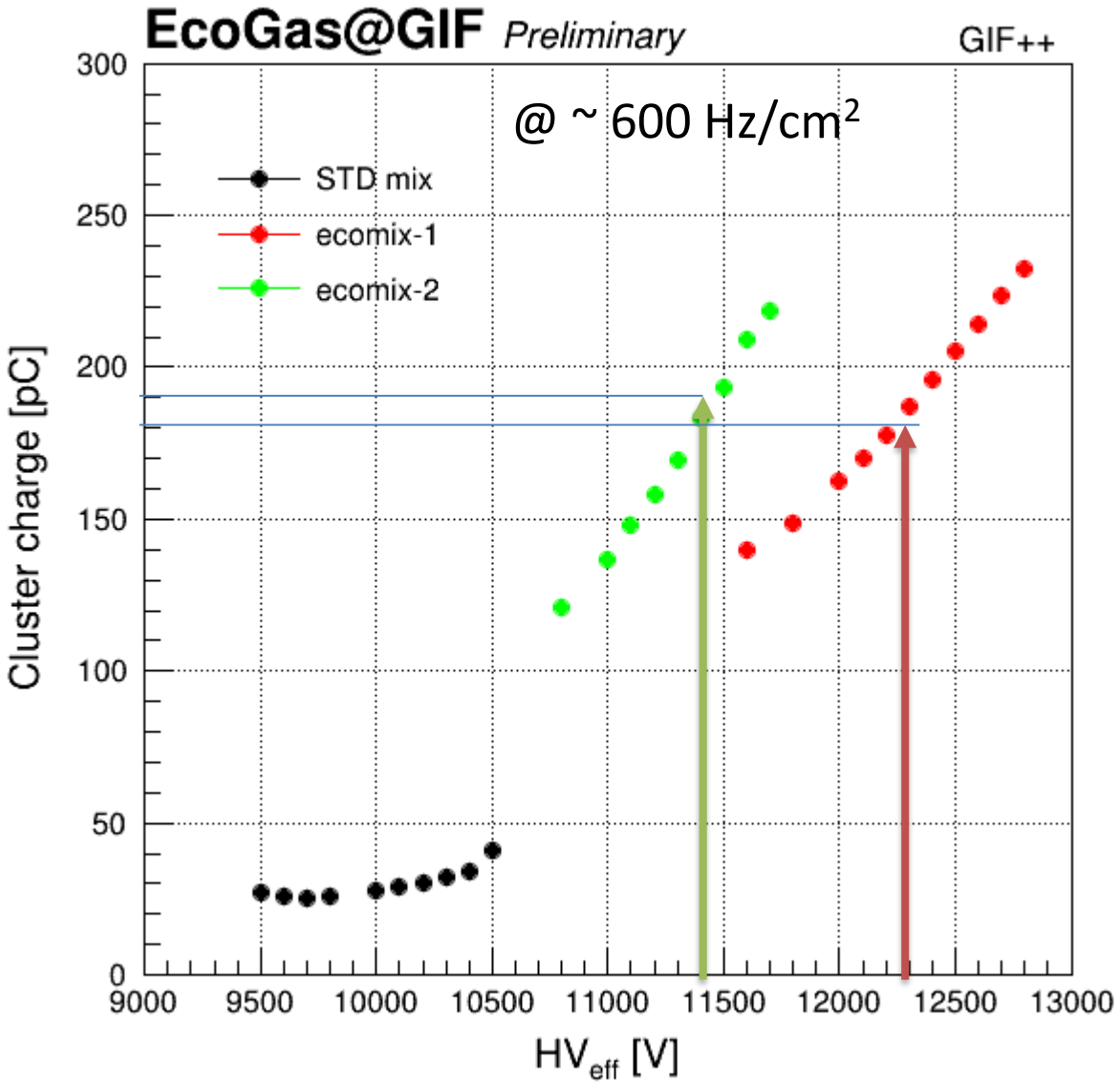
Ecomix-2 dV: 1.8 kV

@ same bkg rate:

