AGIPD Meeting @ PSI

31 Mar – 2 Apr 2014

OUTLINE

➢ Optimization of the Bias Voltages (AGIPD05)

- Vref,cob
- Vcom,cob
- Vref,pxb
- (Vref,cds)
- Influence of the Output CM on the linearity

➢ Data Acquisition with Photons (AGIPD10)

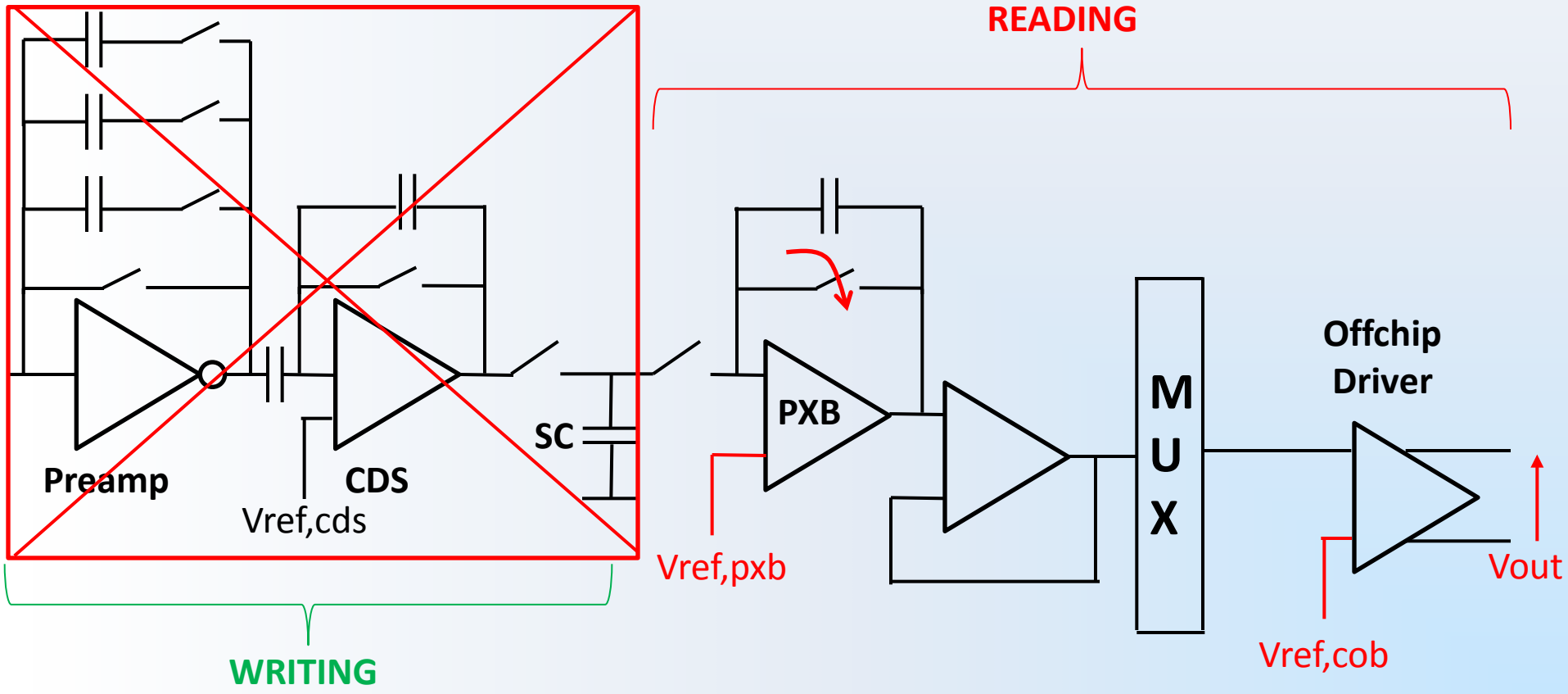
- Investigation of the impact of Writing Speed and Vref,cds on the Pulse Height
- Noise

➢ Ongoing….

Optimization of Reference Voltages

Vref,cob

Measurements on AGIPD05, 1 Pixel (Same as AGIPD10)
Chip Running @ 80MHz
PXB **ALWAYS** in Reset -> Scan Over Vref,cob and Vref,pxb

