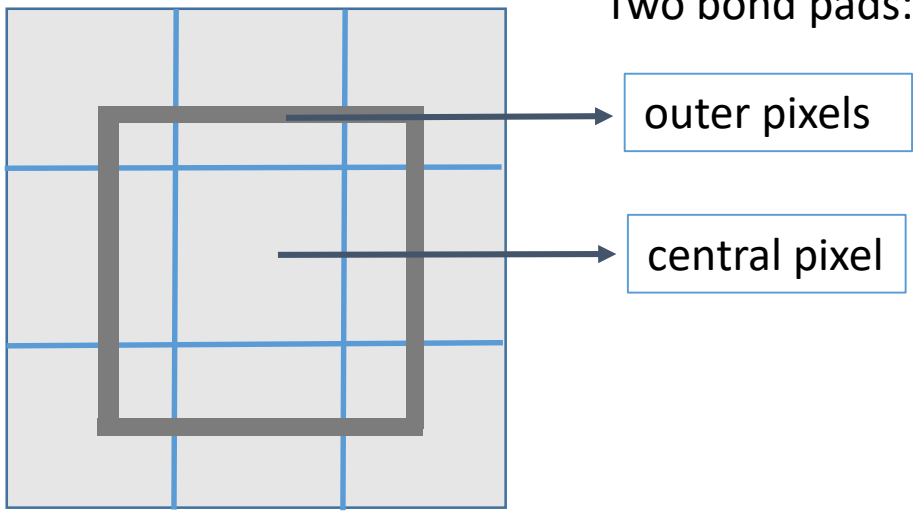
RD50 MPW2 Test structure

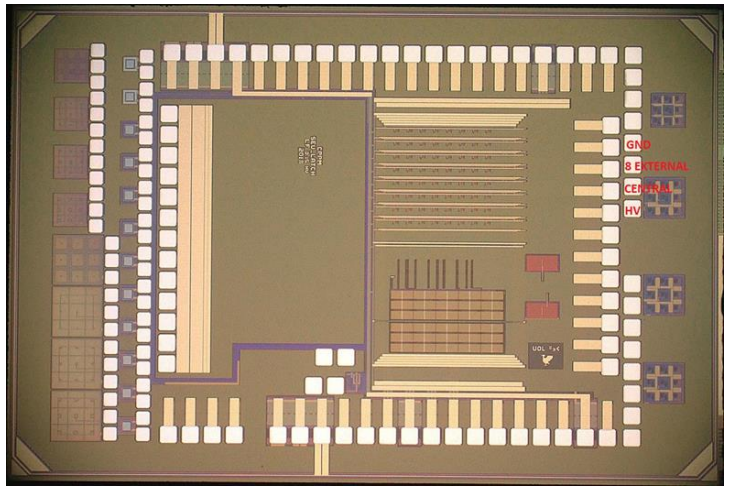
- 60 um x 60 um pixel
- 3x3 pixel array
- central pixel one bond pad
- outer pixels connected together another bond pad



Two bond pads:

outer pixels

central pixel



In our setup:

