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RD50 HV-CMOS Meeting

# Lab Measurements

Irradiated samples

(continued)

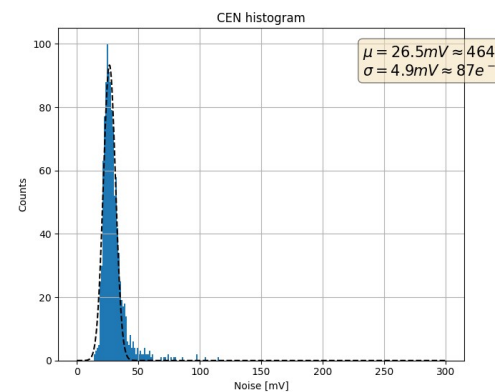
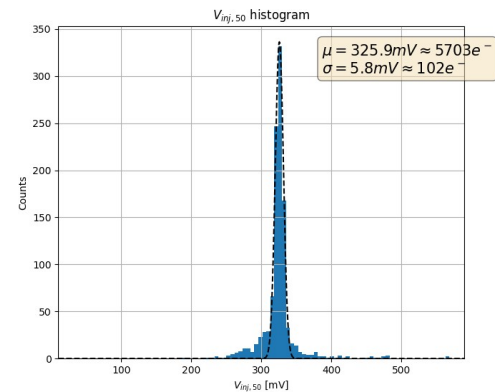
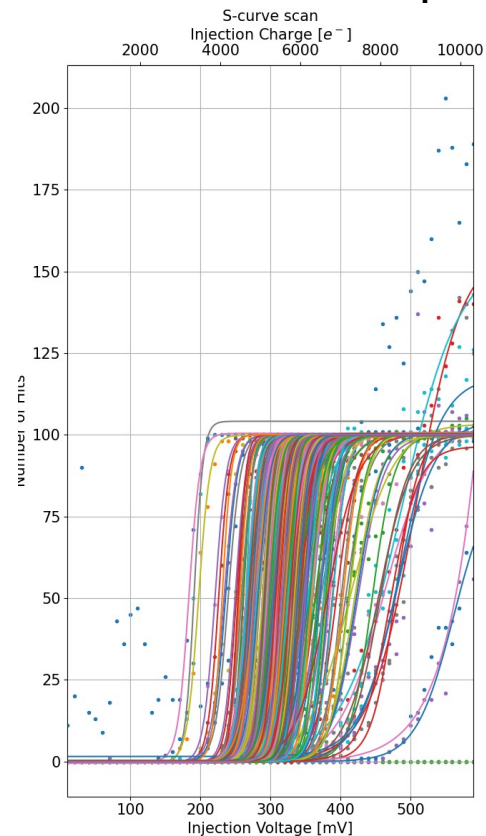
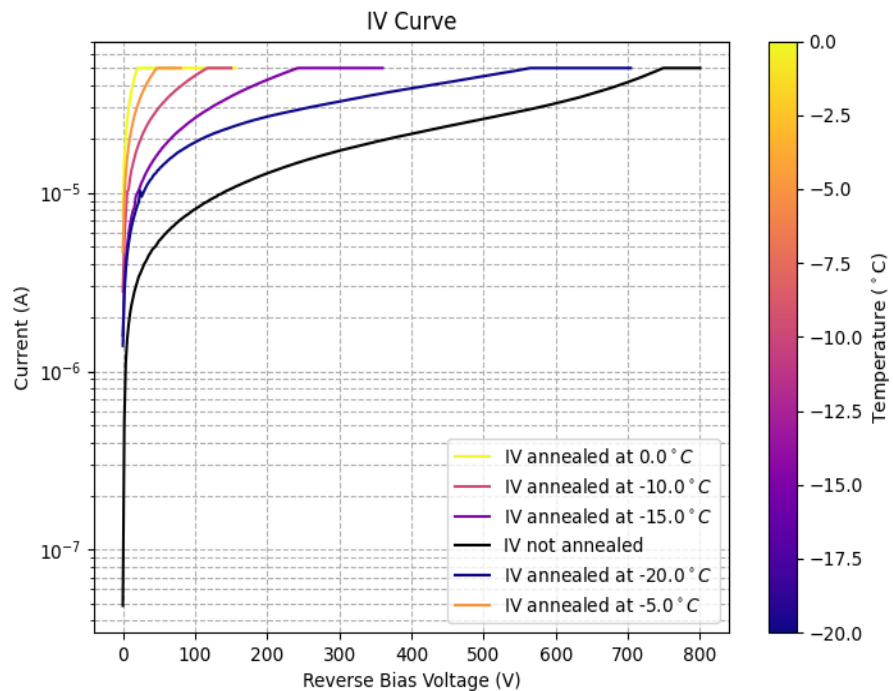
Sebastian Portschy, **Bernhard Pils**