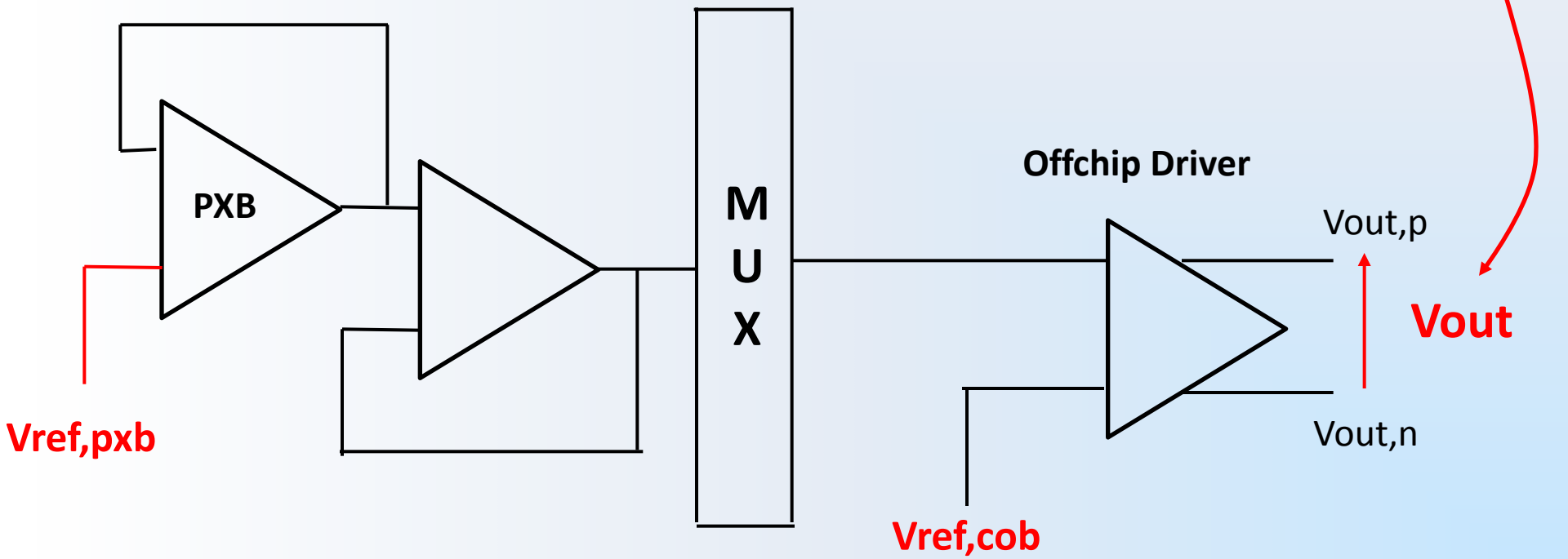


Equivalent Scheme & Scan Settings

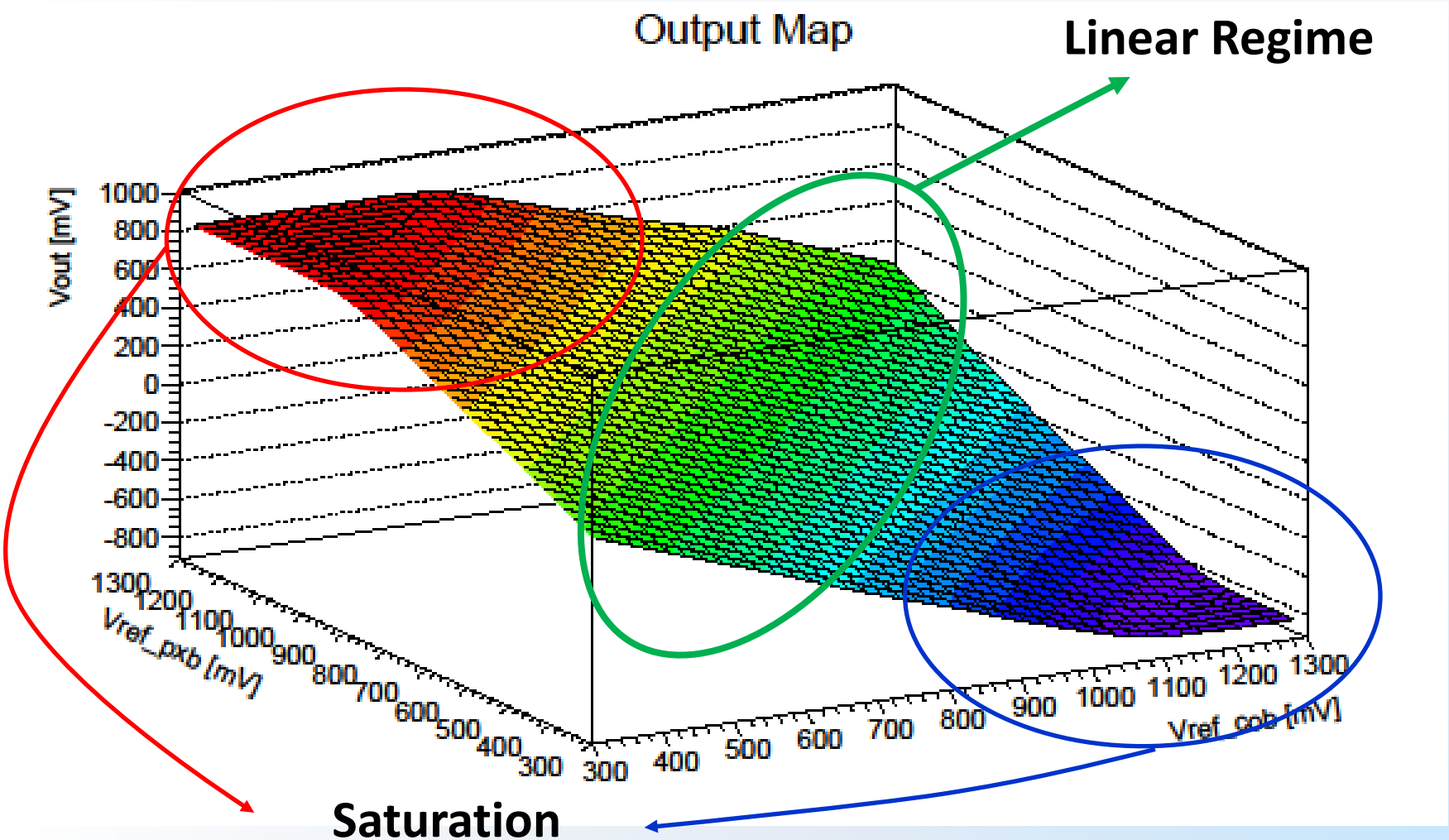
Vref,pxb & Vref,cob Settings

Voltage step ΔV = 33mV
Scan from 300 to 1300 mV

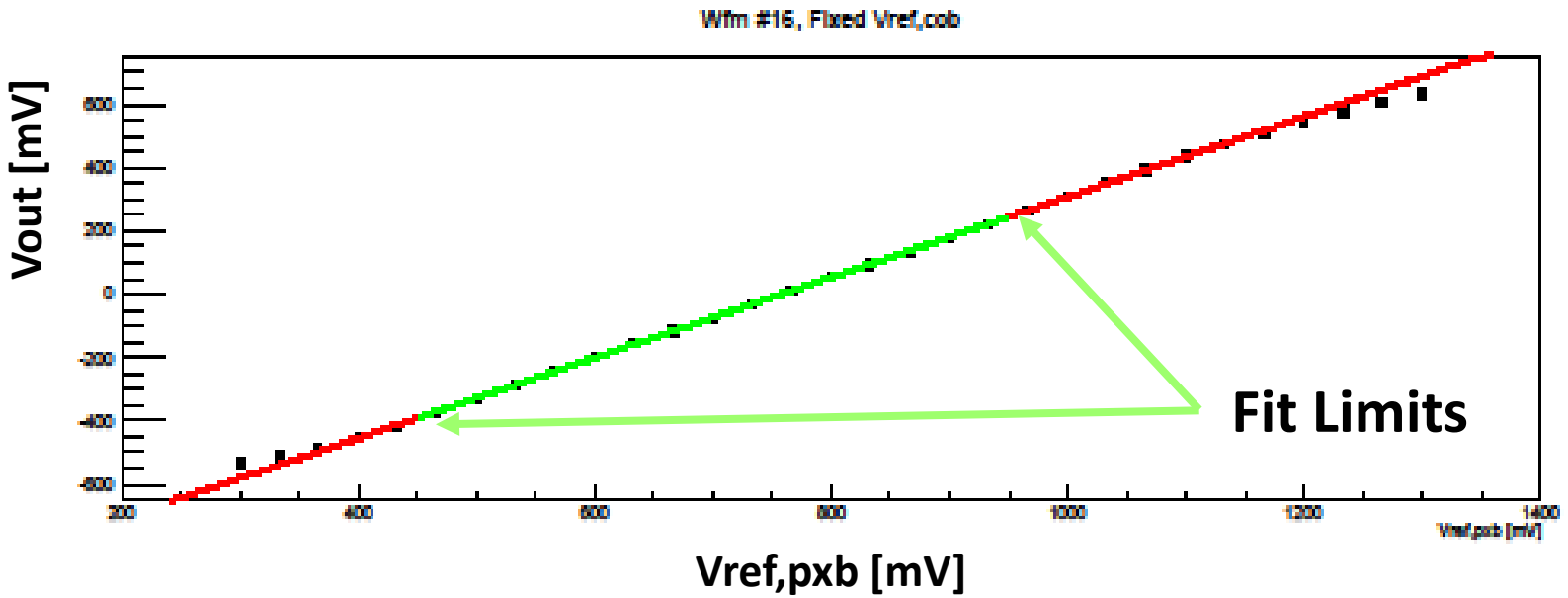
$$V_{out} = V_{out,p} - V_{out,n}$$

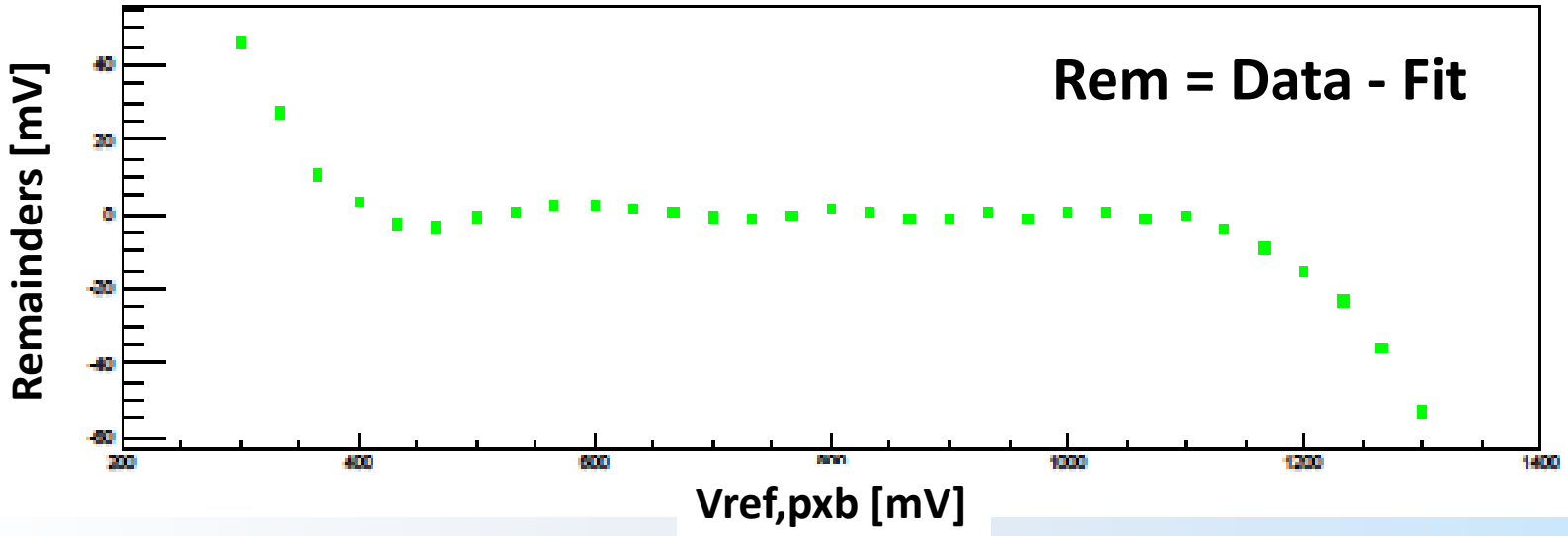


2D MAP
Vref,cob and Vref,pxb

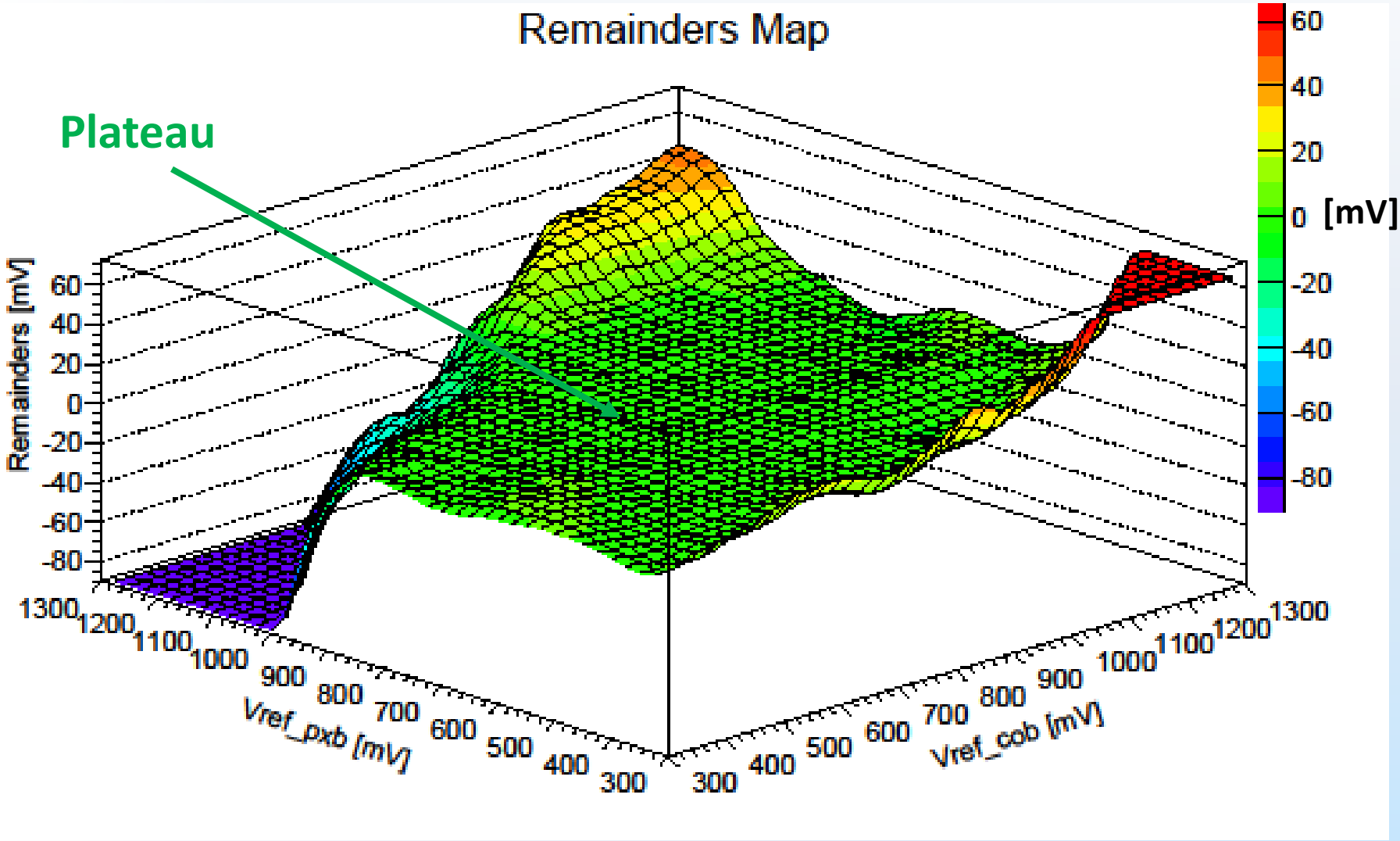


SINGLE WFM AND FIT



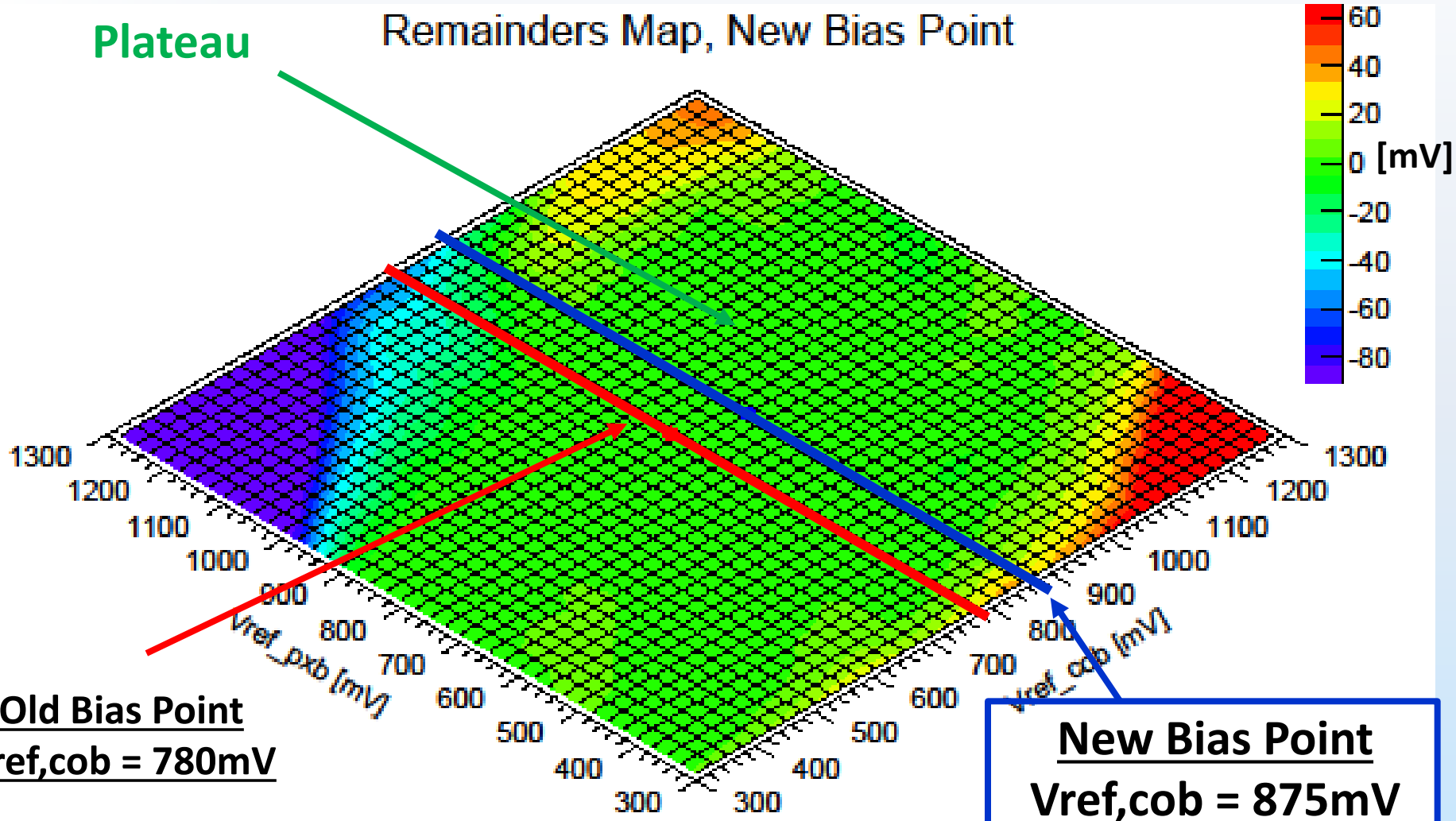


