ÖAW AUSTRIAN ACADEMY OF SCIENCES

HEPHY INSTITUTE OF HIGH ENERGY PHYSICS

RD50 HV-CMOS Meeting

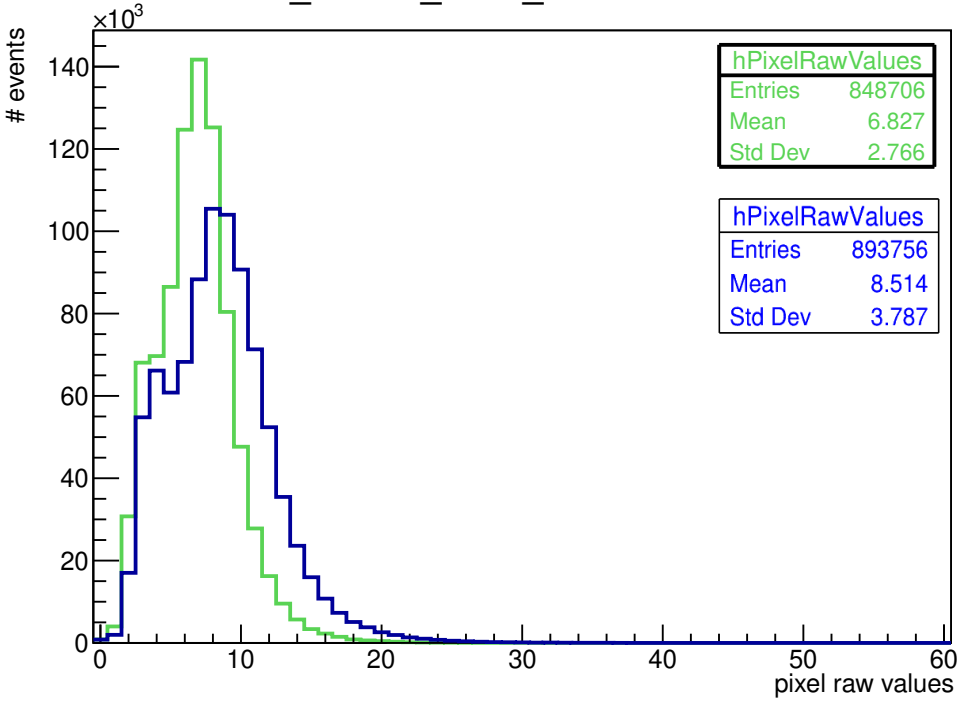
DESY-TB results

Harald Handerkas

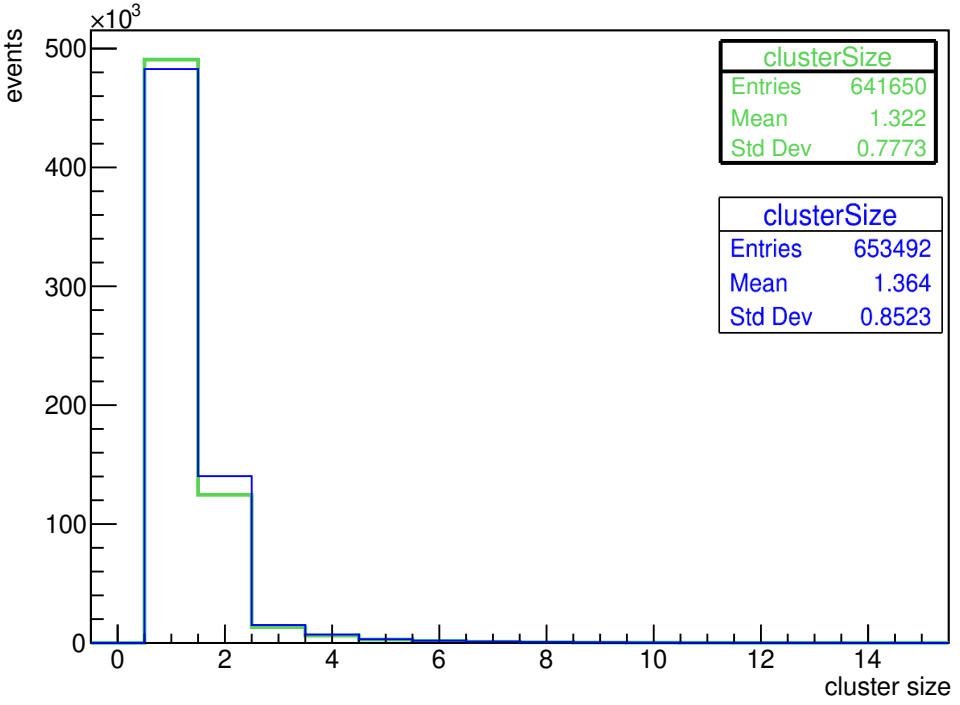
ToT and cluster size

Bias voltage: 190 V
Threshold: 20/40 mV
LSB = 25 ns

RD50_MPWx_base_ToT

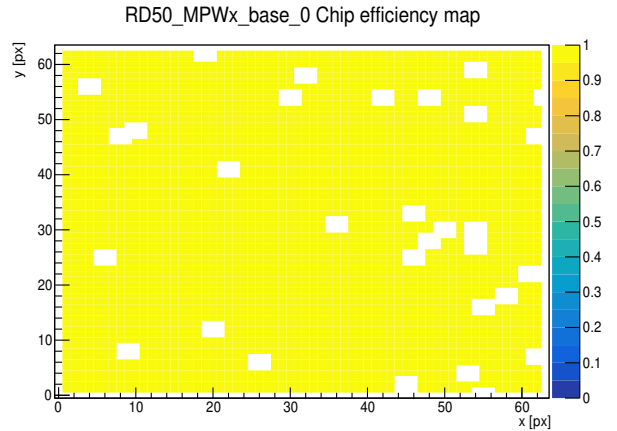


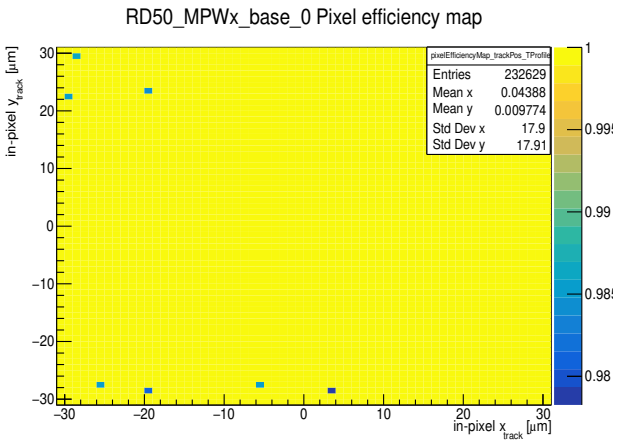