## Update

- Bonding technician interchanged the 1E16 and 3E16 samples
- Errata to last presentation:
  - Not 1E16 but 3E16 is dead
  - 1E16 is alive (measurements shown last time are from this sample)
- **Sad news:** HEPHY's 1E15 is not responding any more
  - 600mA on VDDA and not responding to I2C :(
  - Must have died during IV measurements or handling in between
  - Chip board now populated with W8 1E15
    - No W3 left at HEPHY

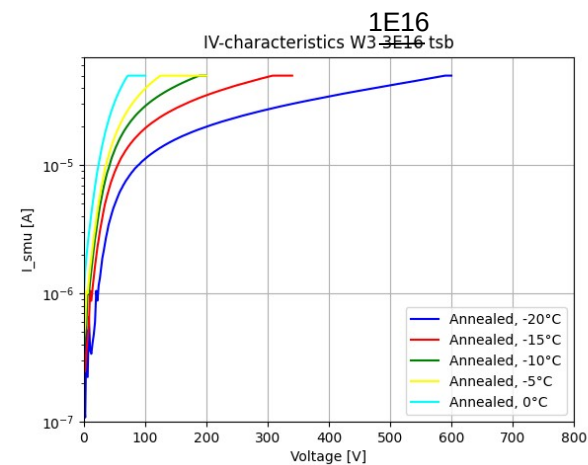
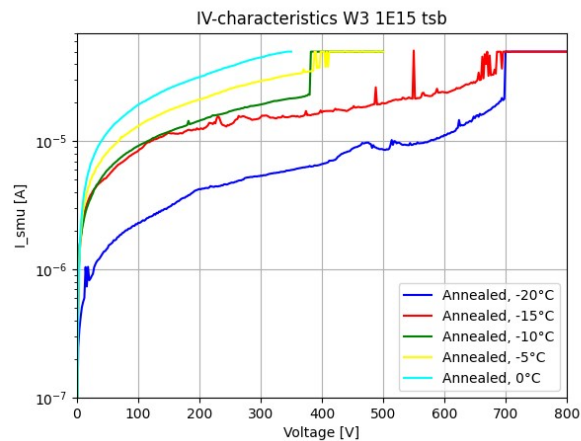
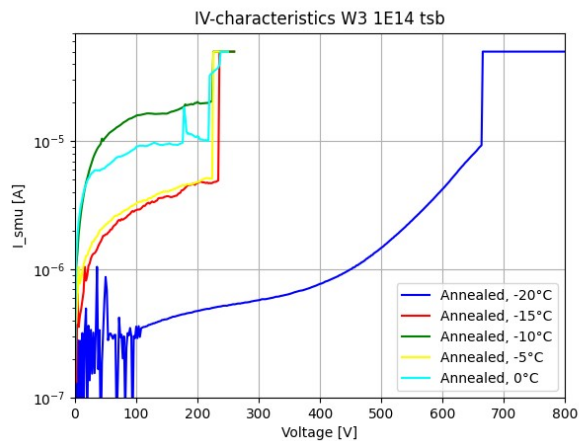
# W3 1E16 backside biased