3D REMAINDERS MAP



1 mV = 64.7 x 10^{-3} ph (@12keV), CDS gain high

NEW BIAS POINT for Vref,cob



Old Bias Point
Vref,cob = 780mV

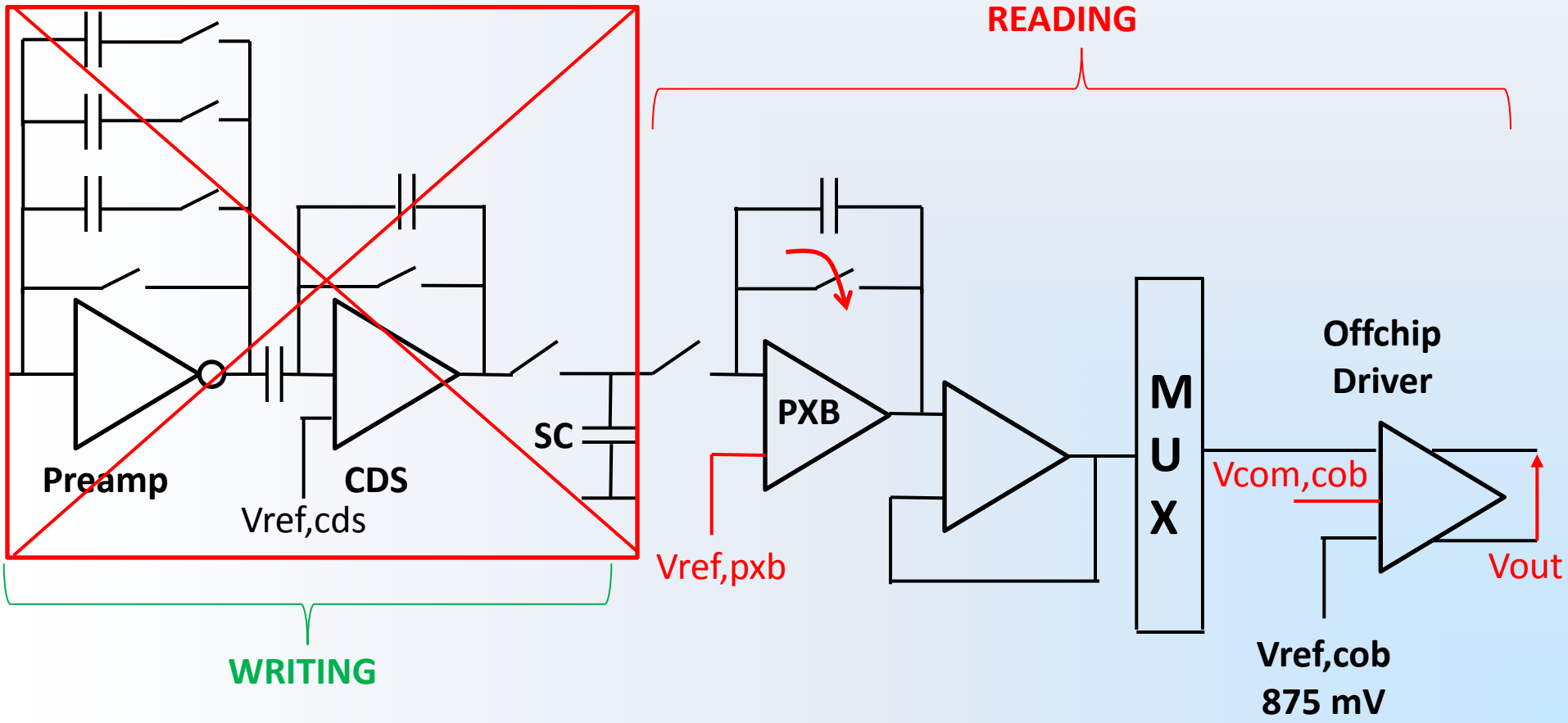
New Bias Point
Vref,cob = 875mV

1 mV = 64.7 x 10^{-3} ph (@12keV), CDS gain high

Optimization of Reference Voltages

Vcom,cob

Measurements on AGIPD05, 1 Pixel (Same as AGIPD10)
Chip Running @ 80MHz
PXB **ALWAYS** in Reset -> Scan Over Vcom,cob and Vref,pxb