RD50_MPWx_base_0 Cluster size



HEPHY topside biased
HEPHY backside biased

Efficiencies





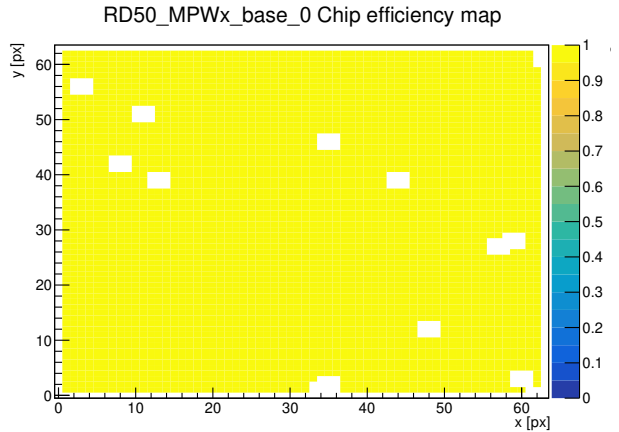
backside

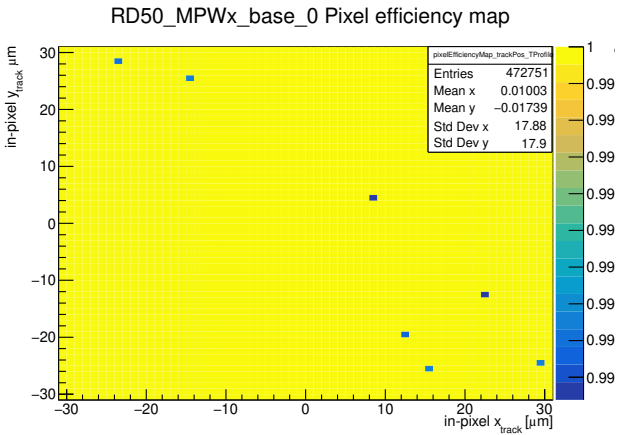
HEPHY topside biased

- Total efficiency: 99.9985 %
- Masked pixels: 14
- Used tracks: 472751
- Missed tracks: 7

HEPHY backside biased

- Total efficiency: 99.9961 %
- Masked pixels: 31
- Used tracks: 232629
- Missed tracks: 9