T = -20°C



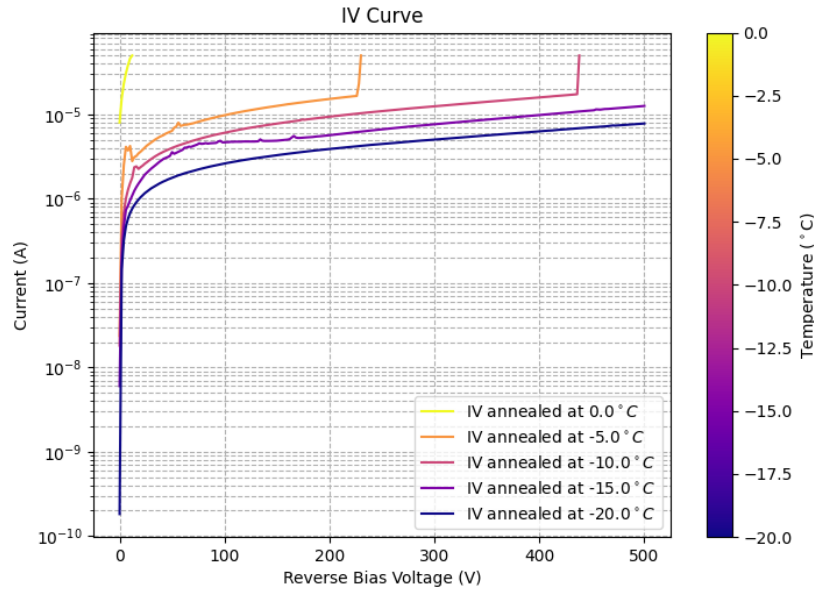
V<sub>Thr</sub> = 930mV

# IVs topside biased



# W8 1E15 topside biased

T = -20°C

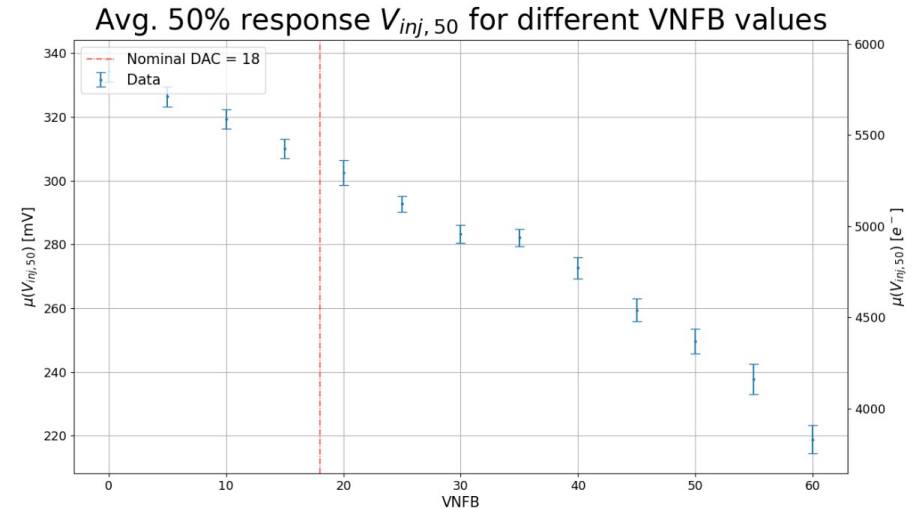
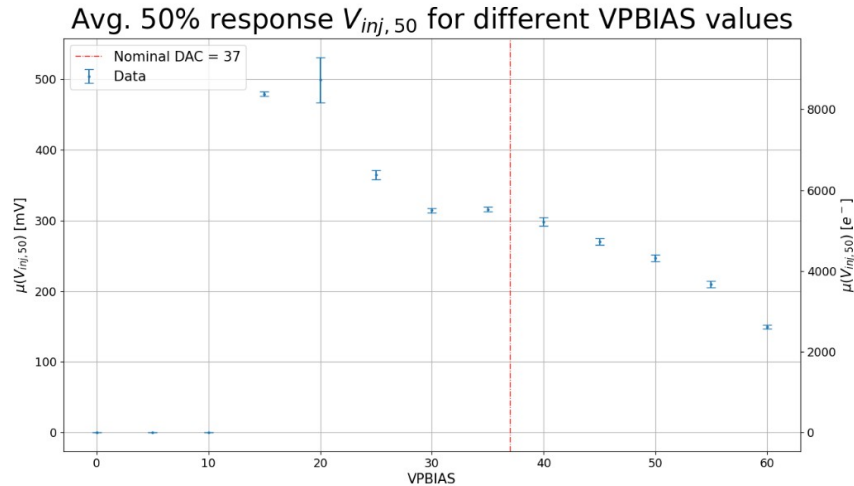