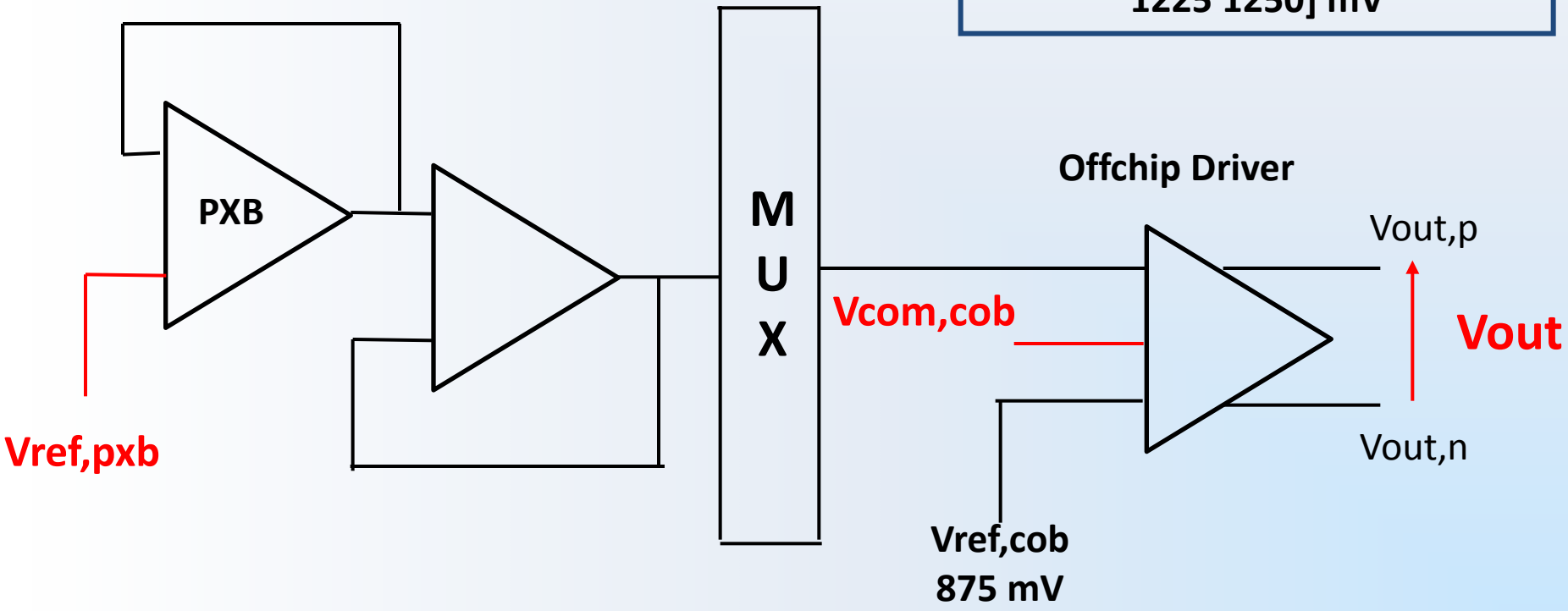
Equivalent Scheme & Scan Settings

Vref,pxb Settings

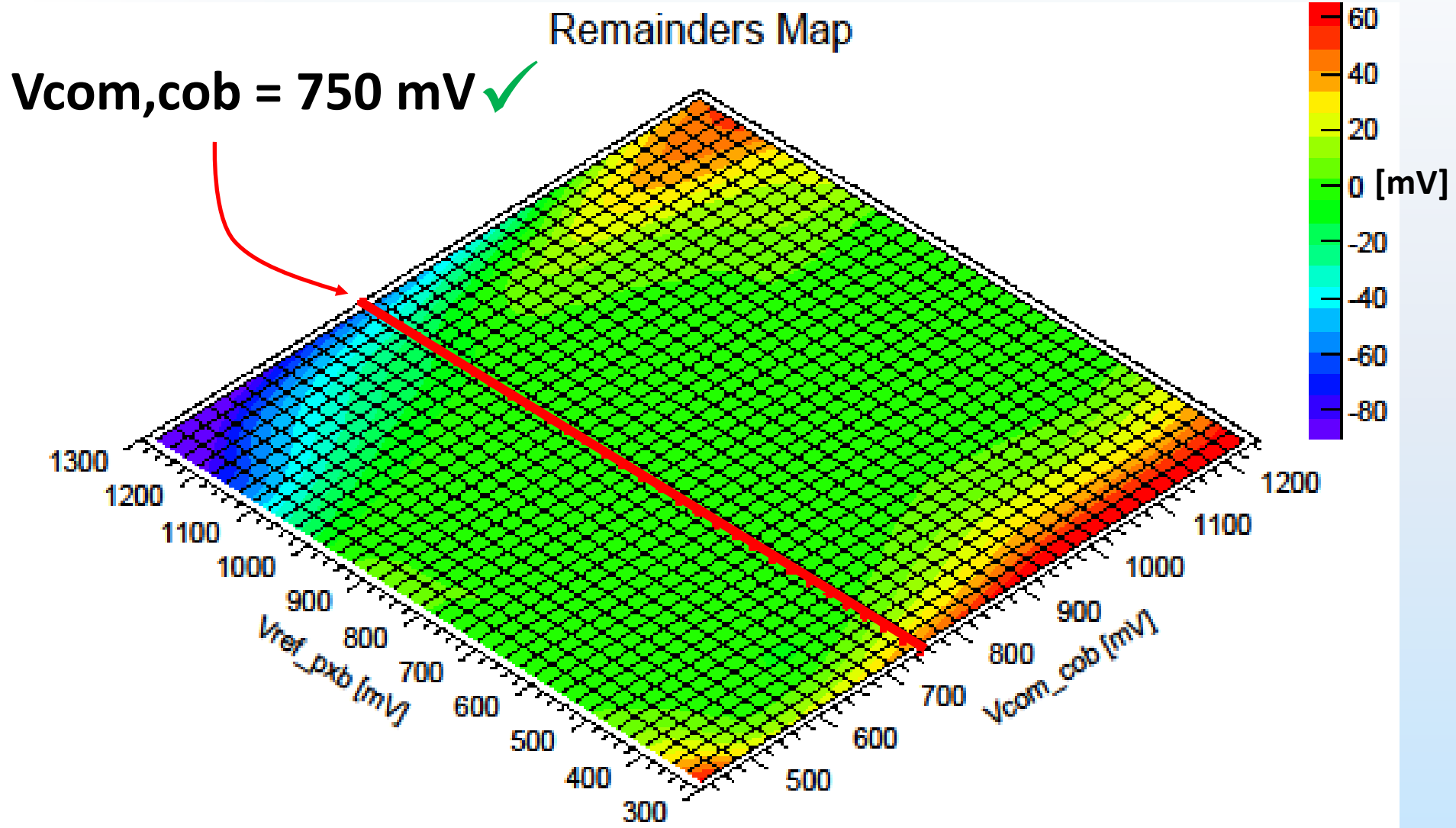
Voltage step ΔV = 33mV
Scan from 300 to 1300 mV

Vcom,cob Settings

Voltages Scanned
[435 460 485 510 550 650 750
850 950 1050 1150 1175 1200
1225 1250] mV



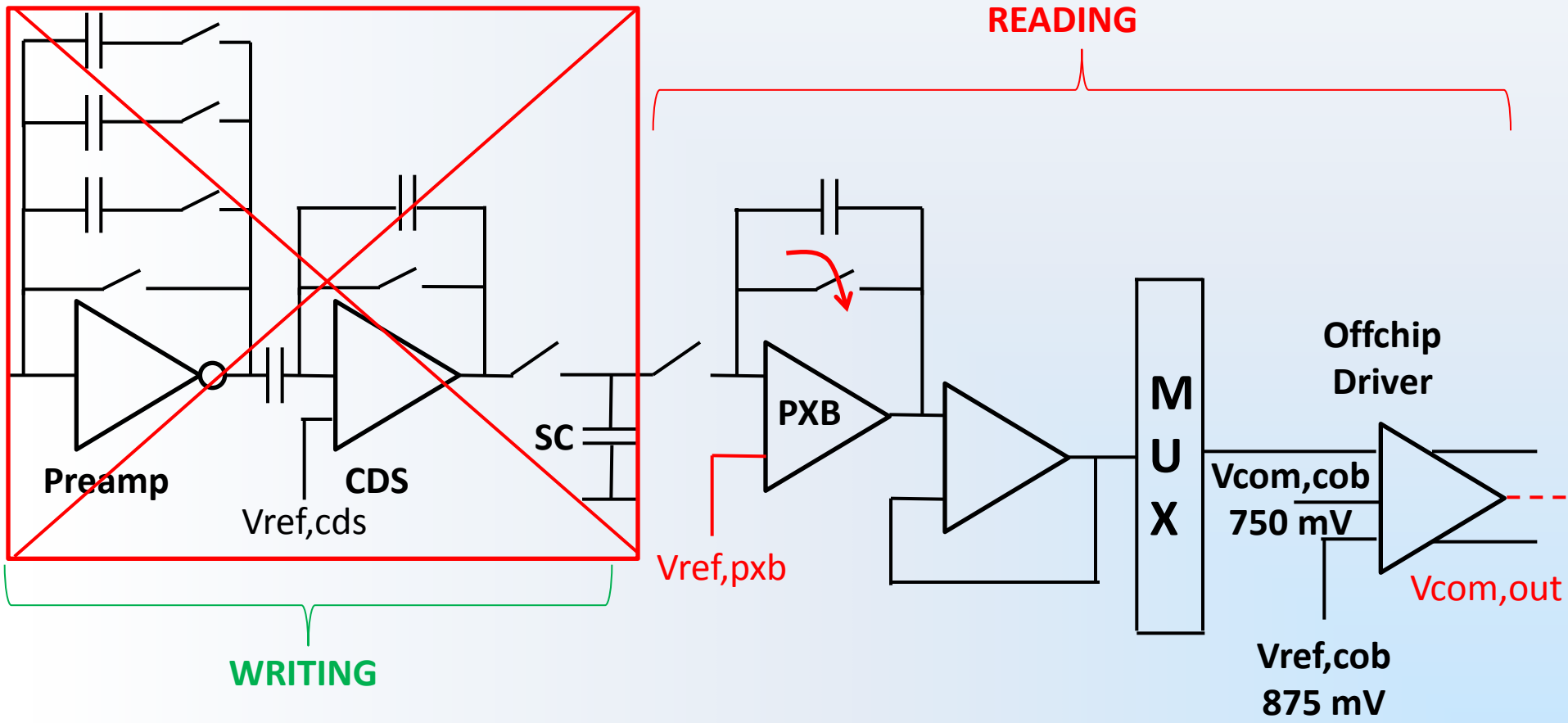
BIAS POINT for Vcom,cob



1 mV = 64.7 x 10^{-3} ph (@12keV), CDS gain high

Output Common Mode (CM)

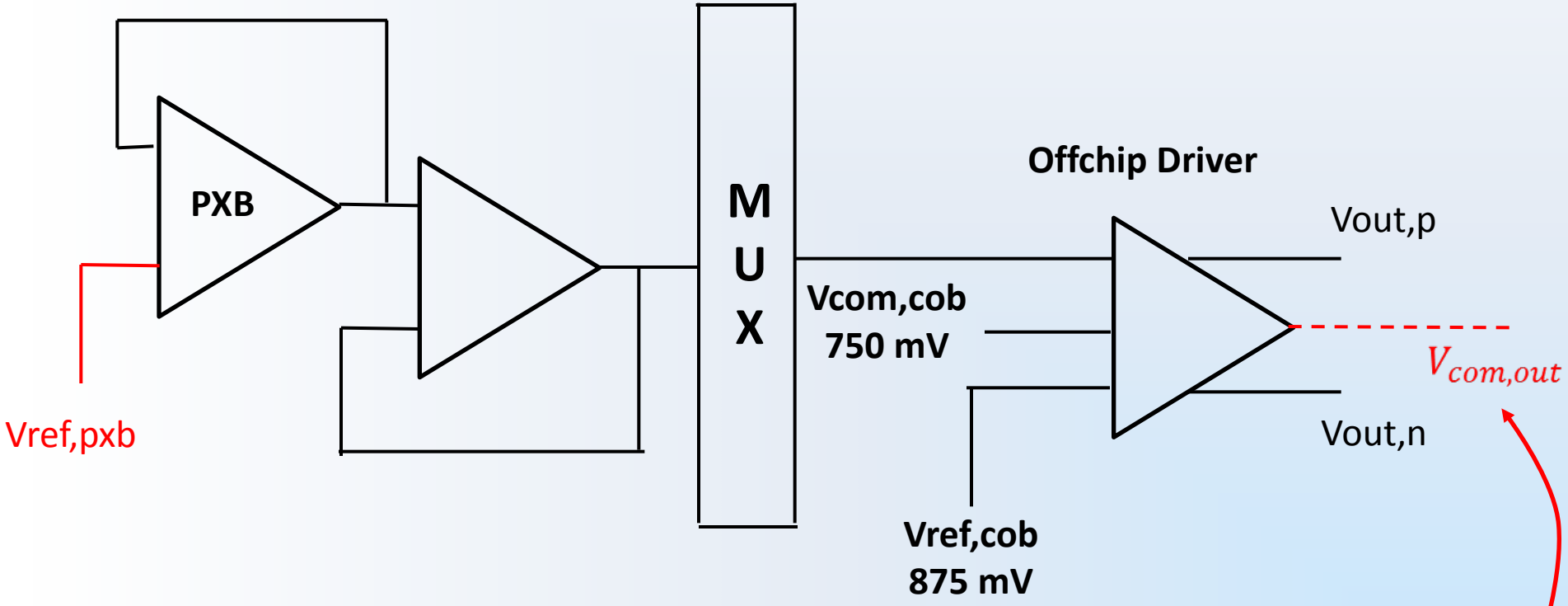
Investigating the Influence of Output CM on the linearity



