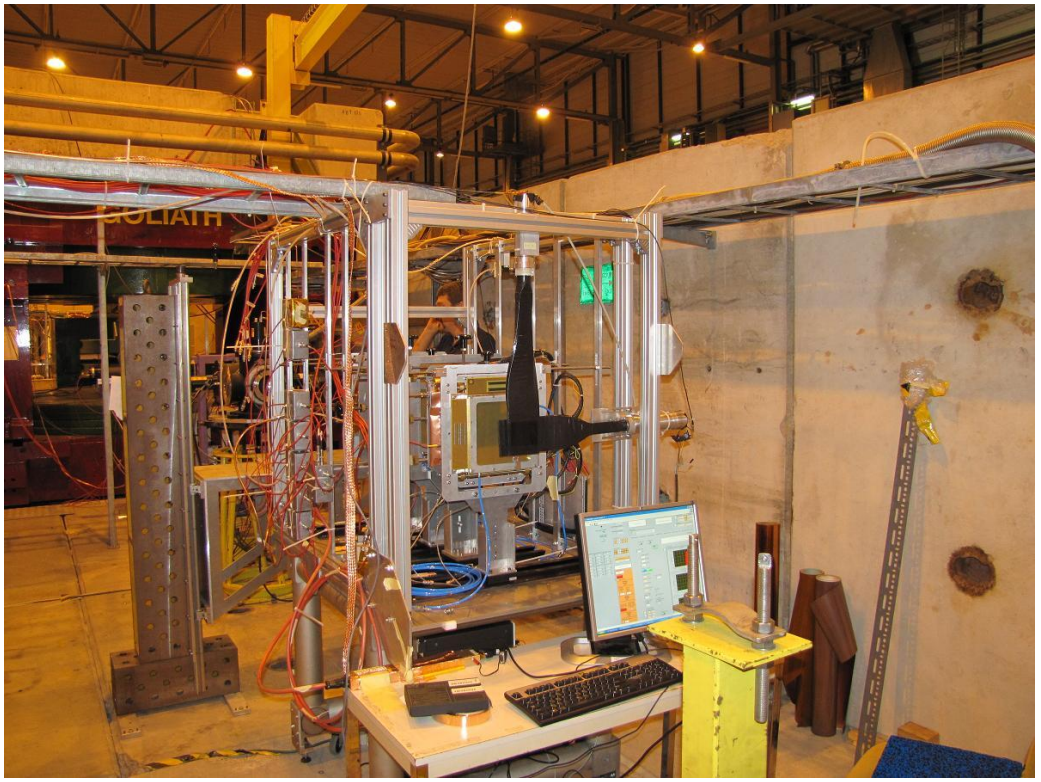
Beam Test June 2010
CMS SUMMARY REPORT



Stefano Colafranceschi

The setup

- Tracking: Standard GEMs chambers: **T1, T2, T3**

- Data-taking: GEMs chambers have been tested:

"Timing chamber"

"Honeycomb chamber "

"Single mask chamber"

- Gas mixtures used:
  1. Ar(70%) + CO2(30%)
  2. Ar(45%) + CO2(15%) + CF4(40%) *[LHCb Mixture]*

Timing chamber summary

COSTANT PARAMETERS DURING DATA-TAKING

3x Double mask gems(standard)

1d readout , strips 0.8*mm* pitch (vertical to the beam)

