Tests on a 6827W13 LGAD

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RD50 LGAD pixels & strips
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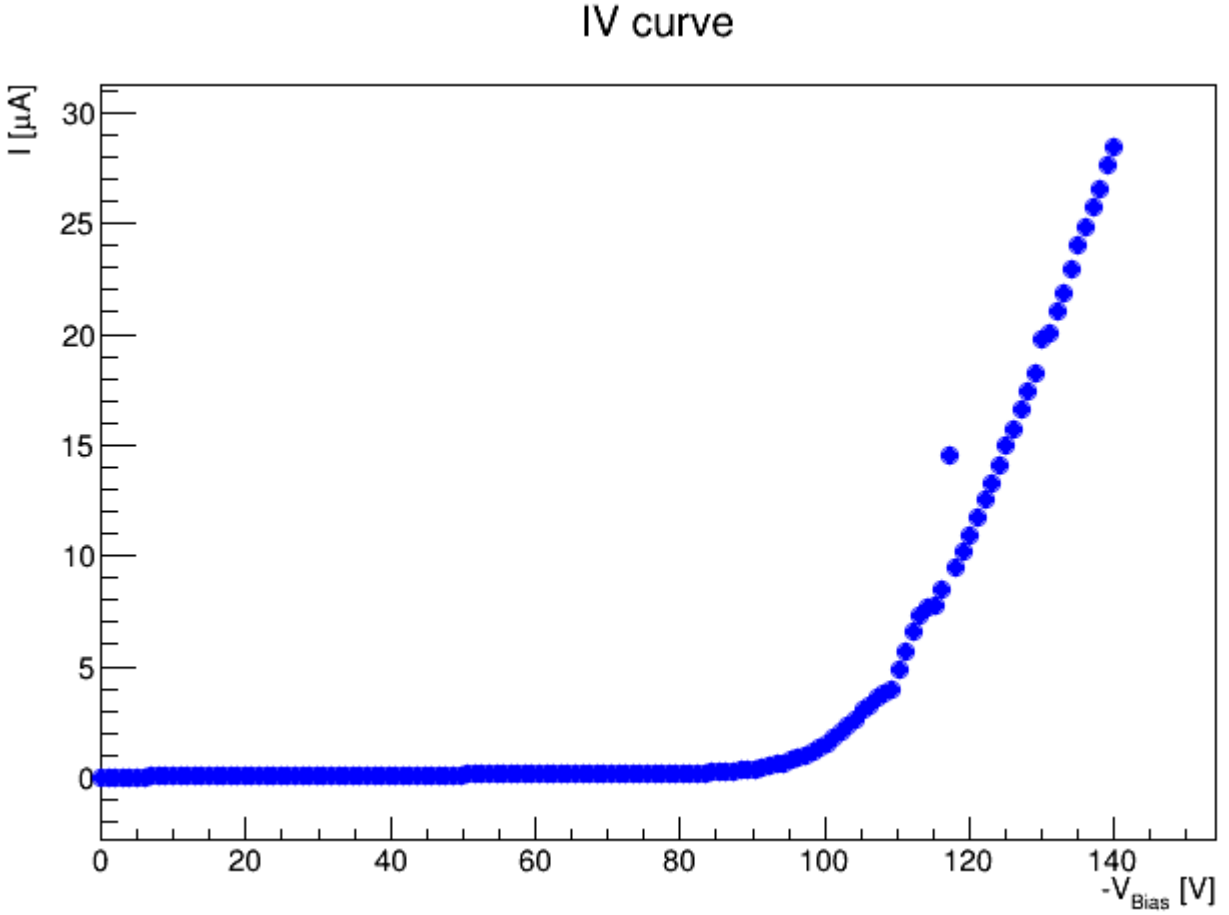
LGAD 6827w13 02 features