Output Common Mode (CM)

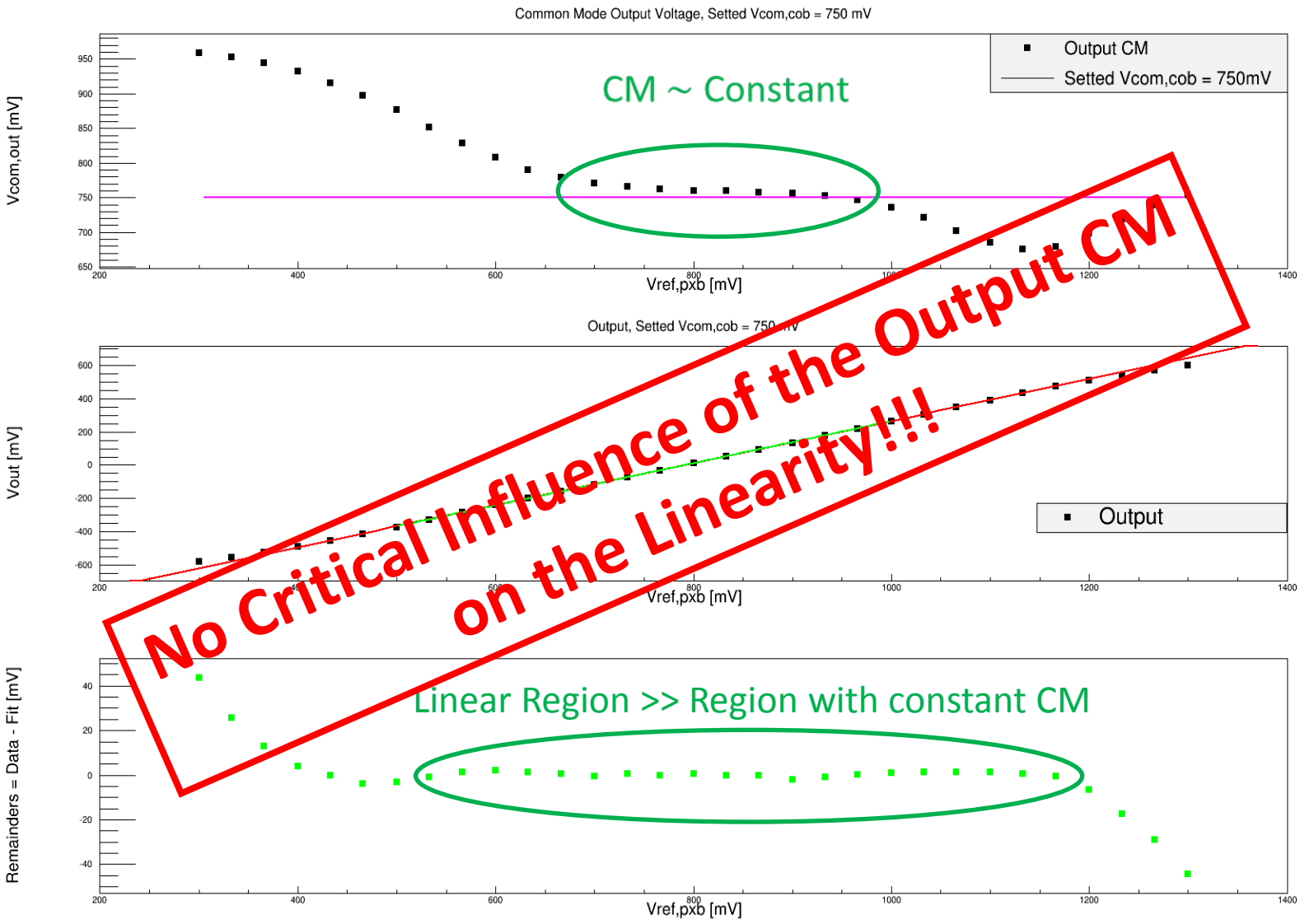
Vref,pxb Settings

Voltage step ΔV = 33mV
Scan from 300 to 1300 mV



$$V_{com,out} = \frac{V_{out,p} + V_{out,n}}{2}$$

Output Common Mode (CM)



Optimization of Reference Voltages

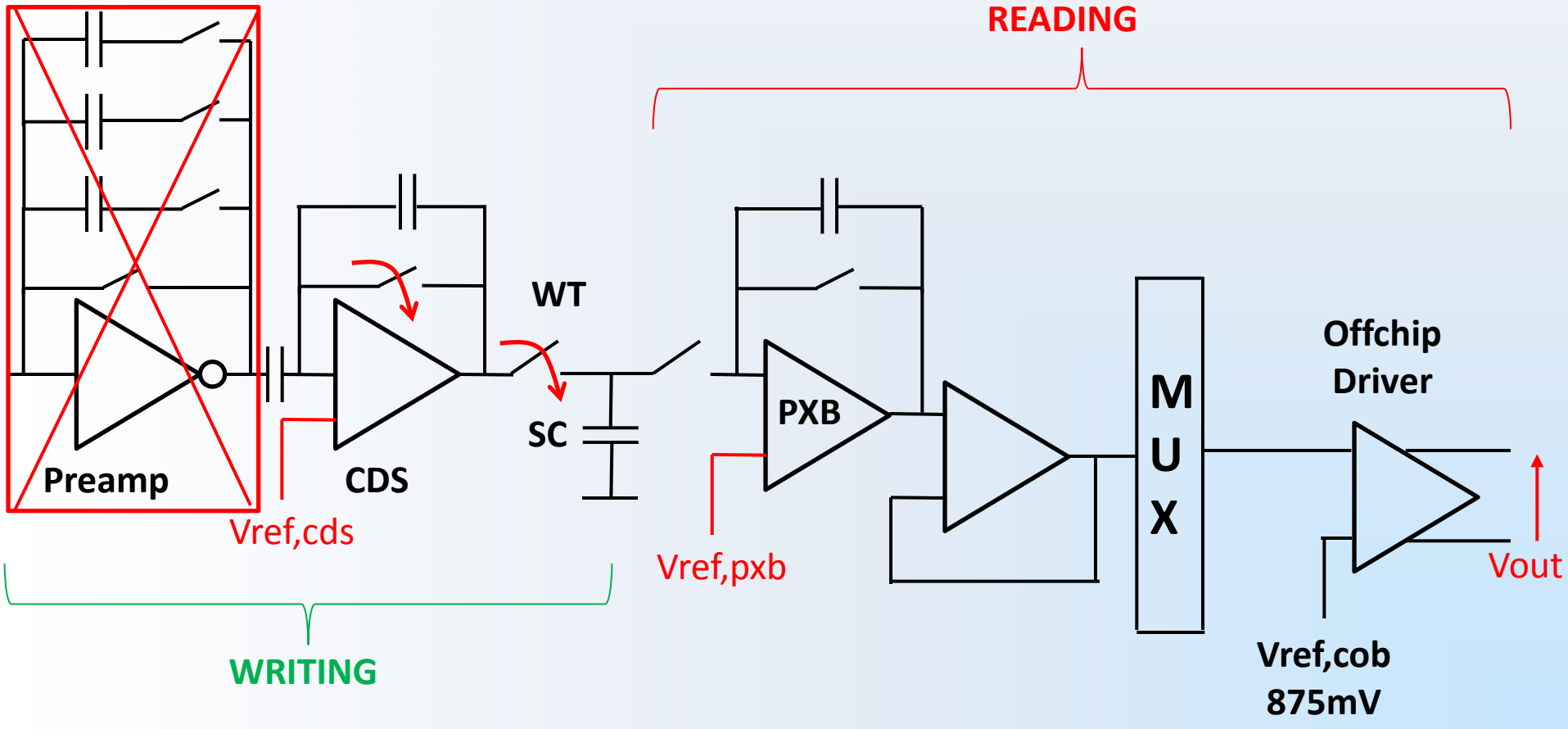
Vref,pxb

Chip Running @ 80MHz

CDS ALWAYS in Reset.