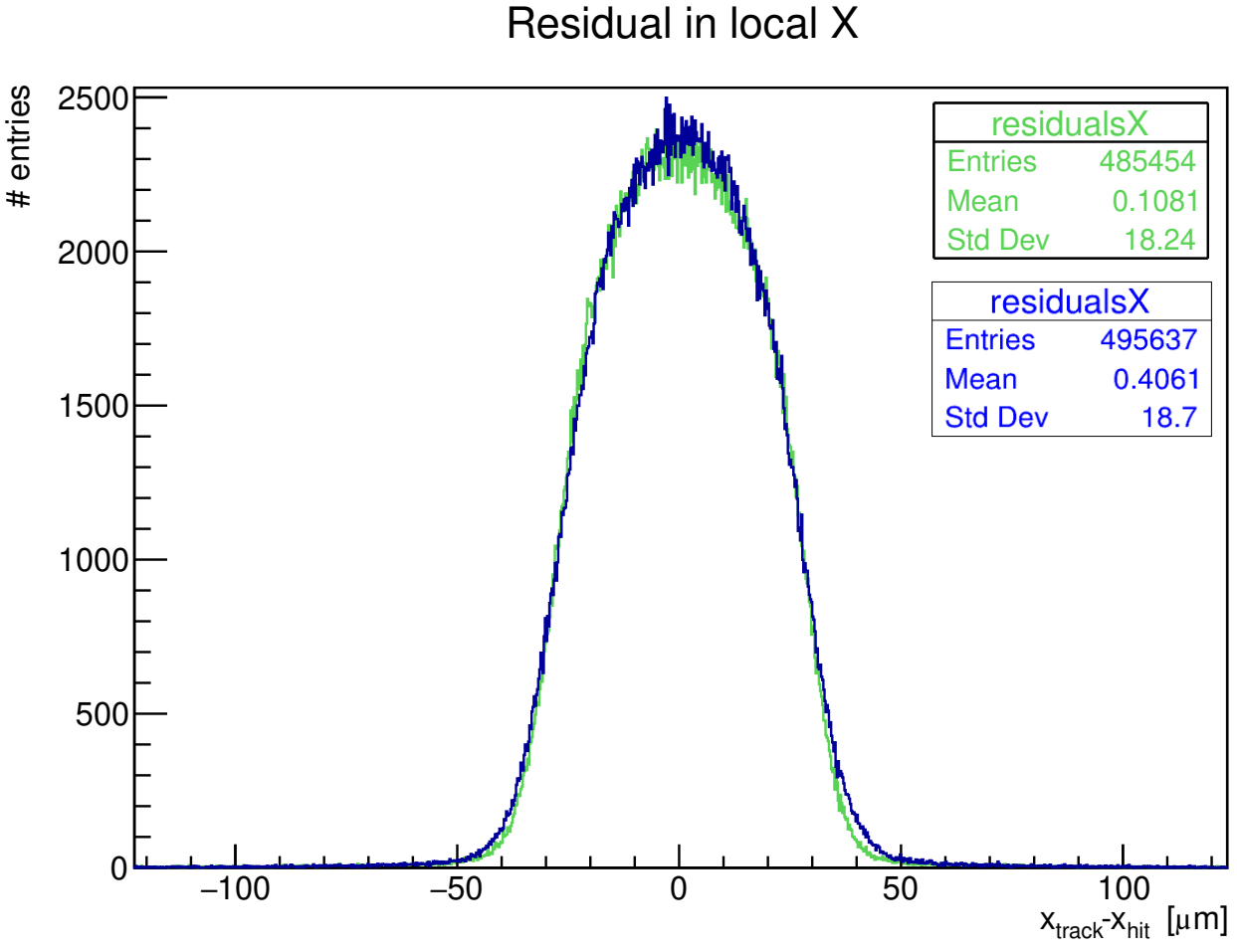
topside

Residuals

Std Dev
binary resolution: 17.89 µm

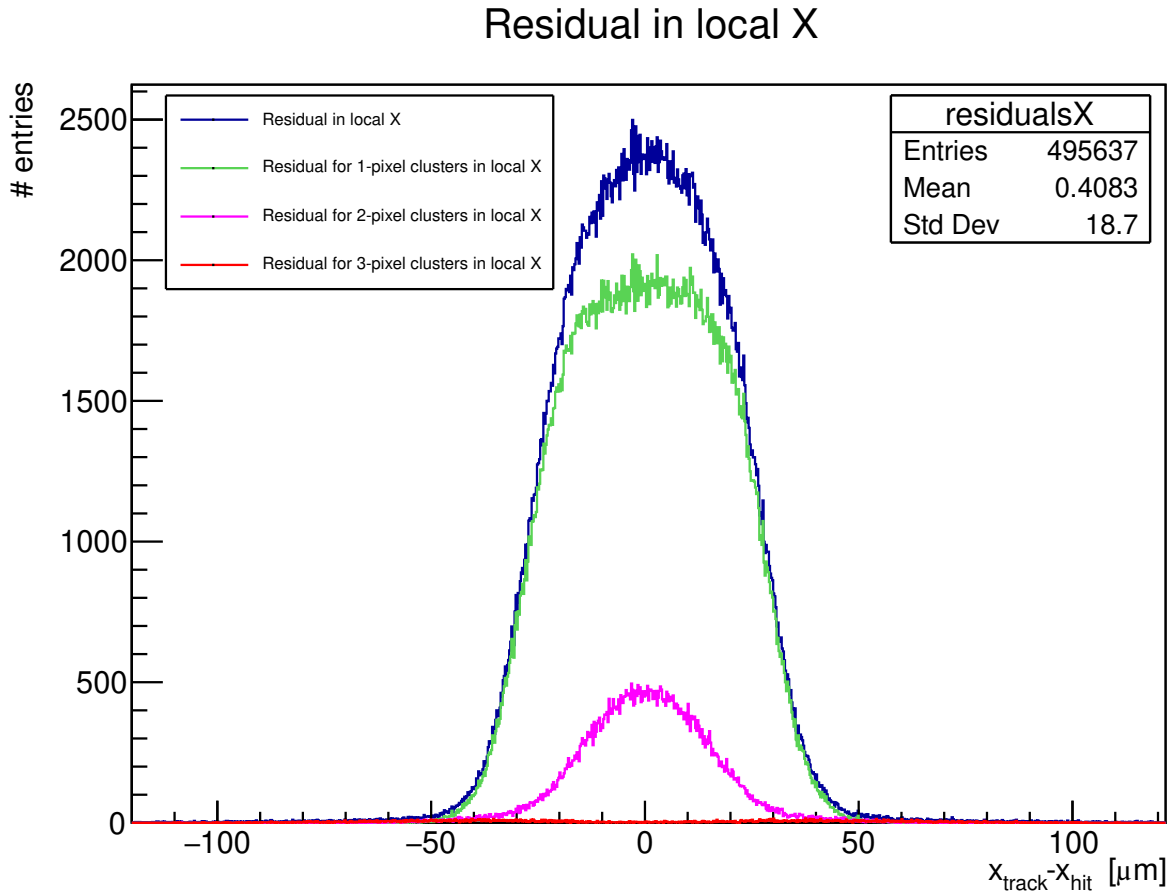
Range: -110 µm to 110 µm
HEPHY topside biased: 18.24 µm
HEPHY backside biased: 18.70 µm