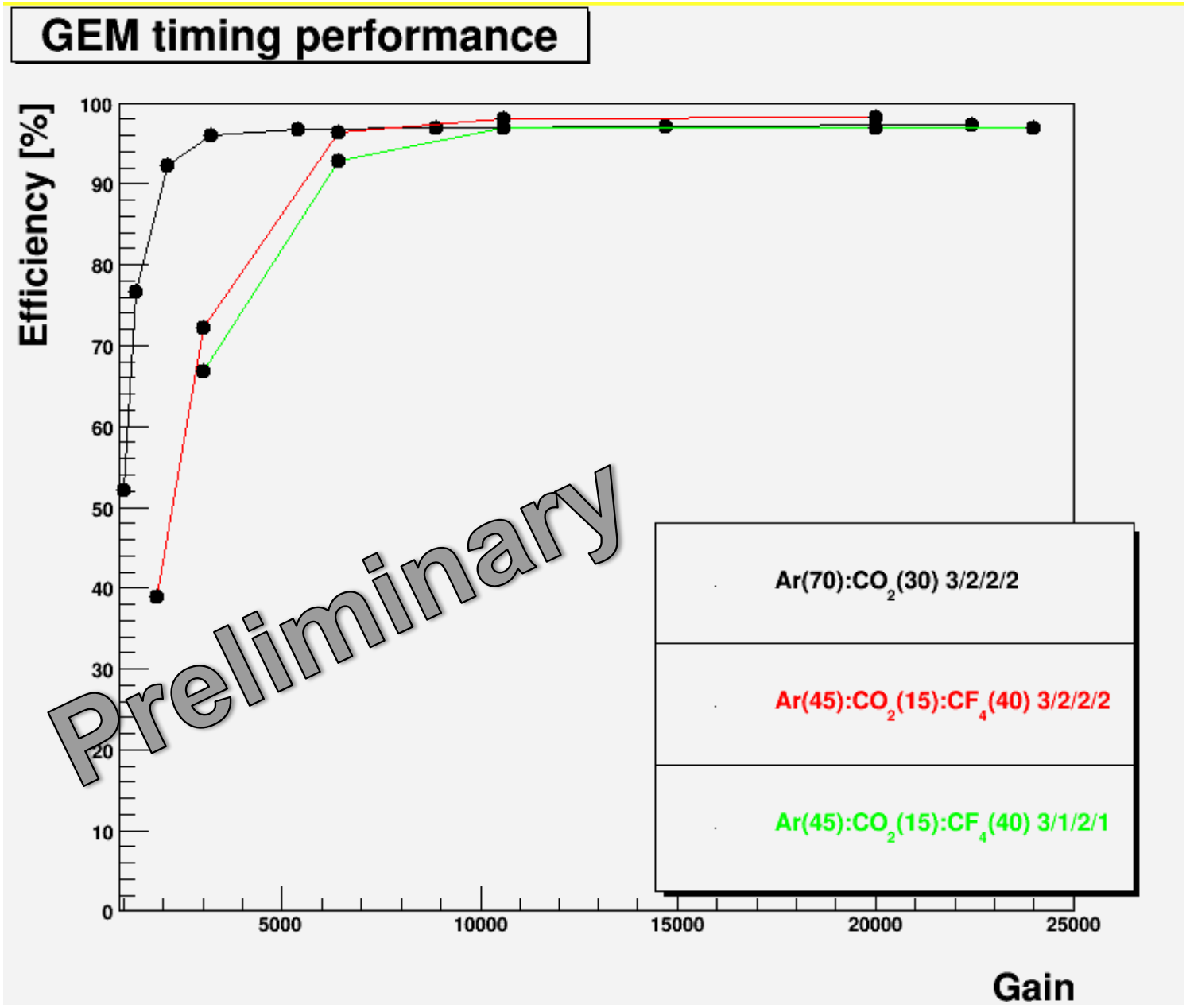
Ed=2.0 KV/cm, Et1=Et2=3.0 KV/cm, Ei=3KV/cm