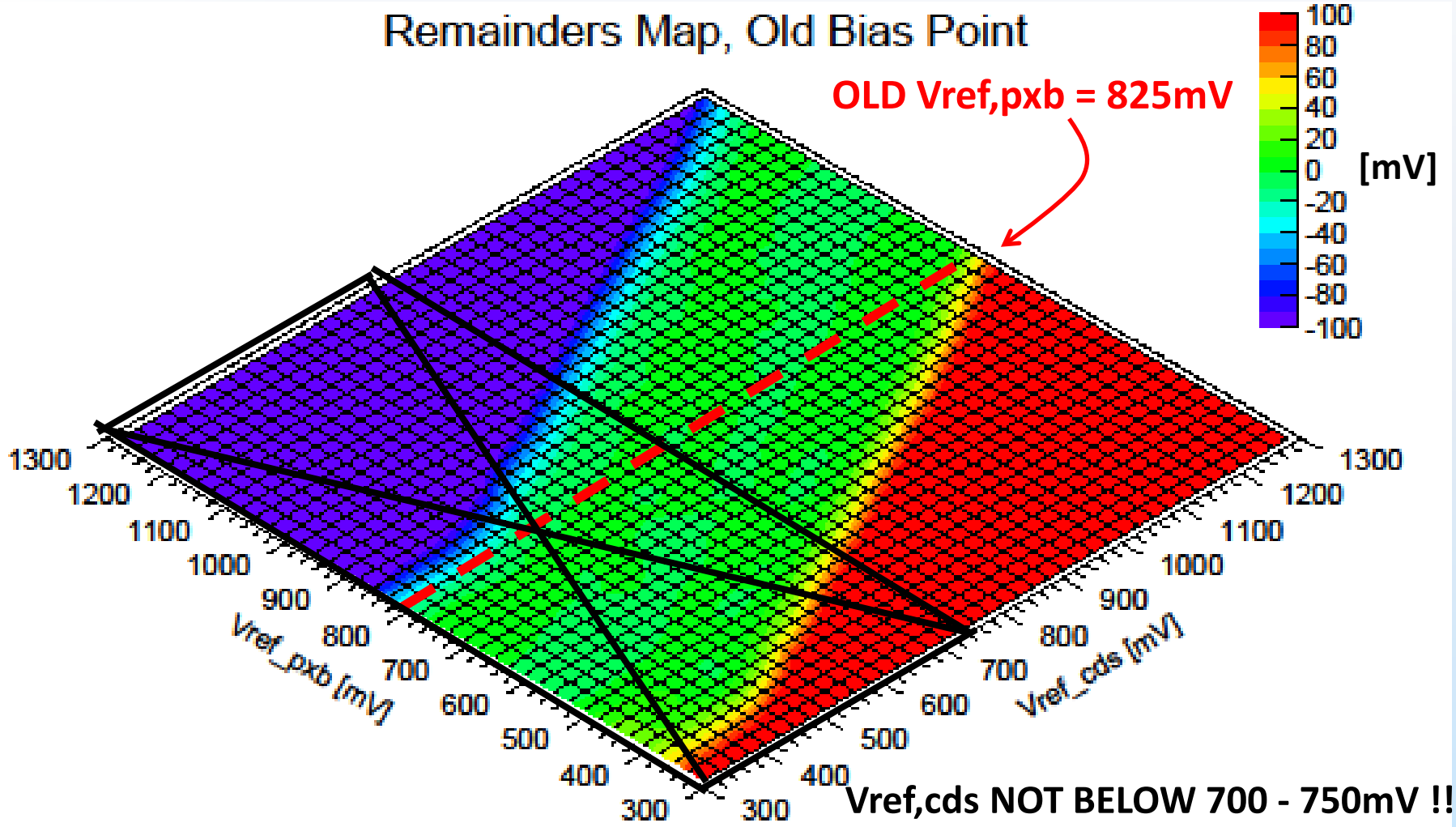
Writing Time (WT) = 225ns

Voltage step ΔV = 33mV
Scan from 300 to 1300 mV
Both Vref,cds and Vref,pxb



Vref,pxb

Remainders Map and Old Bias



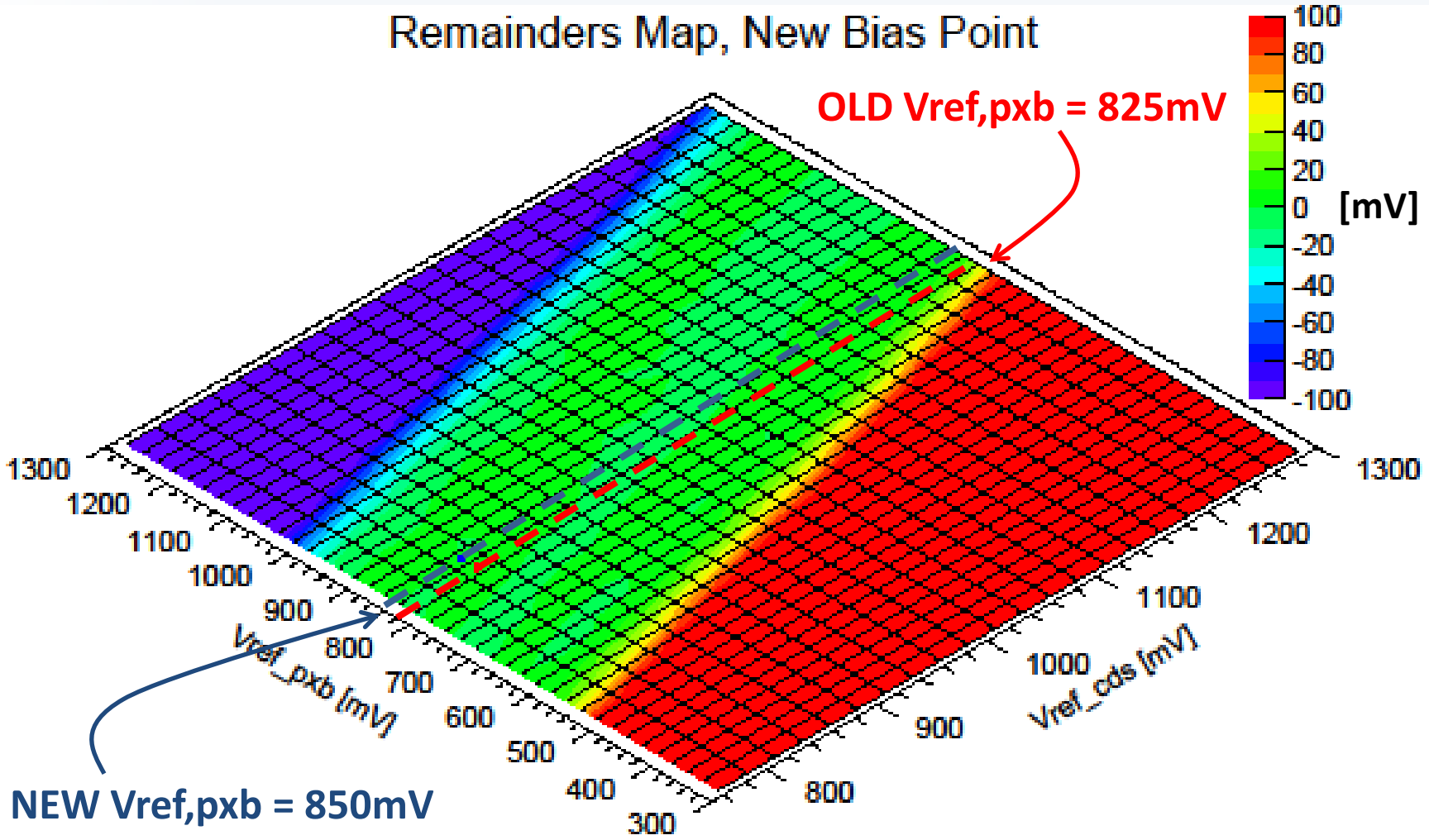
Vref,cds NOT BELOW 700 - 750mV !!!

(See Next Slides!)

1 mV = 64.7 x 10^{-3} ph (@12keV), CDS gain high

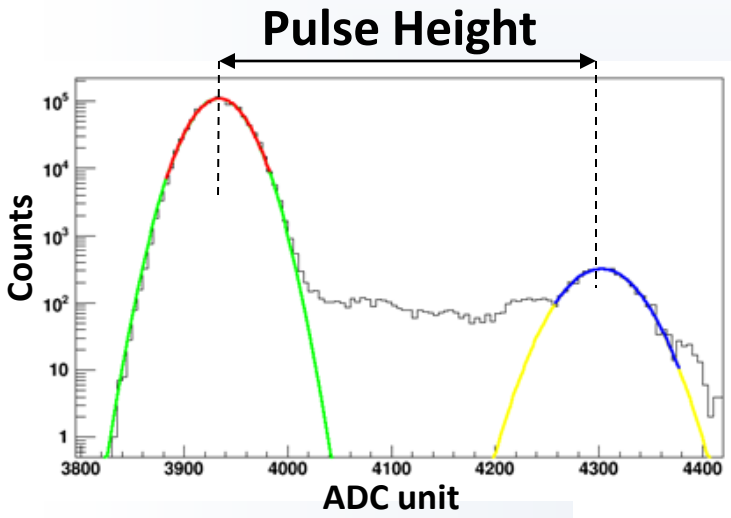
Vref,pxb

New Bias Point



1 mV = 64.7 x 10^{-3} ph (@12keV), CDS gain high

Data Acquisition with Photons



Noise = 286±9 el.