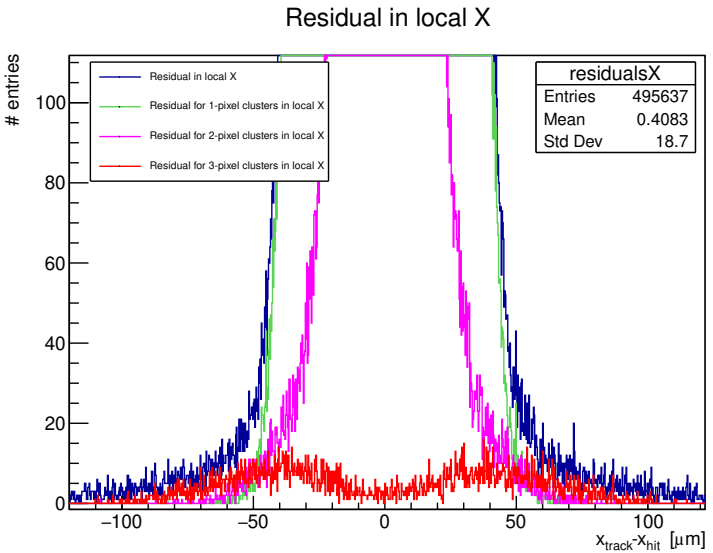
Range: no cuts
HEPHY topside biased: 19.09 µm
HEPHY backside biased: 20.01 µm



HEPHY topside biased
HEPHY backside biased

Residuals by clusters





Std dev (range: -110 µm to 110 µm)

- All clusters: 18.70 µm
- 1-pixel clusters: 17.95 µm
- 2-pixel clusters: 15.60 µm
- 3-pixel clusters: 49.13 µm