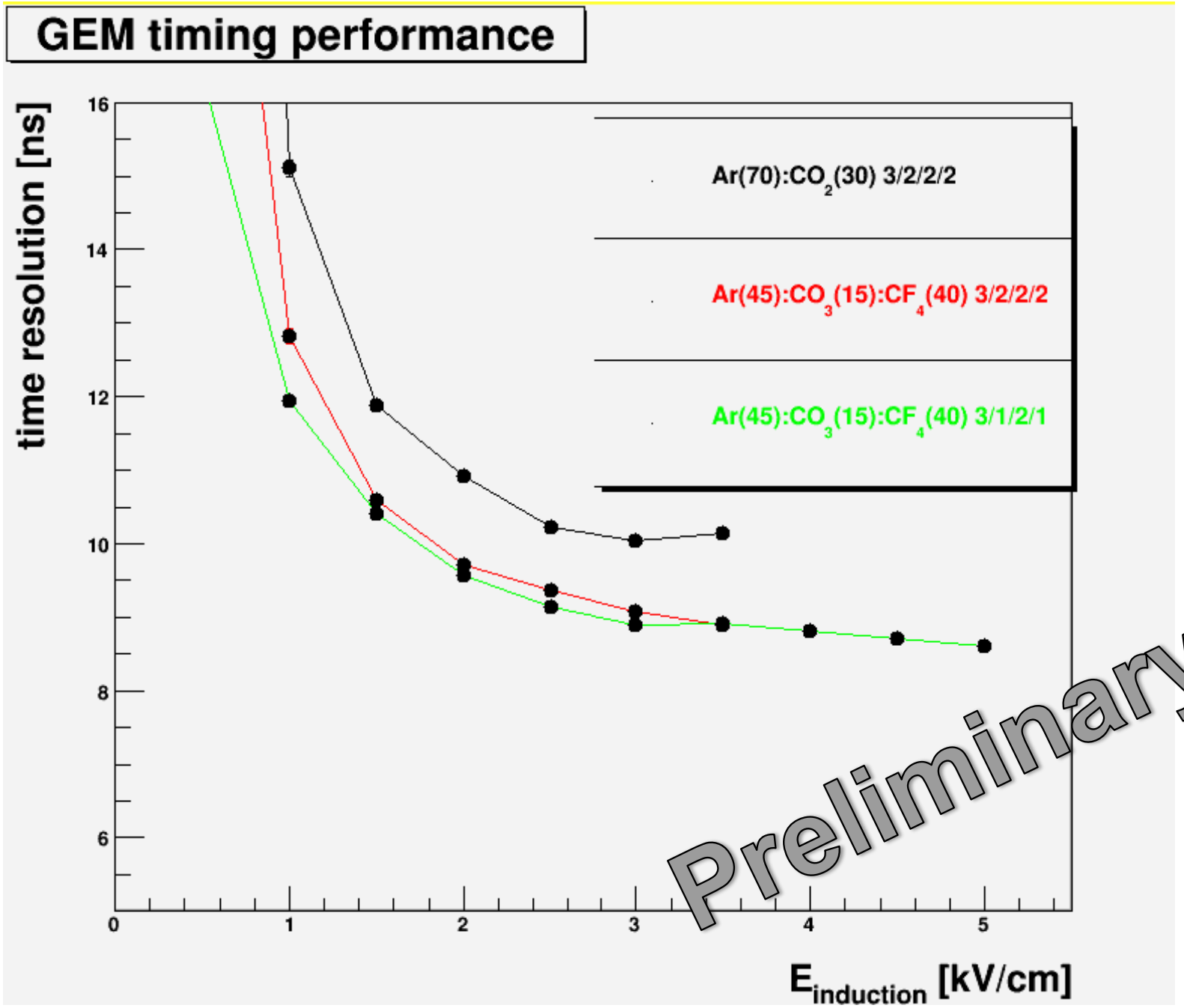
CONFIG. 1 gaps :3*mm*(Drift) / 2*mm*(T1) / 2*mm*(T2) / 2*mm*(Induction)