300 µm thick FE-I3 sensor

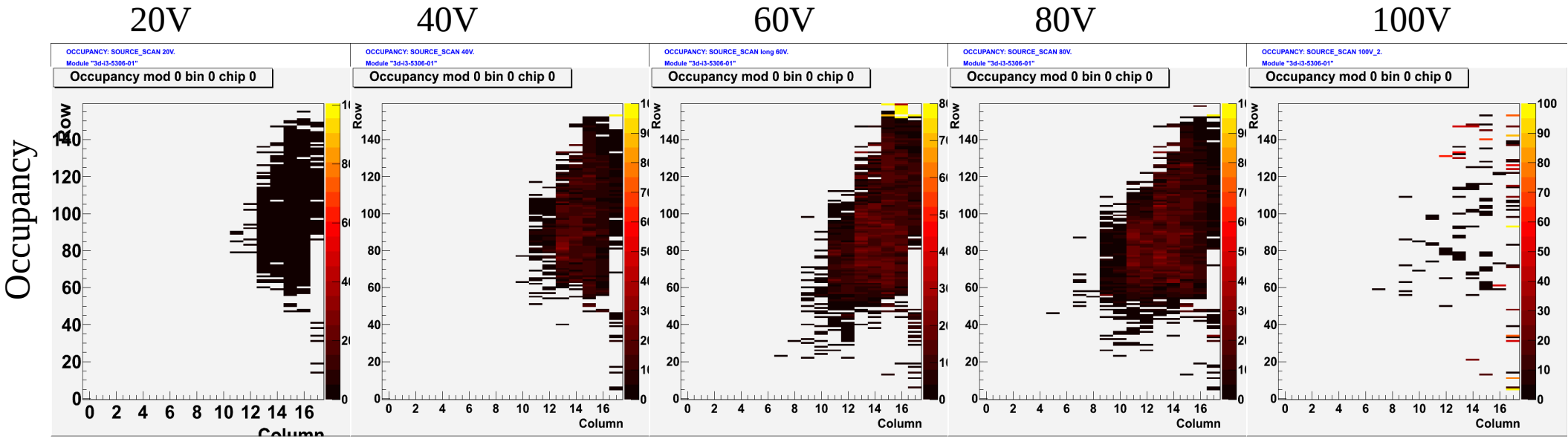
Standard diffusion time of dopant

Indium Bonding by Selex

V_{bd} ~ -100V



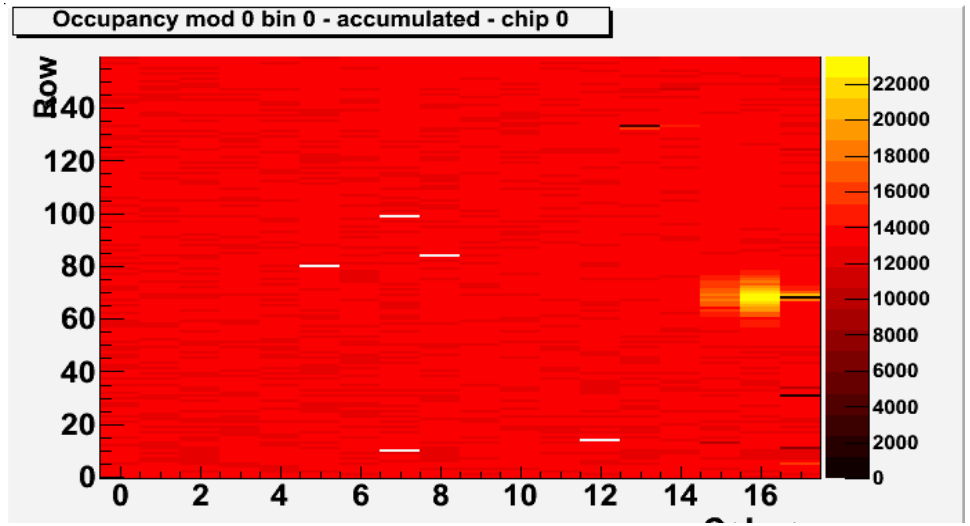
Source Scan vs Bias Voltage

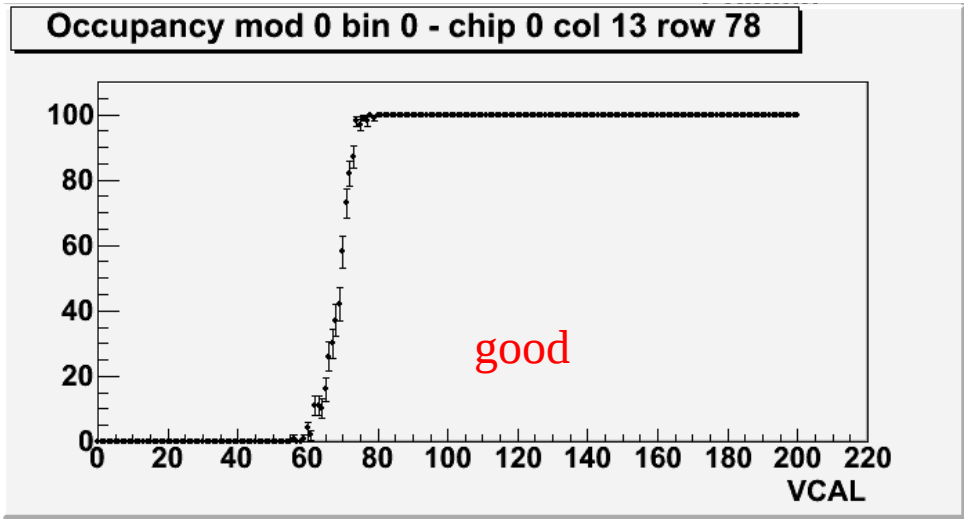