Comparison HEPHY backside biased with Liverpool topside biased

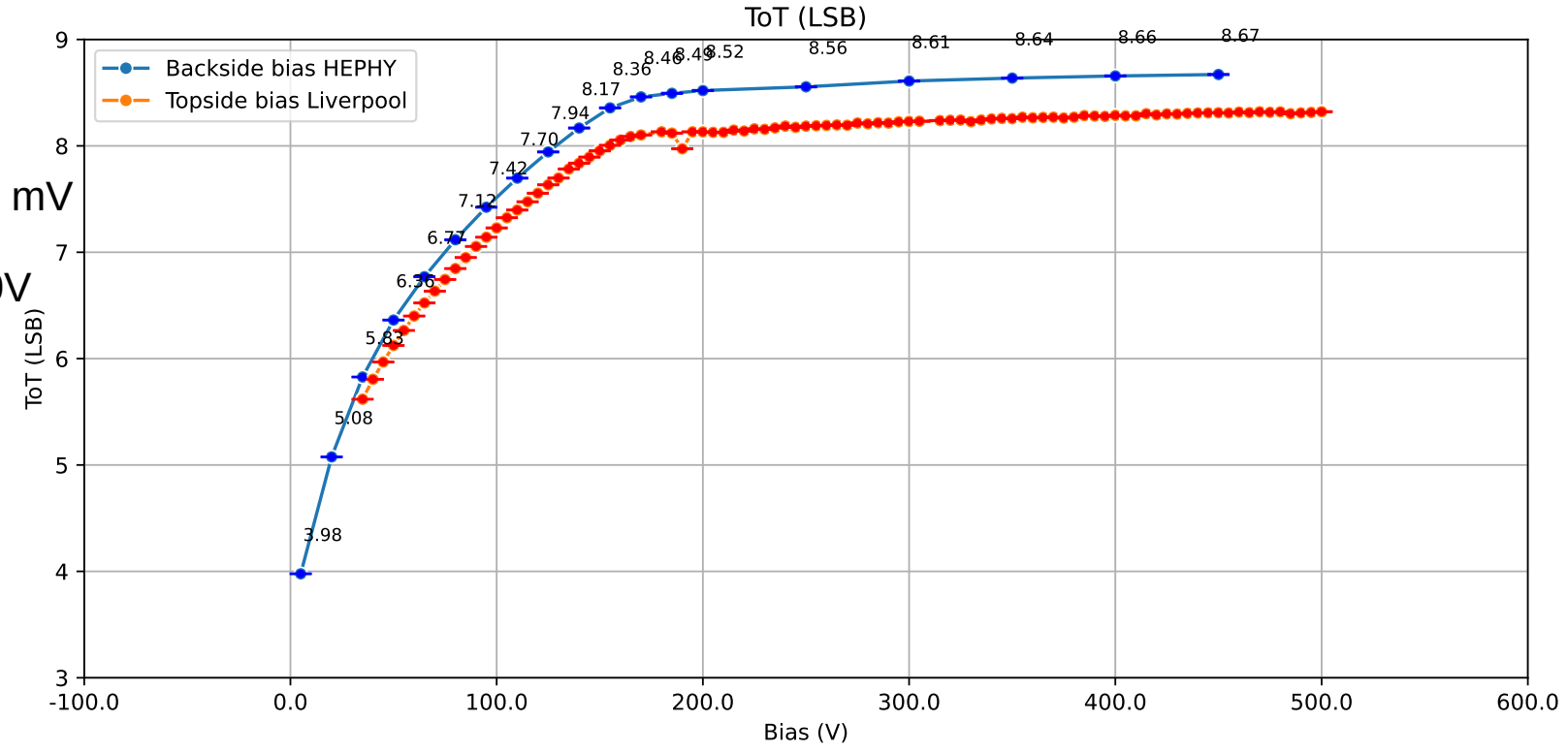
HV scan

- Threshold: 30/40 mV
- Cluster size increases till 200 V => full depletion
- Decrease after this point due to increasing strength of E-field

Comparison HEPHY backside biased with Liverpool topside biased

HV scan

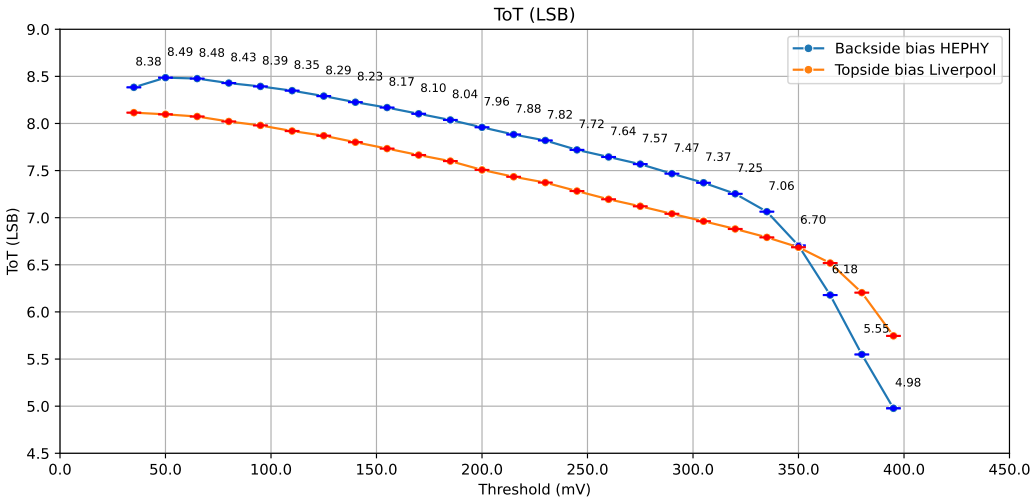
- Threshold: 30/40 mV
- Saturation at 200V => full depletion