~ 1kV difference in WP

CONFIRMED

CLUSTER CHARGE VS HV



WP_γ = ~ WP_μ + 400 V

Charge @ WP_γ

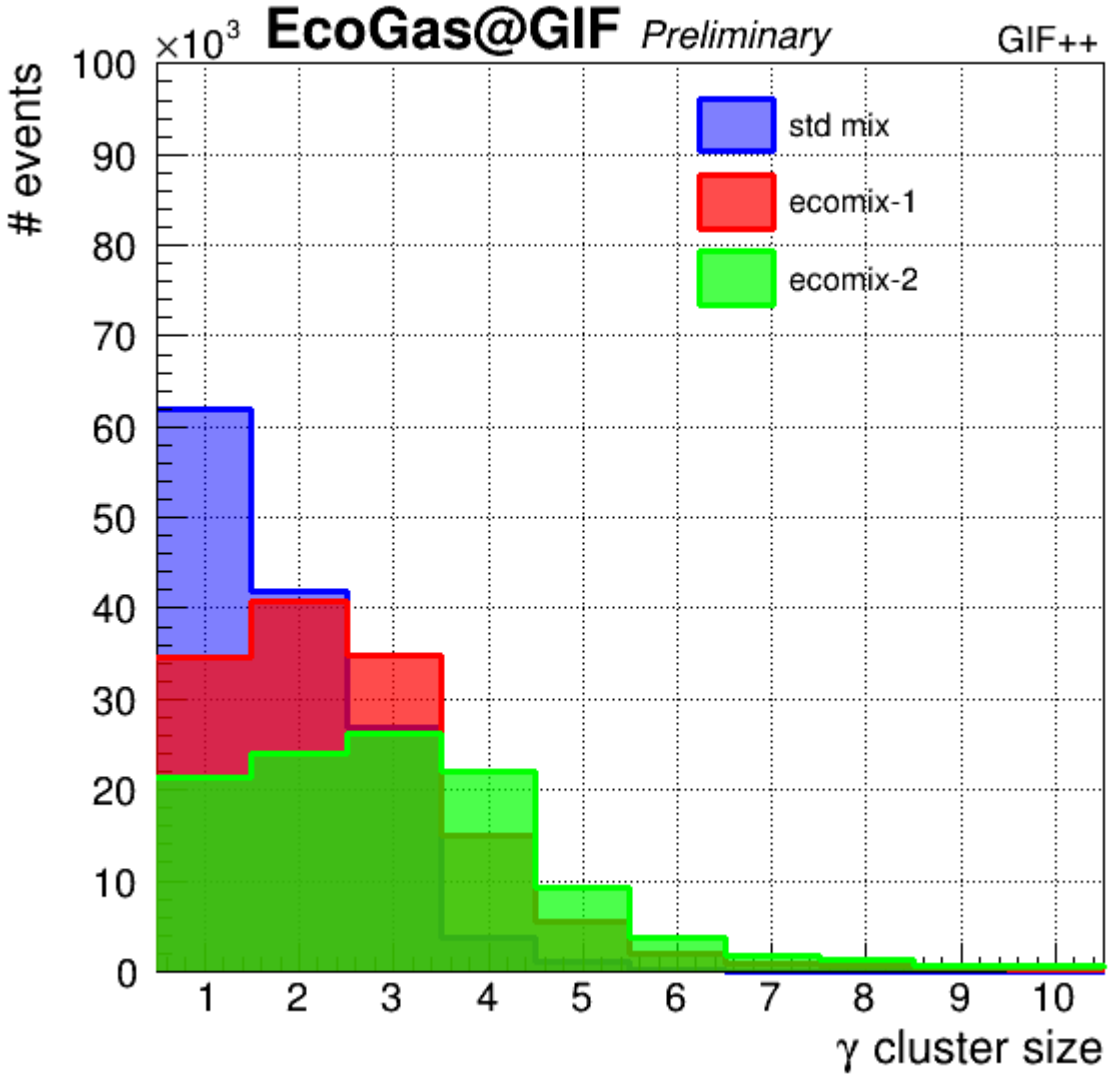
q STD = ~ 40 pC

q eco1 = ~ 180 pC

q eco2 = ~190 pC

Cluster charge = $\frac{Current\ density}{Cluster\ rate}$

GAMMA CLUSTER SIZE



Average CLS @ WP

CLS STD	1.8 strips
CLS ecomix-1	2.6 strips (+44%)
CLS ecomix-2	3.3 strips (+83%)

*normalized number of events