Mo @ 17.5 keV

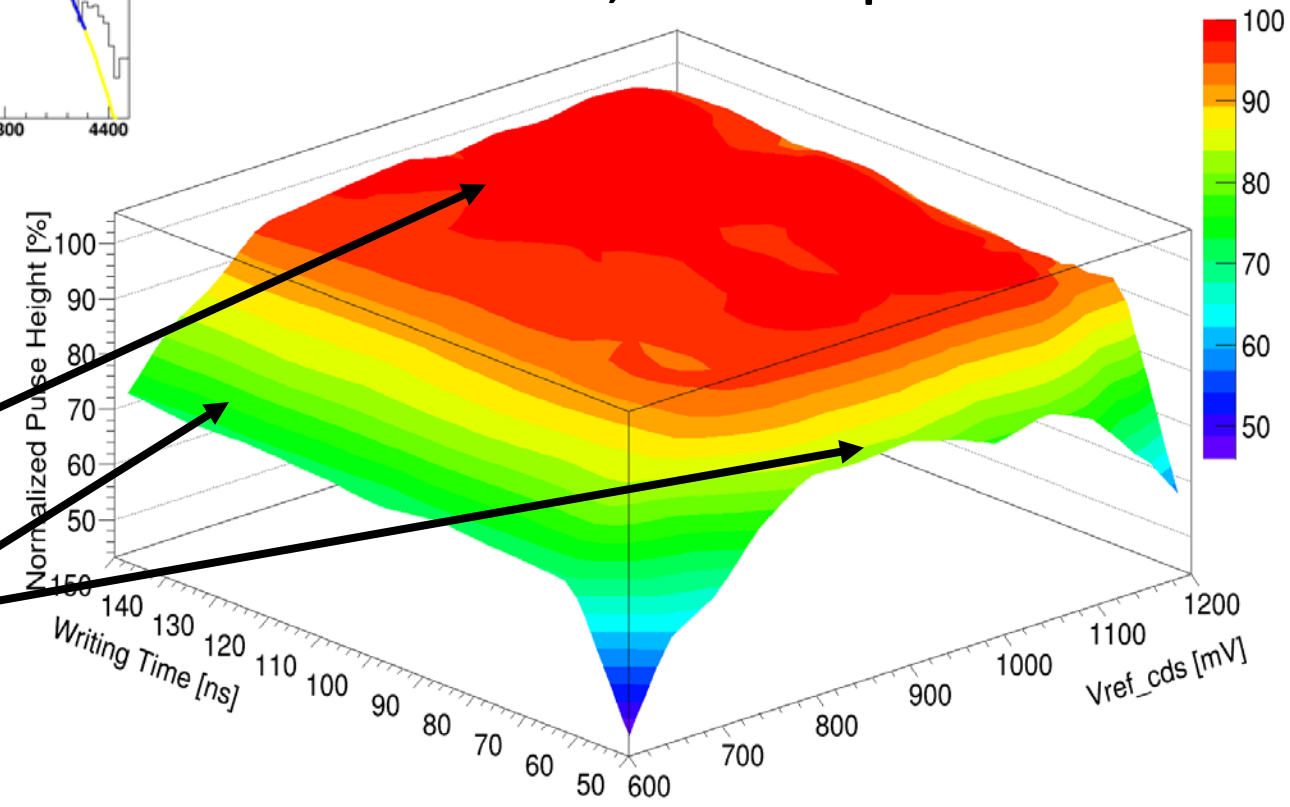
Writing Time

Δ(WT) = 12.5ns, Scan from 50 to 150 ns

Vref,cds

Voltage step ΔV = 50mV, Scan from 600 to 1200 mV

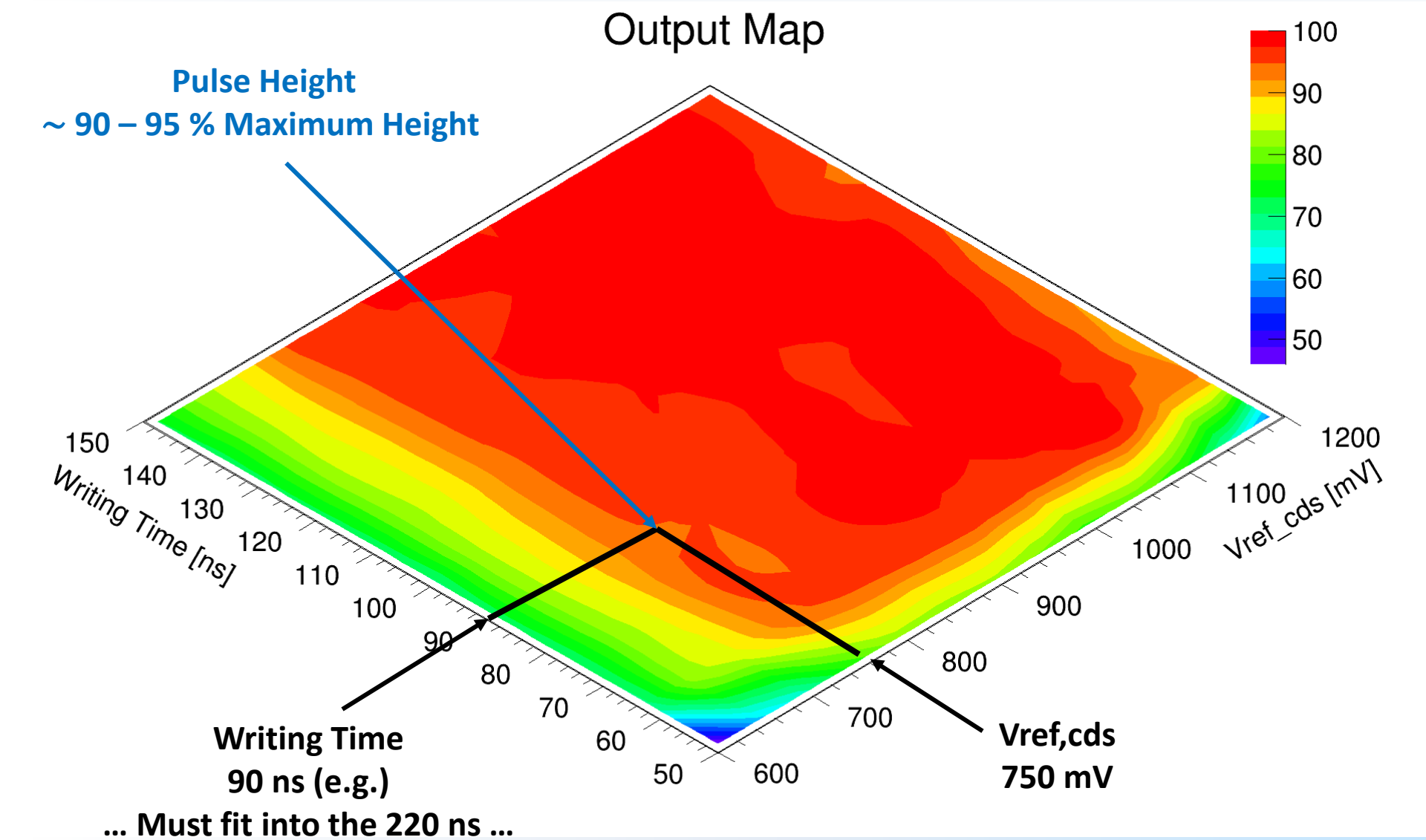
AGIPD10, 1 Pixel Map



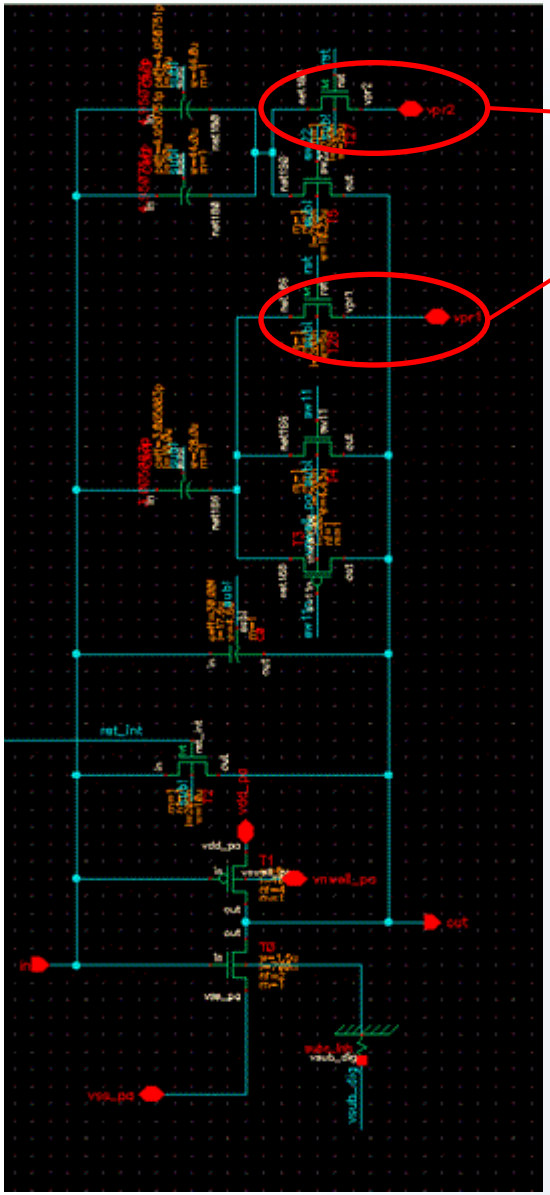
~ Complete Writing

Incomplete Writing

Vref,cds – Writing Time

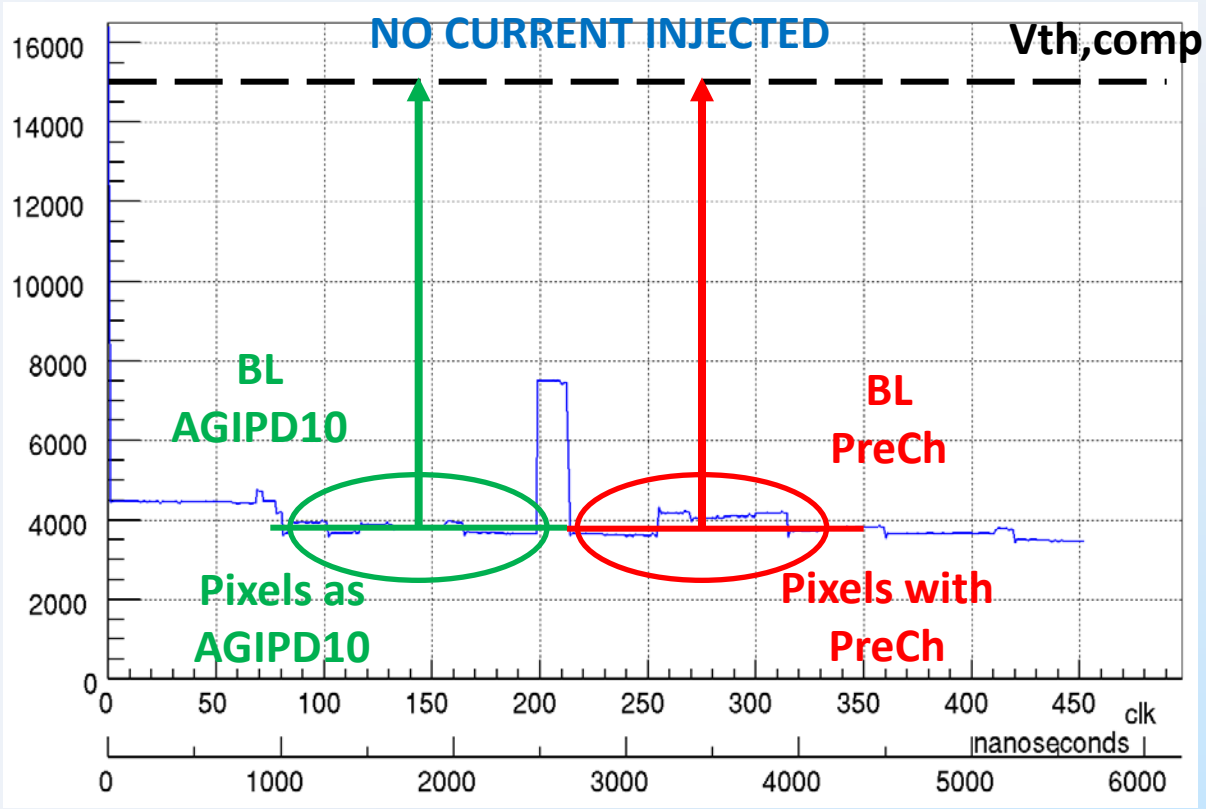


Ongoing… AGIPD05…
DR Enhancement…

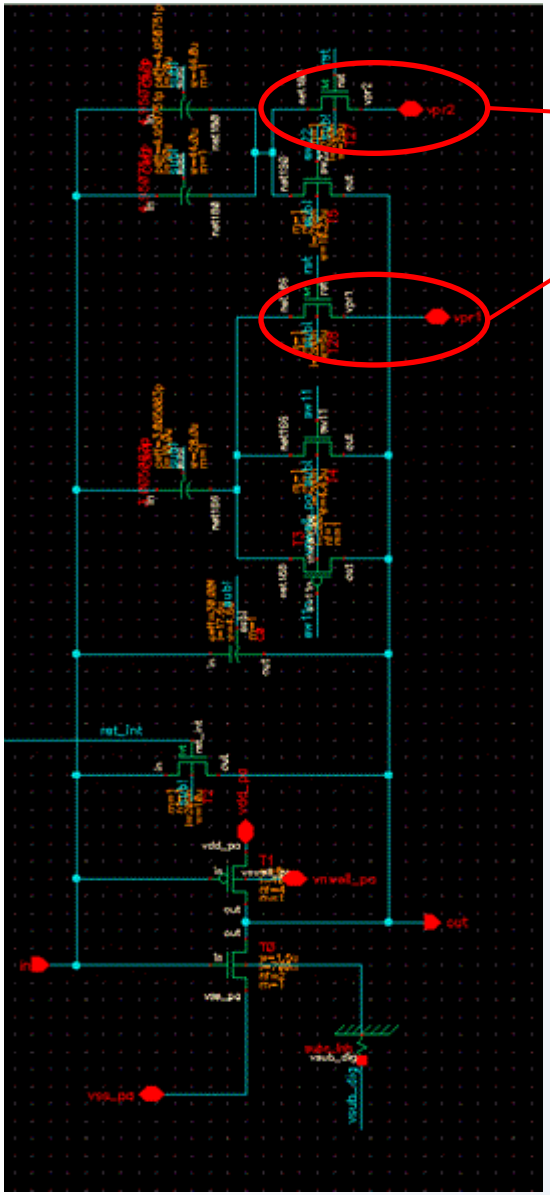


Possibility to Pre-Charge the C of the Medium and Low Gain to a fixed voltage V_{pr1} and V_{pr2} adjuastable by means of 2 potentiometers