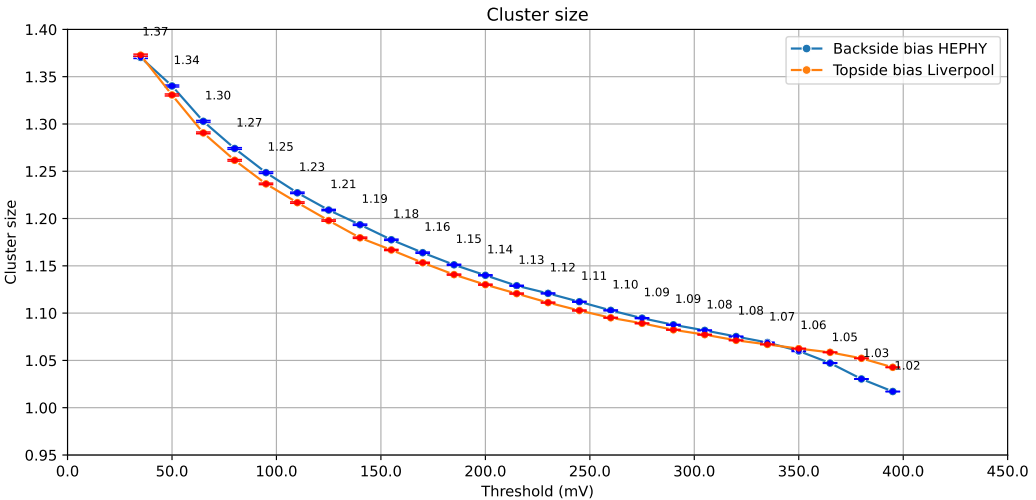


Comparison HEPHY backside biased with Liverpool topside biased

Threshold scan

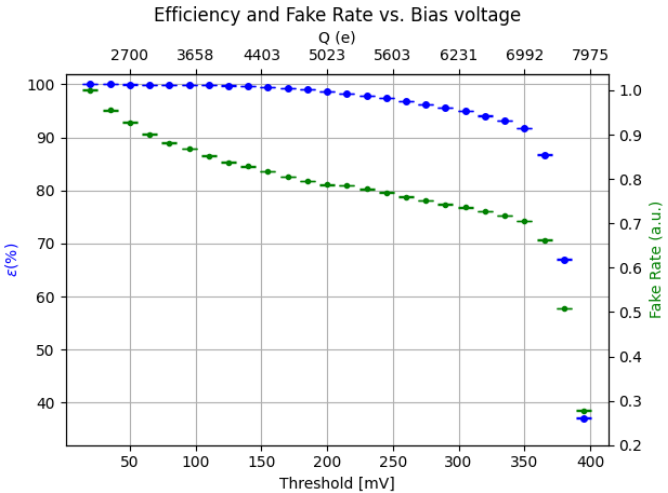
- Bias voltage: 190 V



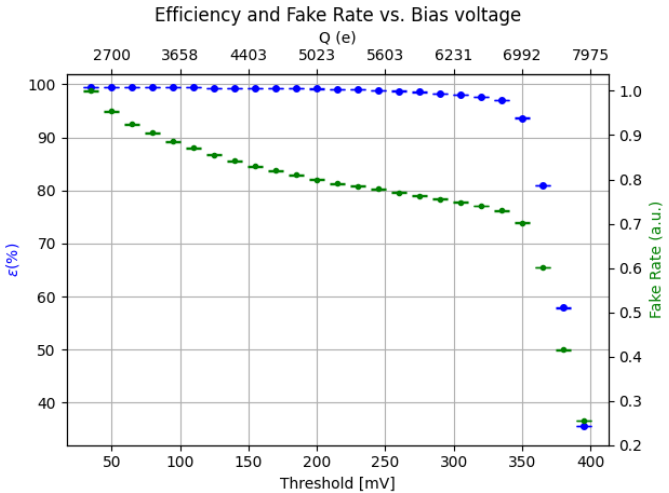


Threshold Scans

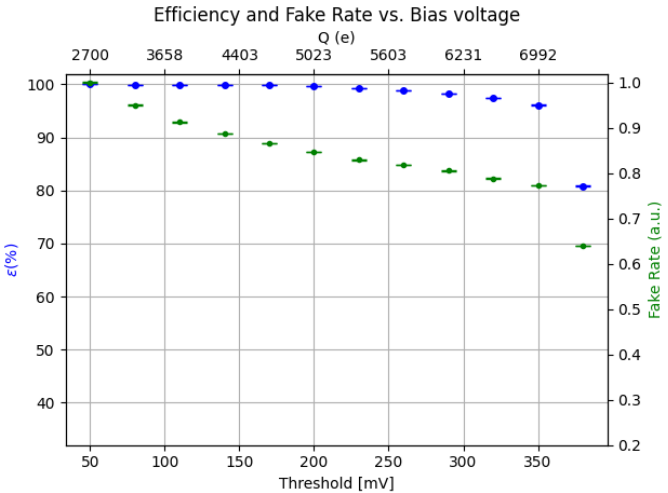
Bias voltage: 190 V



HEPHY topside biased



HEPHY backside biased



NIKHEF backside biased
biased from top

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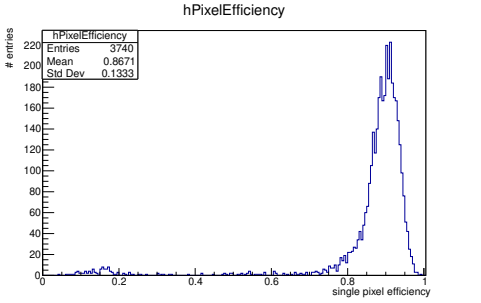
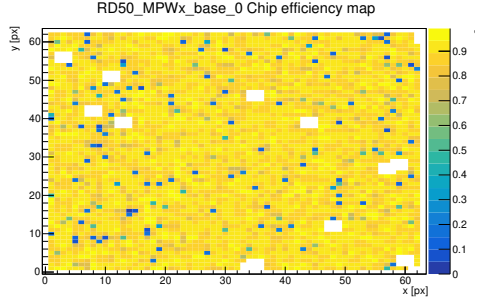
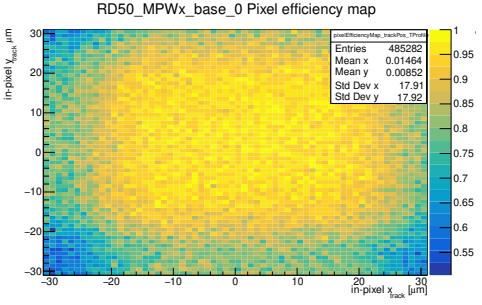
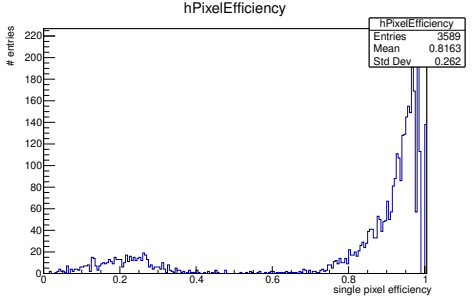
HEPHY topside biased
Threshold: 365 mV
Eff: 86 %