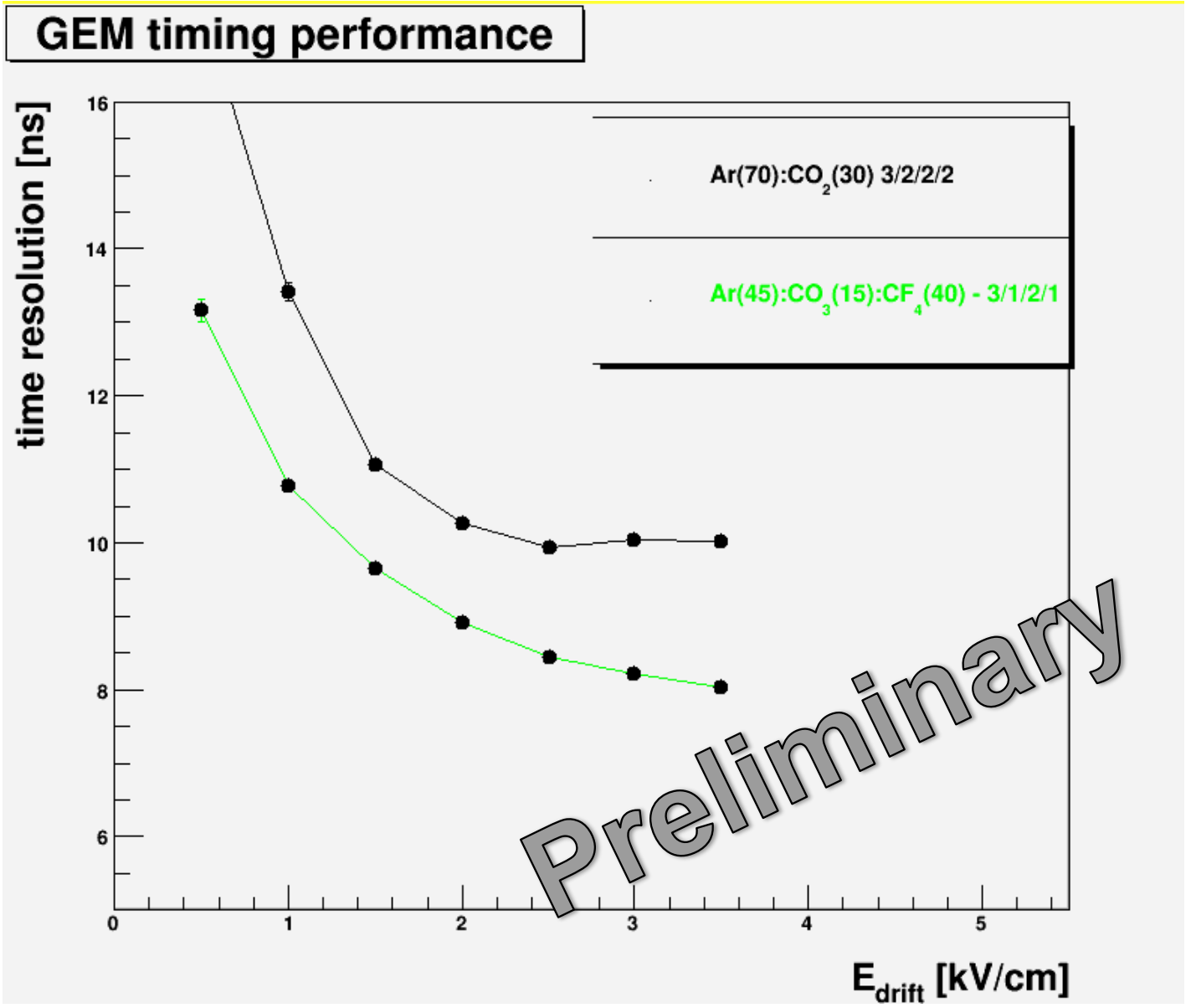
CONFIG. 2 gaps :3*mm*(Drift) / 1*mm*(T1) / 2*mm*(T2) / 1*mm*(Induction)

DATA-TAKING

- Efficiency scan (TDC and VFATs) for two gases.
- Drift scan (from 0.5kV/cm to 3.4kV/cm with 0.5kV/cm step).
- Induction Scan (from 0.5kV/cm to 3.4kV/cm with 0.5kV/cm step).
- Beam Intensity scan (Pion 150GeV).
- Threshold scan using LHCb gas and best efficiency point.


GEM timing performance
Efficiency [%]
100
90
80
70
60
50
40
30
20
10
0
5000
10000
15000
20000
25000
Gain
Preliminary
Ar(70):CO2(30) 3/2/2/2
Ar(45):CO2(15):CF4(40) 3/2/2/2
Ar(45):CO2(15):CF4(40) 3/1/2/1


GEM timing performance
time resolution [ns]
16
14
12
10
8
6
0
1
2
3
4
5
E induction [kV/cm]
Ar(70):CO2(30) 3/2/2/2
Ar(45):CO3(15):CF4(40) 3/2/2/2
Ar(45):CO3(15):CF4(40) 3/1/2/1
Preliminary


GEM timing performance
time resolution [ns]
16
14
12
10
8
6
0
1
2
3
4
5
E_drift [kV/cm]
Ar(70):CO2(30) 3/2/2/2
Ar(45):CO3(15):CF4(40) - 3/1/2/1
Preliminary

Honeycomb chamber summary

COSTANT PARAMETERS DURING DATA-TAKING

3x Double mask gems(standard)

2d readout , strips 0.8*mm* pitch

Ed=2.0 KV/cm, Et1=Et2=3.0 KV/cm, Ei=3KV/cm

gaps :3*mm*(Drift) / 2*mm*(T1) / 2*mm*(T2) / 2*mm*(Induction)

HONEYCOMB STRUCTURES

CONFIG. 1: 12*mm*(Drift) / 12*mm*(T1) / 12*mm*(T2) / 12*mm*(Induction)

CONFIG. 2: 6*mm*(Drift) / 12*mm*(T1) / 12*mm*(T2) / 12*mm*(Induction)

CONFIG. 3: 6*mm*(Drift) / 0*mm*(T1) / 0*mm*(T2) / 0*mm*(Induction)