S-curve is WIP  
Not looking good though

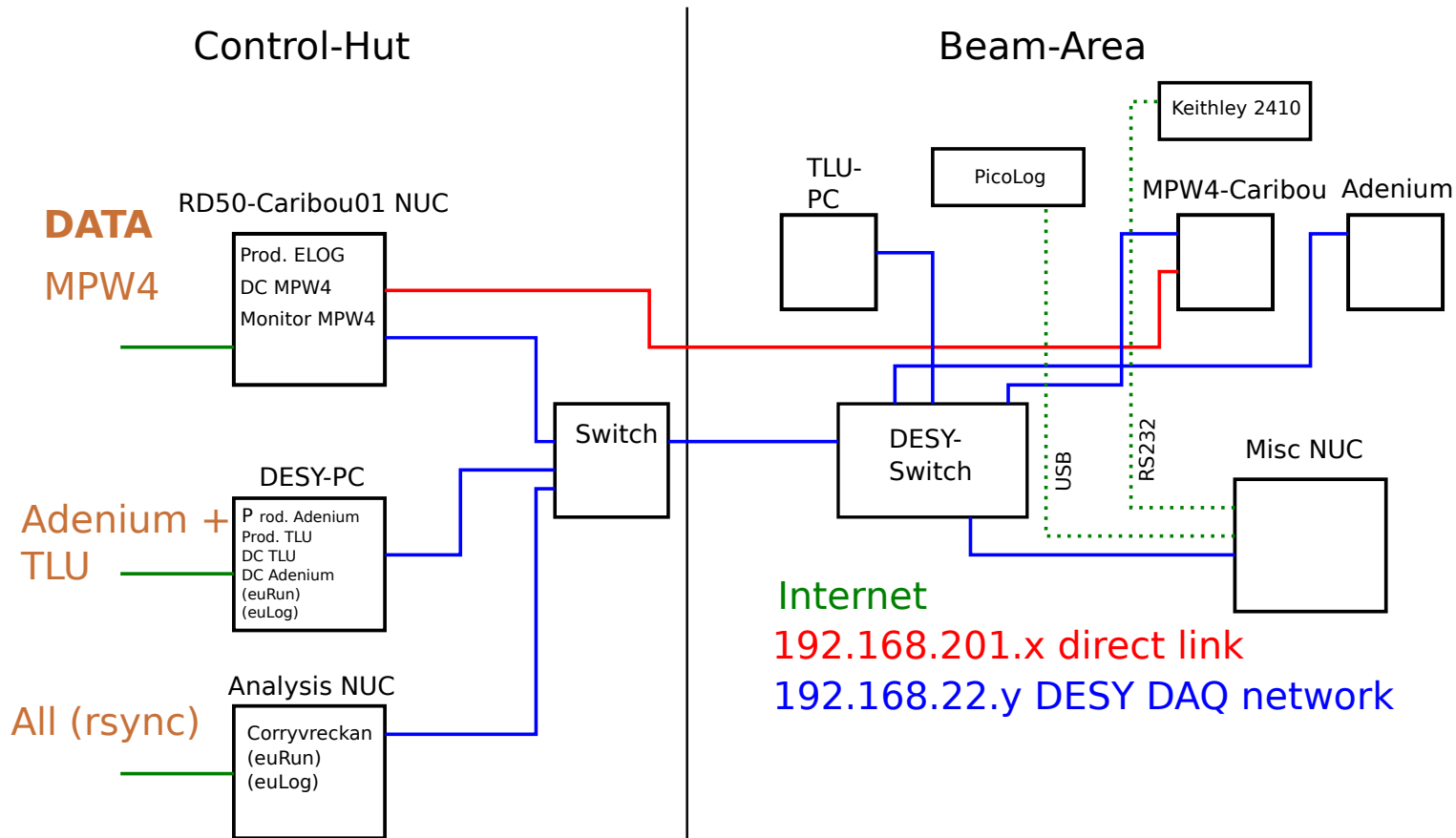
$V_{Thr} = 935\text{mV}$

## DAC Scans W3-1E16

- Performed S-curve measurements for 32 pixels
- extracted mean  $V_{inj,50}$
- plot as function of DAC
- VPBIAS and VNFB can be used to improve “sensitivity”



# Setup proposal



## Measurement plan proposal

- We have 5 samples
  - W3-1E14, W3-1E16, W8-1E15 from HEPHY
  - W3-3E14, W3-3E15
  - Biasing from top and back (when possible (W8 not possible)) → Effectively 9 samples
- Minimum time for a run:
  - Minimum statistic 200 000 tracks
  - Trigger rate of ~1kHz and ~0.4 tracks / event (both with Telepix) → minimum run duration ~ 500s ~ 8min → 10min
- Measure with lowest possible threshold settings at lowest possible temperature biased at -190V
  - Compare with non irradiated samples, make sure we measured the lowest possible threshold setting at the last testbeam
- Several samples can be biased up to 800V at -20C (hopefully properly working already at lower bias voltages)
  - Do a bias voltage scan, proposal (0, 800)V in 35V → 23 steps a 10 min → ~4h / sample
- Scan interesting DACs
  - VNFB, VPBIAS



## Rough schedule

- Setup and verify with HEPHY topside ~2 days → 5 days for irradiated samples
- 9 samples → 2 samples / day
- Running over night, ~18h / day → 9h / sample
- Each sample:
  - 1) Standard measurement, Setup and debug until proper first results seen ~3h
    - Lowest threshold, -190V bias, as cold as possible → std. / best operation conditions for irradiated sample
    - Fixed threshold (~1V), -190V bias → compare samples aka fluences directly
  - 2) Bias scan
    - 0 – ~800V or max. in 35V steps a 10 min ~ 4h
  - 3) DAC-scans ~2h
- This is a realistic if not conservative schedule which is realistically achievable (most likely more time available)
- **FINGERS CROSSED**