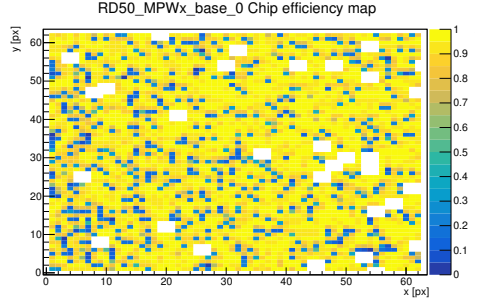


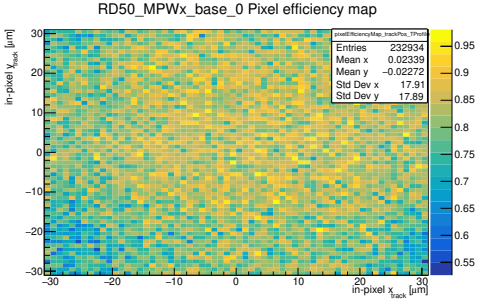




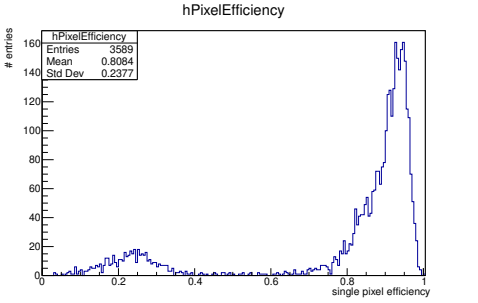
HEPHY backside biased
Threshold: 365 mV
Eff: 81 %