DATA-TAKING

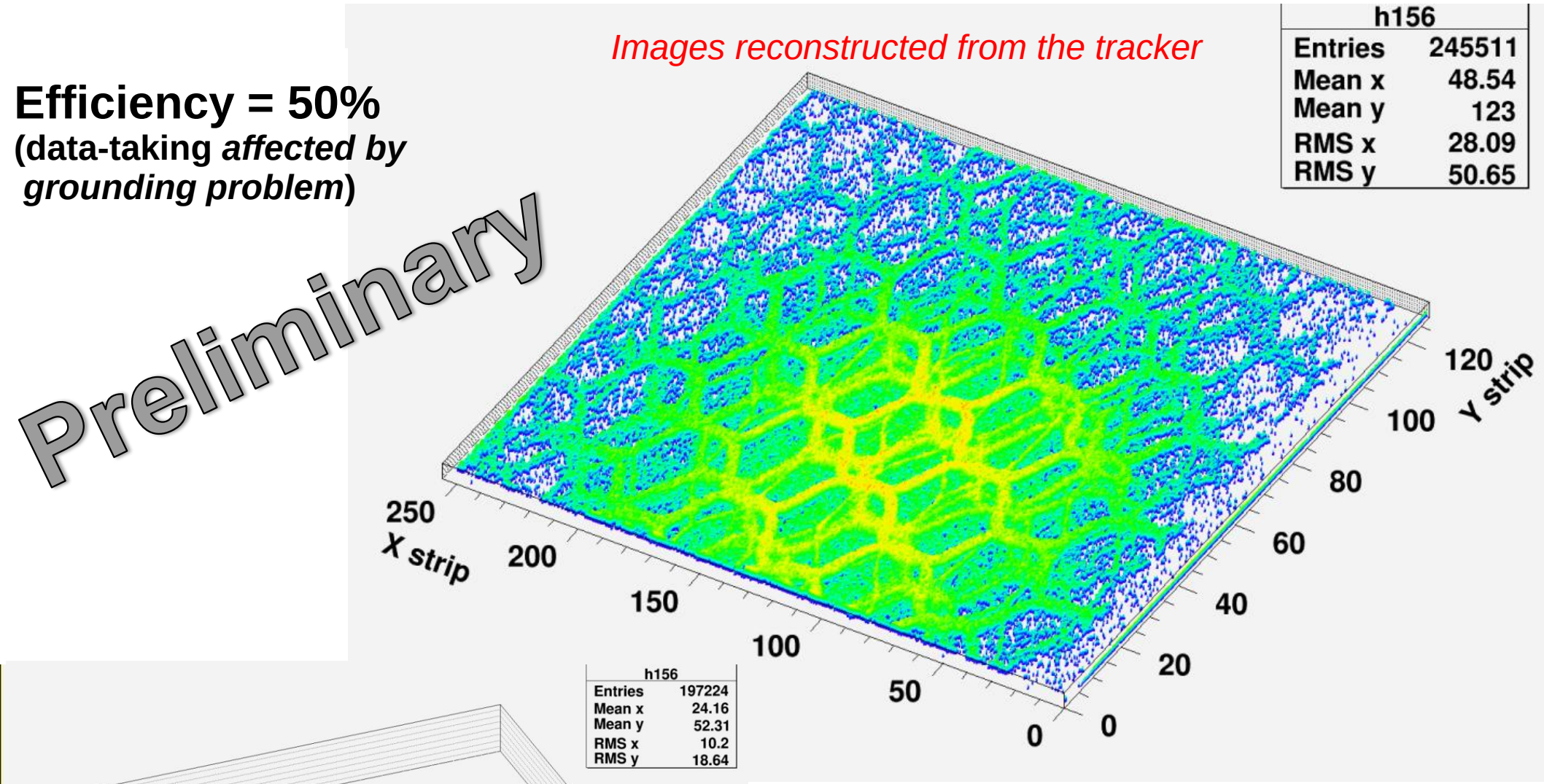
- Efficiency and Imaging studies

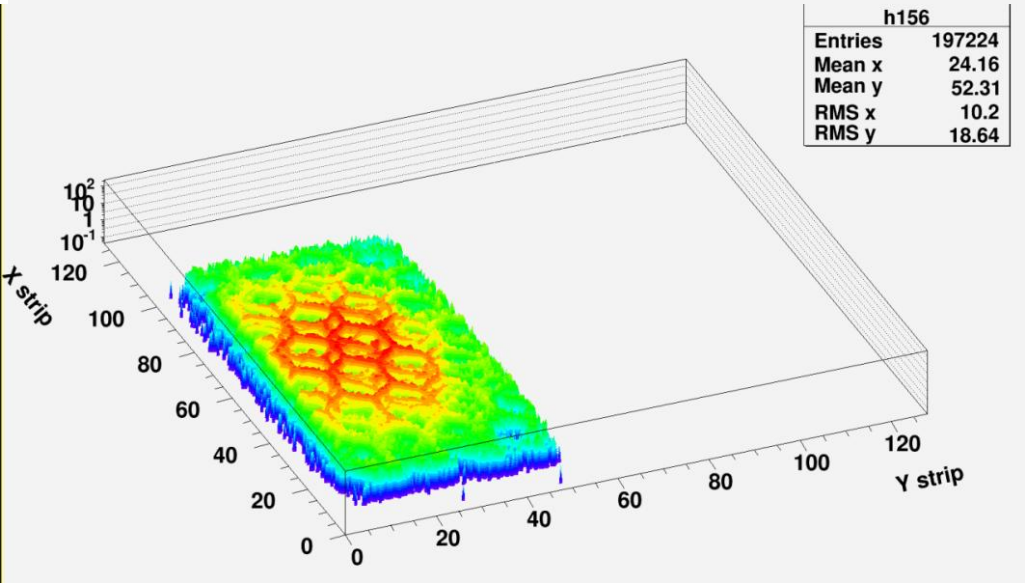
CONFIG. 1: 12*mm*(Drift) / 12*mm*(T1) / 12*mm*(T2) / 12*mm*(Induction)

Images reconstructed from the tracker

Efficiency = 50%
(data-taking *affected by grounding problem*)