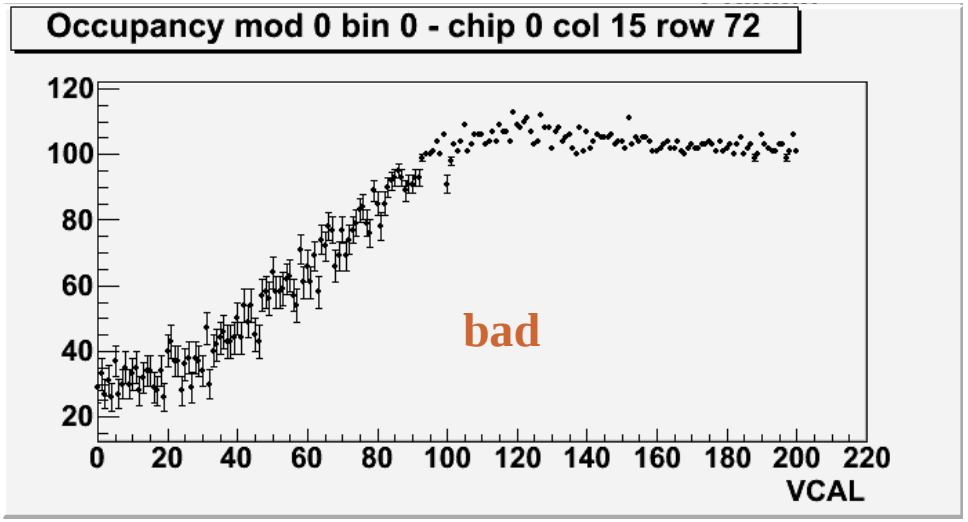
- The **Indium bonding** did not work properly, only **a small region is connected** to the FE
- Sensitive area seems to **increase with voltage** up to 80V around breakdown
- Some **noisy pixels** appear after voltage rump up