HIGH GAIN

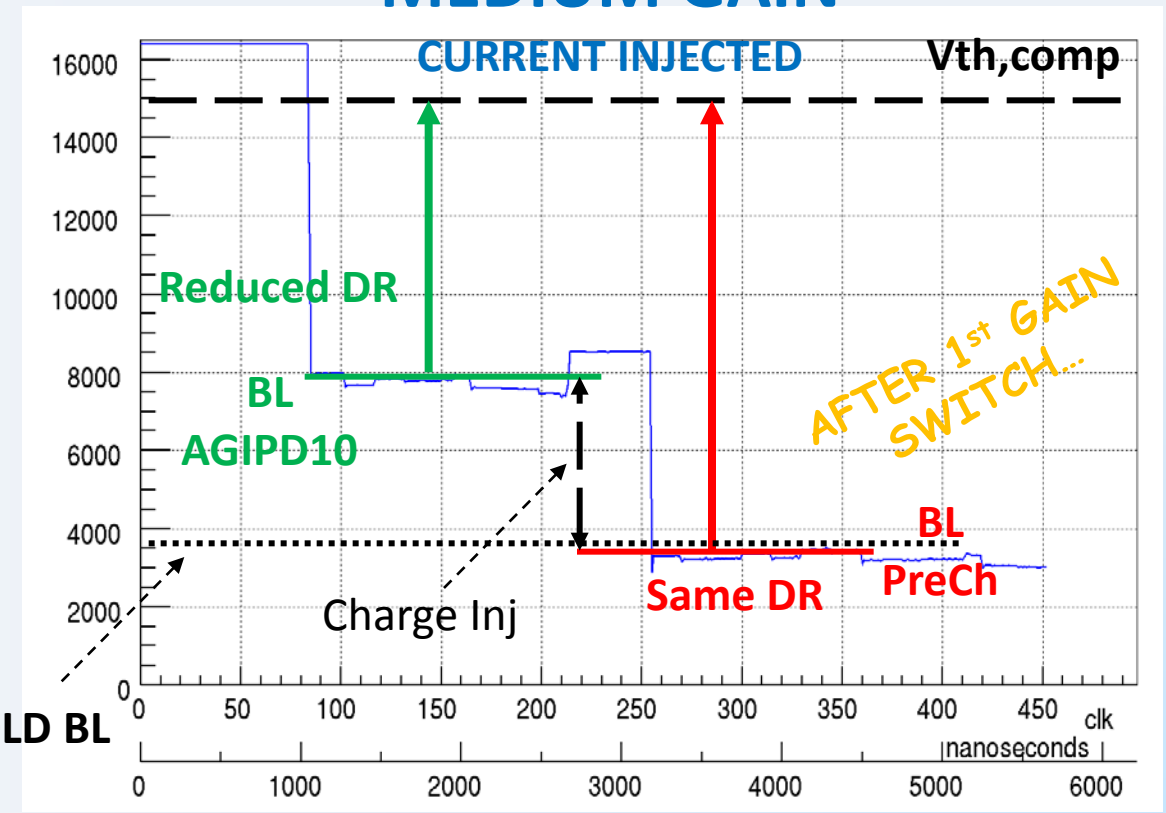


Ongoing… AGIPD05…
DR Enhancement…

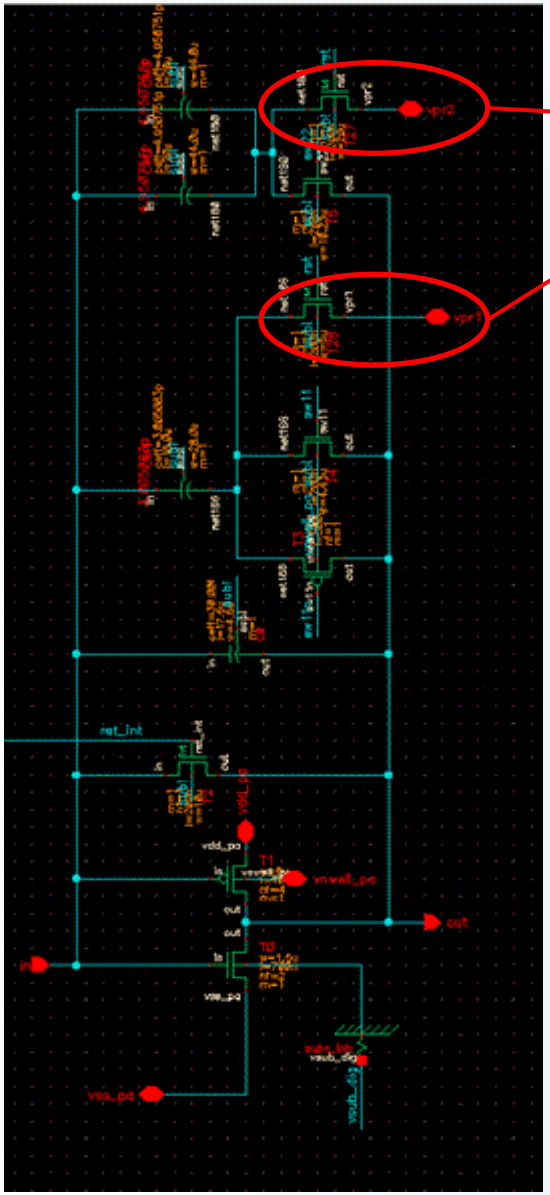


Possibility to Pre-Charge the C of the Medium and Low Gain to a fixed voltage V_{pr1} and V_{pr2} adjuastable by means of 2 potentiometers

MEDIUM GAIN

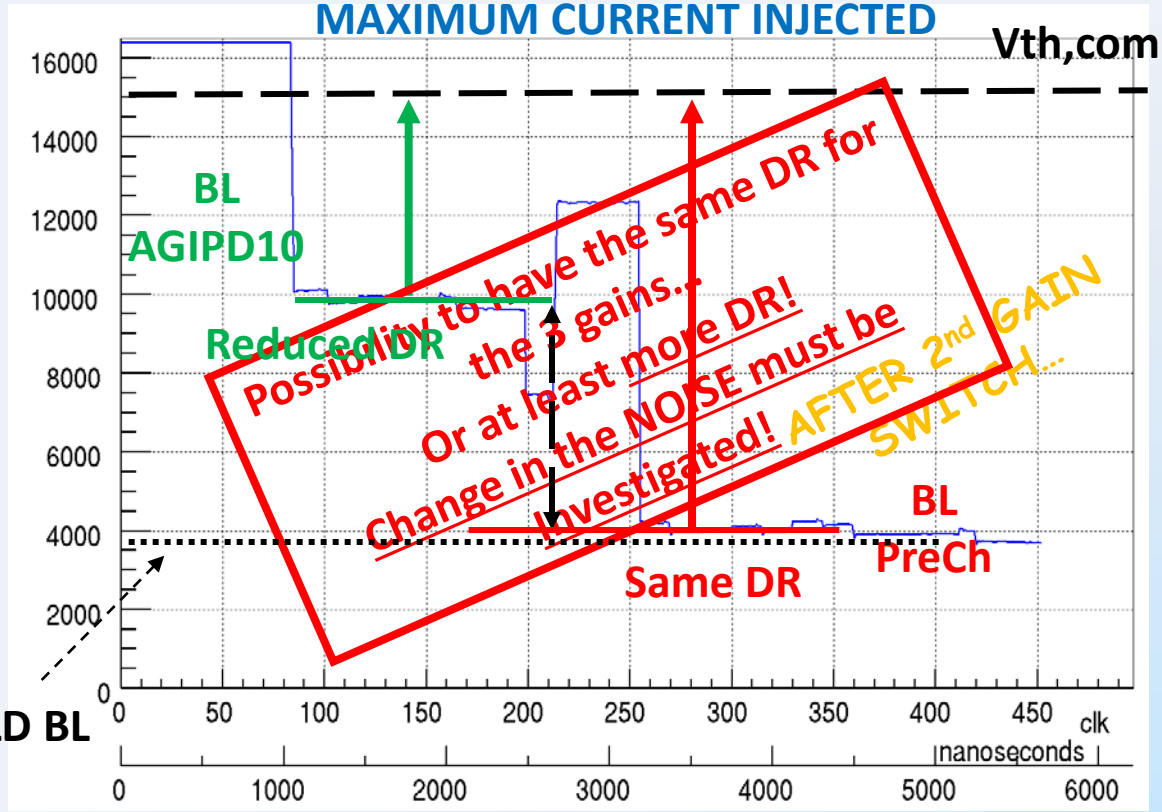


Ongoing… AGIPD05…
DR Enhancement…



Possibility to Pre-Charge the C of the Medium and Low Gain to a fixed voltage V_{pr1} and V_{pr2} adjuastable by means of 2 potentiometers

LOW GAIN



Summary

New Optimized Settings

- Vref,cob = 875mV
- Vcom,cob = 750mV
- Vref,pxb = 850mV

- Vref,cds – Int Time (Writing Time) → Can be chosen according to the pulse height needed

- No Critical Influence of the Output CM on the linearity

- Ongoing measurements on Pixels with PreCharge (AGIPD05) to evaluate the Enhancement of DR and the Impact on the Noise