Preliminary



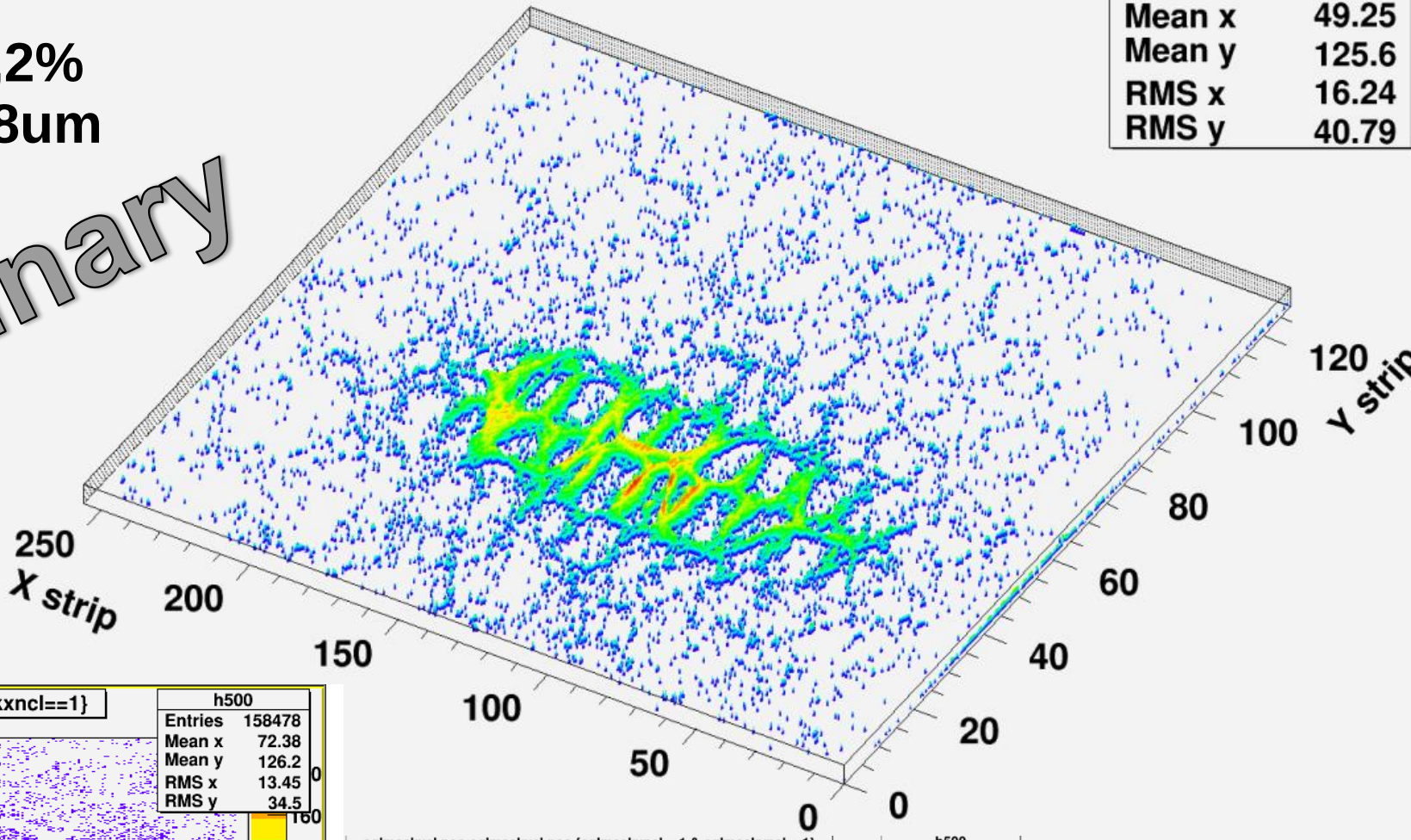


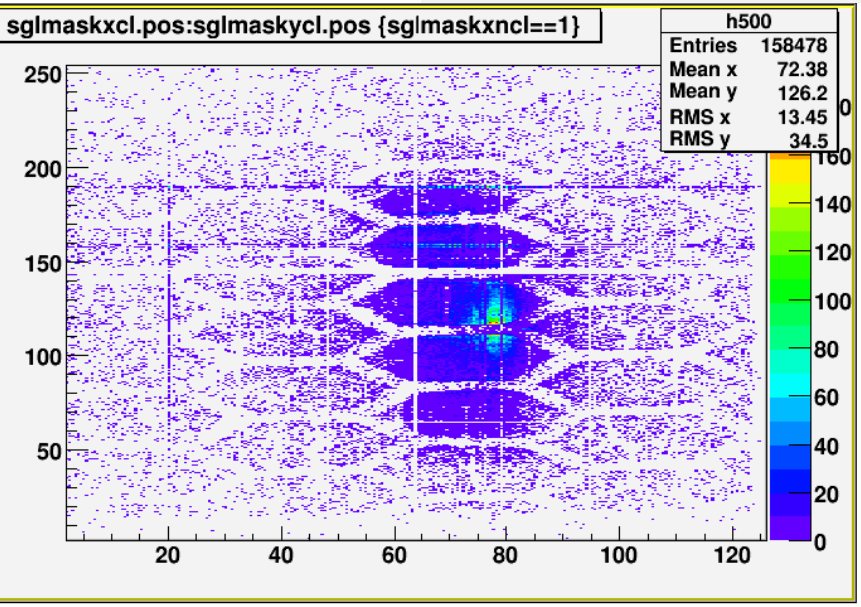
CONFIG. 2: 6*mm*(Drift) / 12*mm*(T1) / 12*mm*(T2) / 12*mm*(Induction)