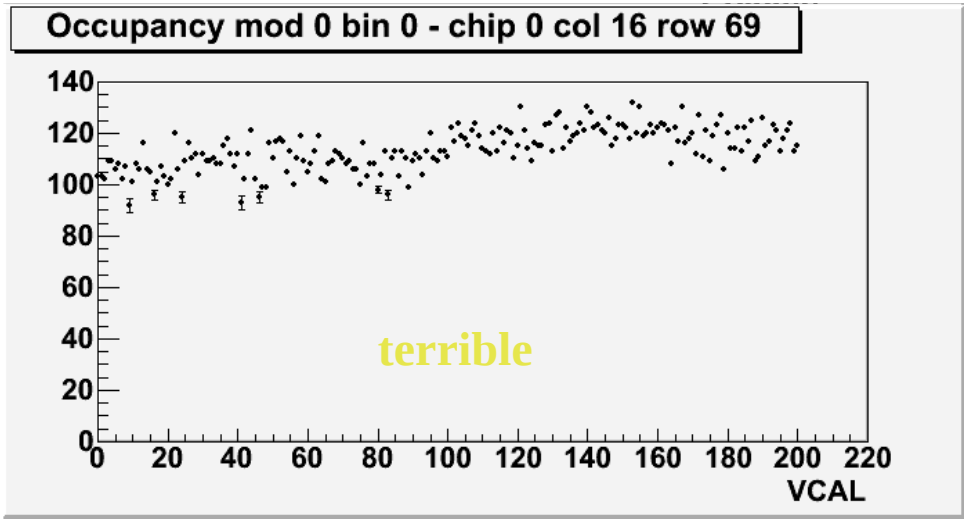
Threshold Scan @ -100 V

Some S-curves example



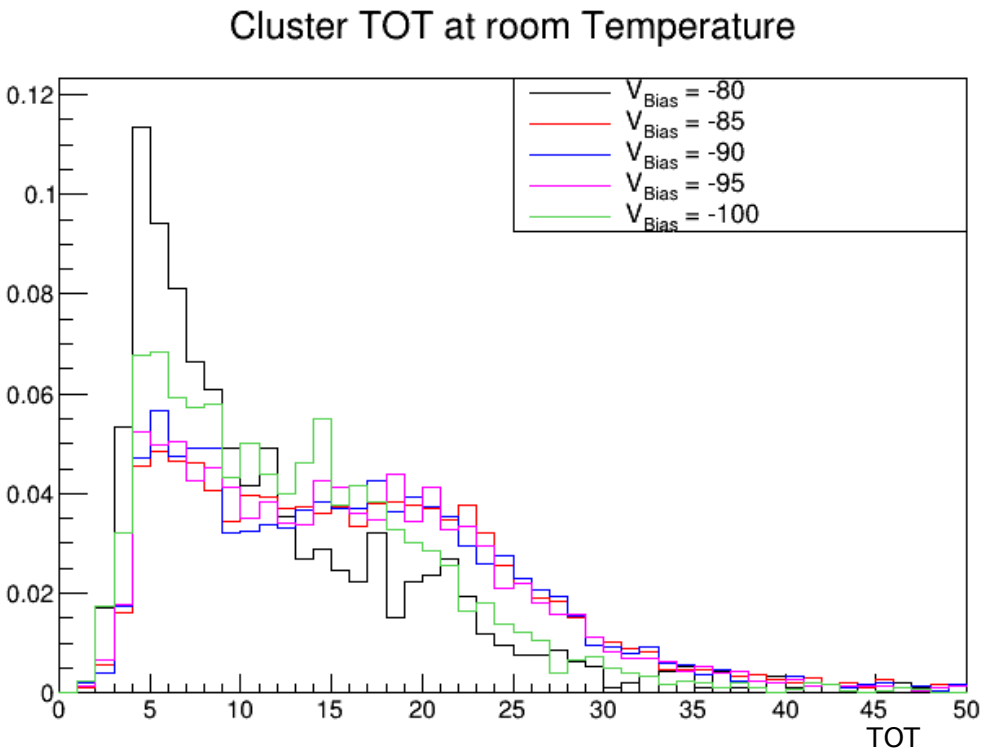


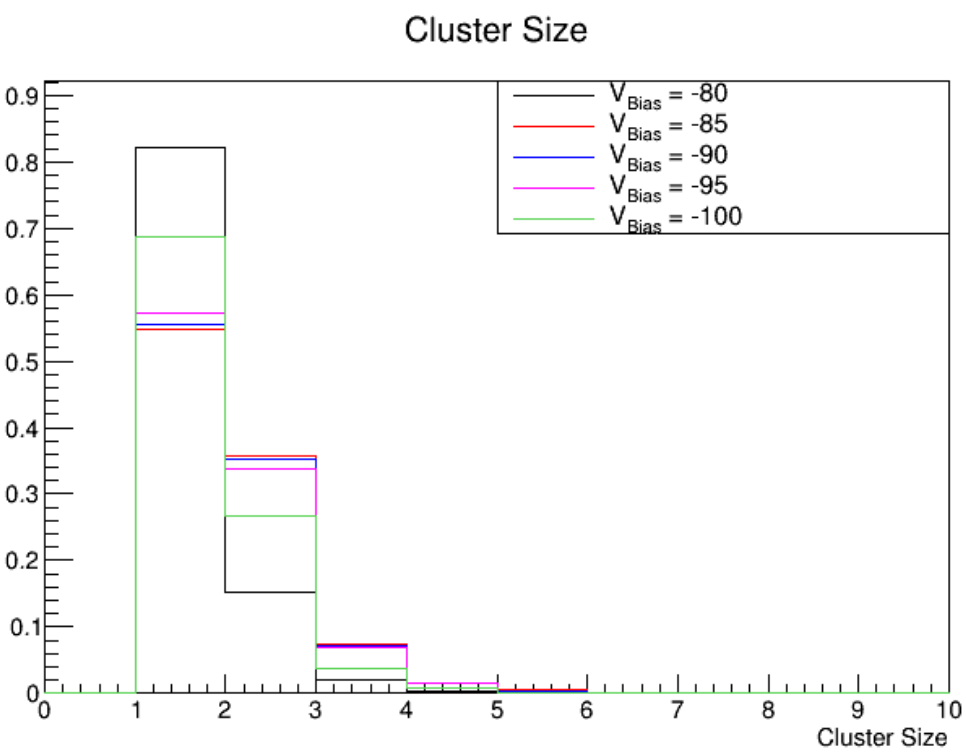




At $V_{bias} < V_{bd}$ the a region of connected pixel become extremely **noisy**
w/ **occupancy higher than 100%**

Cluster analysis





- The cluster appear at V_{bias} < - 80V
- The device is tuned at threshold = 3200e^- and TOT = 30@20ke^-
- We see less charge, maybe because of disconnected pixels.
- The foreseen charge amplification is not showing off within the breakdown

Conclusions

- **100 V are not enough** to ignite the charge multiplication
  - At least on this defectively bonded device
- **More tests** on LGAD devices are mandatory
- Today we bump bonded a new LGAD device from **6827-W14** run
  - 300 µm thick FEI3 w/ **deep diffusion** of dopant