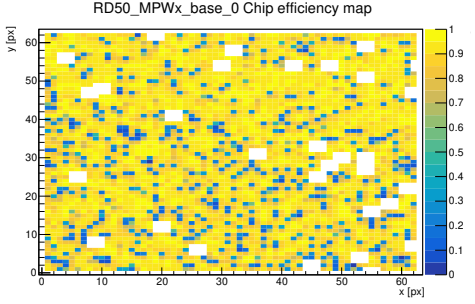


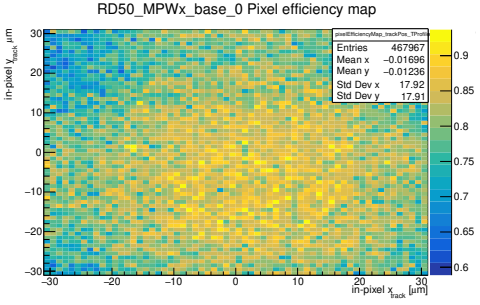




NIKHEF backside biased from top
Threshold: 380 mV
Eff: 80 %

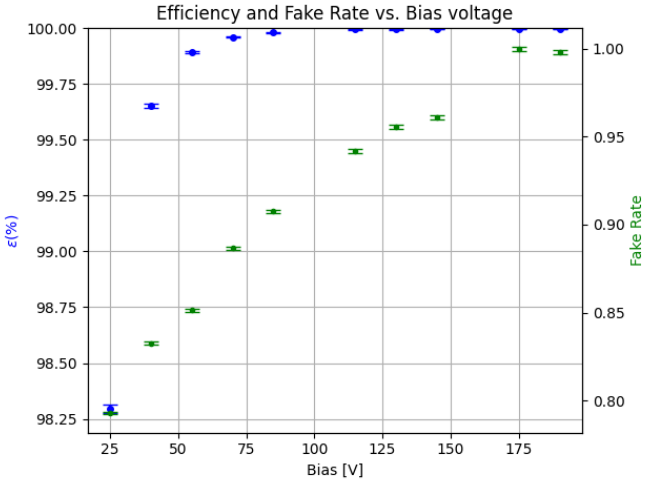




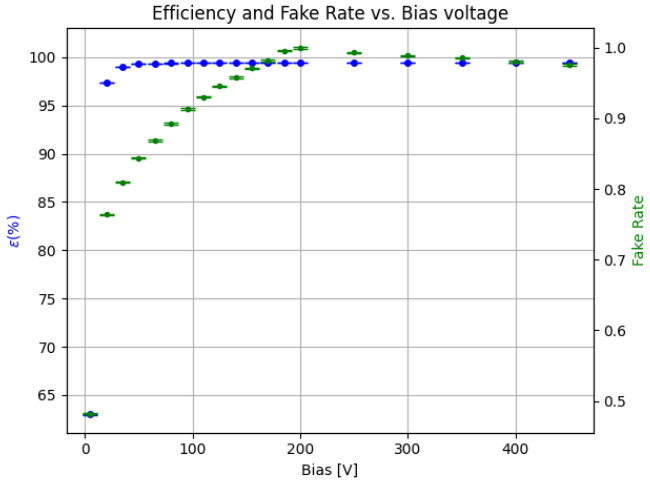


Bias Voltage Scans

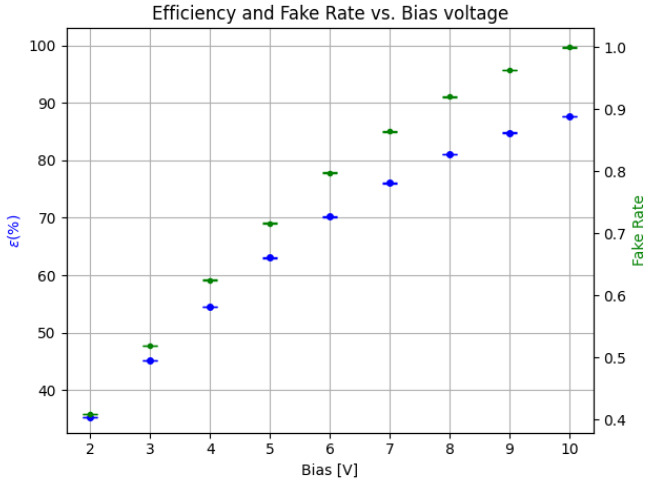
Attention: different scales!



HEPHY topside biased
Threshold: 20 mV
HV: 25-190 V

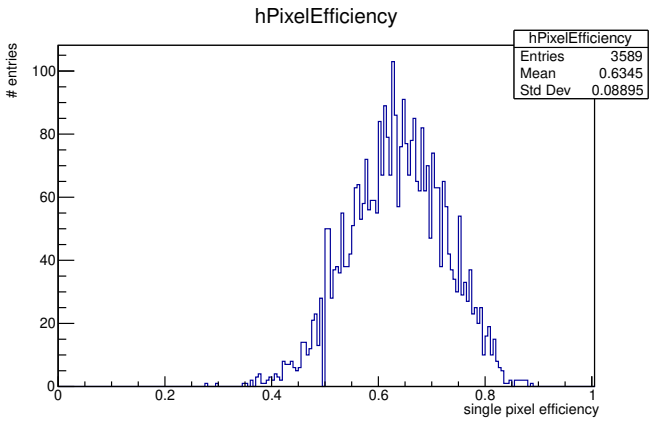


HEPHY backside biased
Threshold: 40 mV
HV: 5-450 V

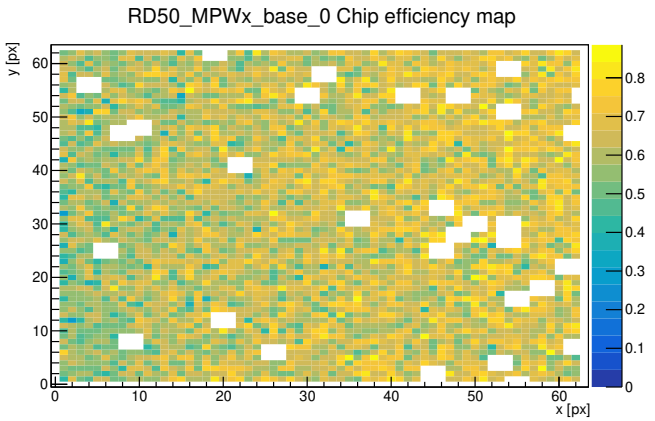


HEPHY backside biased
Threshold: 40 mV
HV: 2-10 V

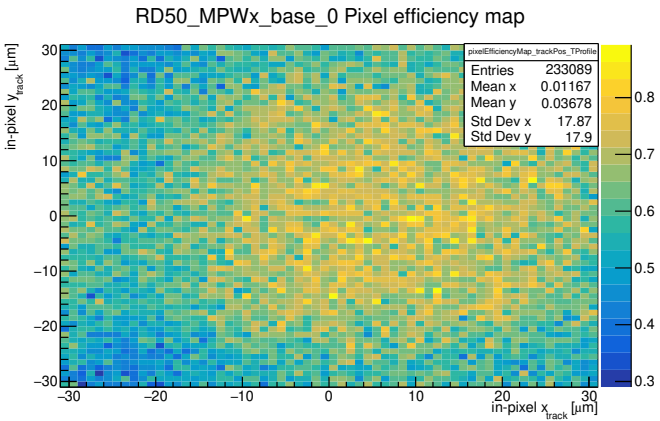
Loss of Efficiency



Single Pixel efficiency



Chip efficiency



Pixel efficiency

HEPHY backside biased
Threshold: 20 mV
HV: 5 V
Eff: 63 %