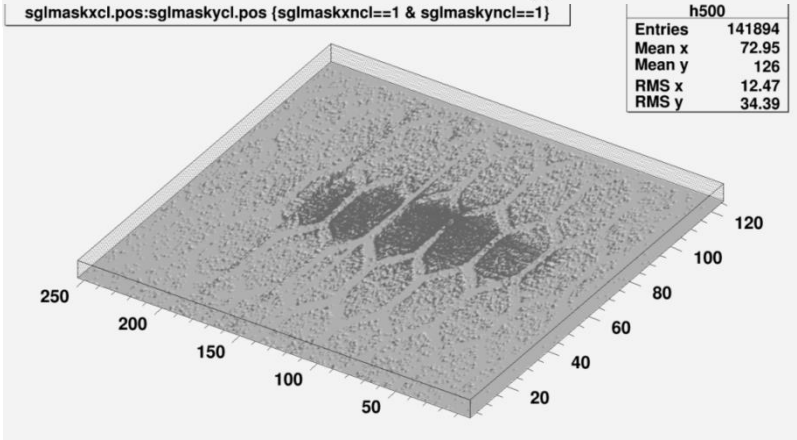
Images reconstructed from 2d readout

Efficiency = 71,2%
Space res > 418um

Preliminary



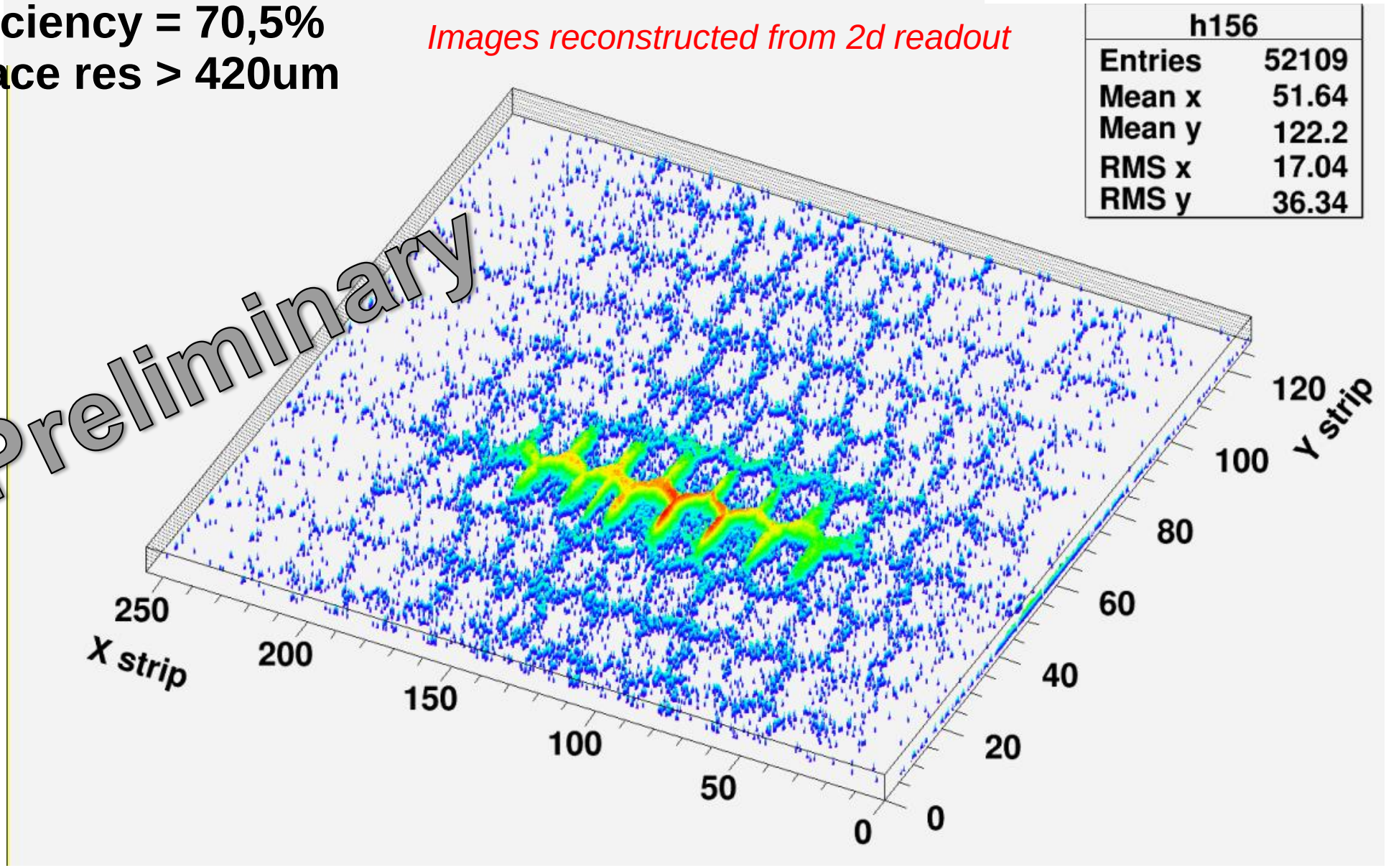




CONFIG. 2: 6*mm*(Drift) / 0*mm*(T1) / 0*mm*(T2) / 0*mm*(Induction)

Efficiency = 70,5%
Space res > 420um

Images reconstructed from 2d readout



Single mask chamber summary

COSTANT PARAMETERS DURING DATA-TAKING

3x Single mask gems

2d readout , strips 0.4*mm* pitch

gaps :3*mm*(Drift) / 2*mm*(T1) / 2*mm*(T2) / 2*mm*(Induction)

CONFIG. 1 gaps :3*mm*(Drift) / 2*mm*(T1) / 2*mm*(T2) / 2*mm*(Induction)

DATA-TAKING

- Efficiency scan and 2D Imaging (VFATs)

..Data analysis in progress..