DNWELL connected to + HV

Substrate (HV) to GND

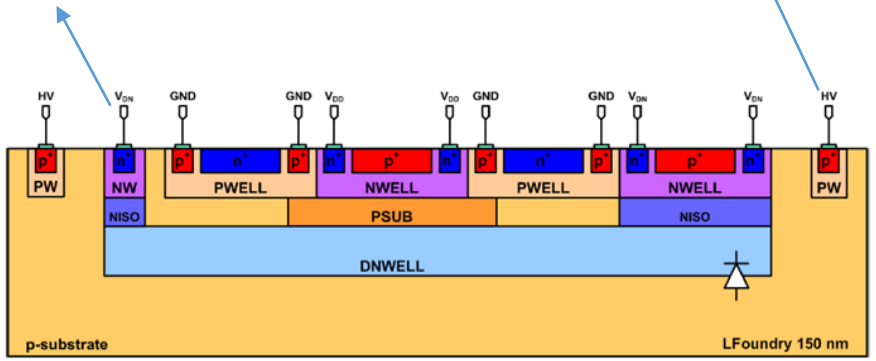
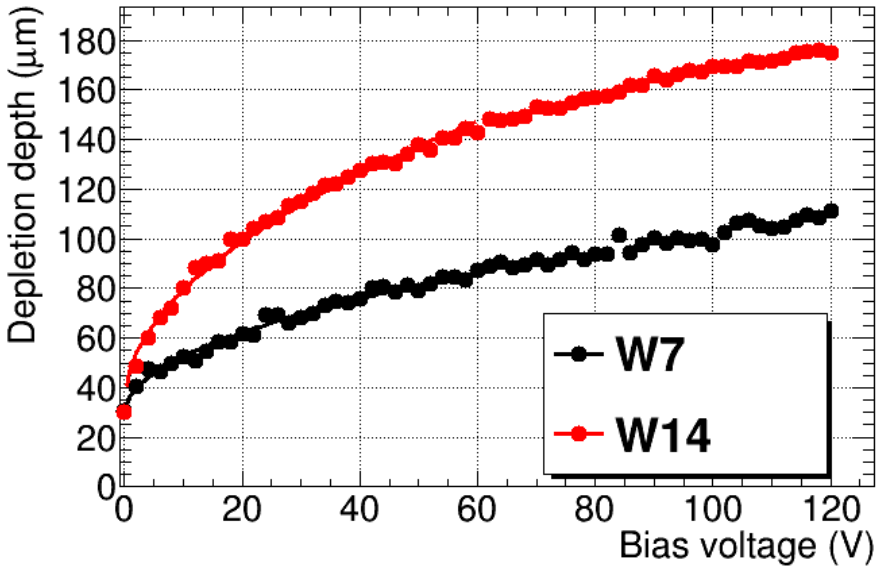
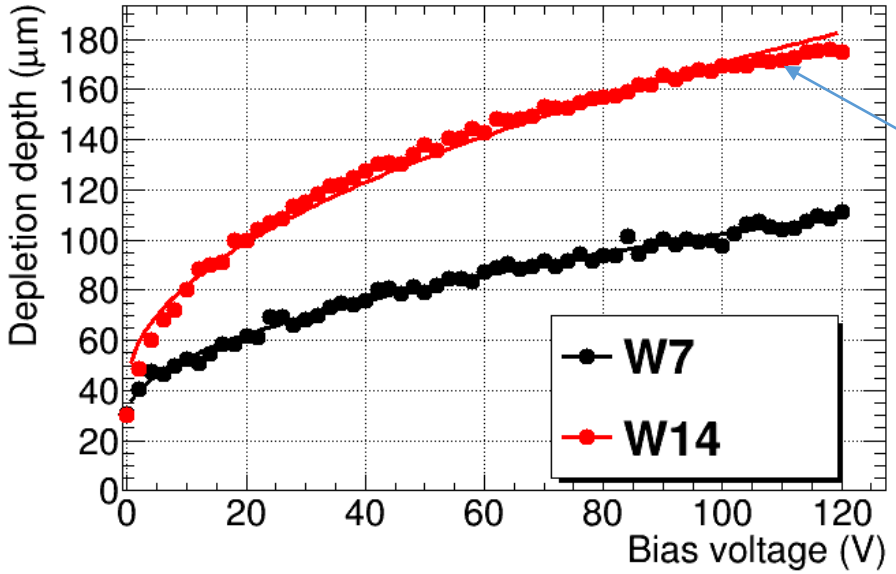


Figure 12. Simplified cross-section of one pixel

Fit up to 60 V



Fit up to 120 V



slabši fit
kot do 60 V

Fit:

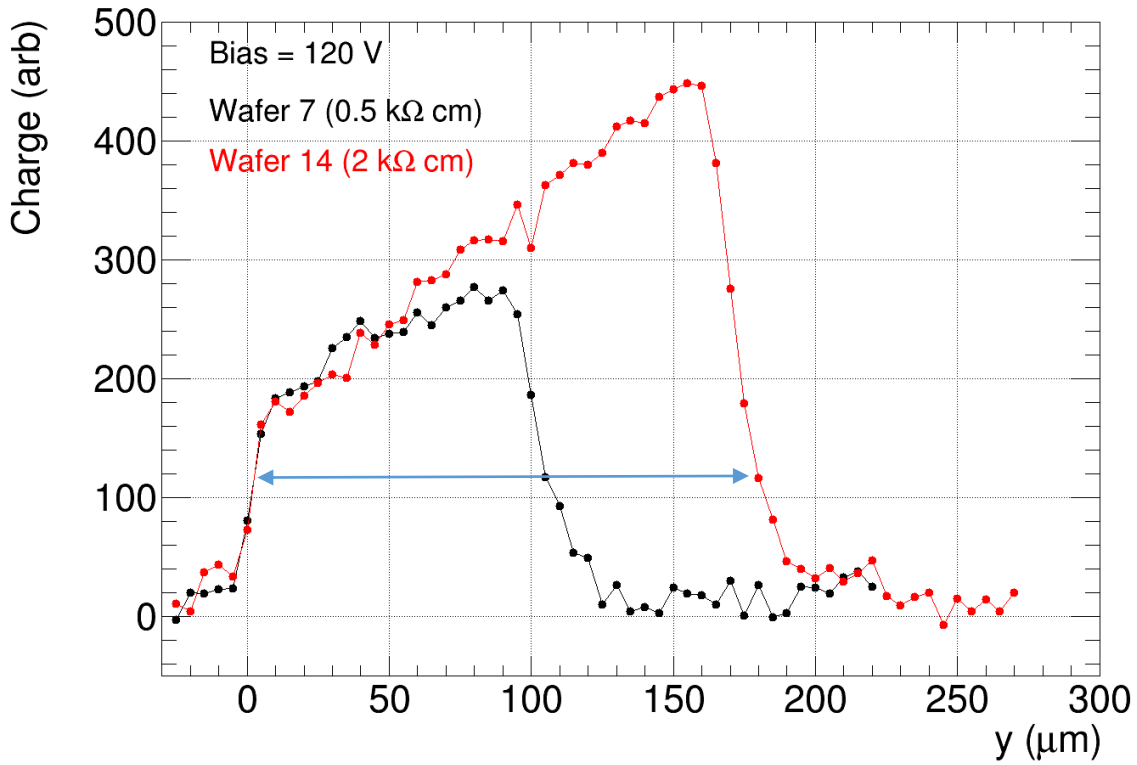
$$d = d_0 + \sqrt{\frac{2\varepsilon\varepsilon_0}{e_0 N_{eff}} \cdot V_{sub}}$$

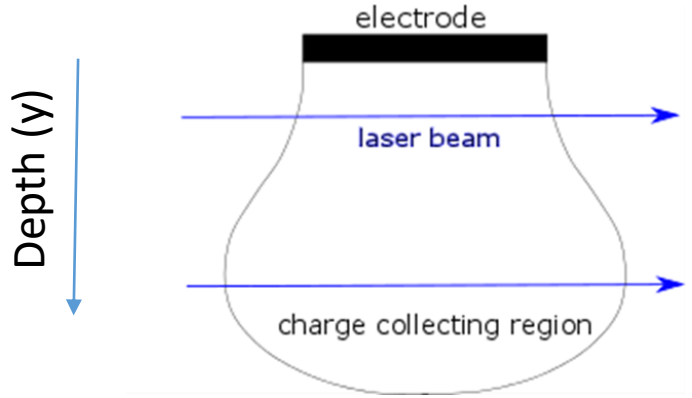
Fit up to 60 V:
Neff_w7 = 2.4e13
Neff_w14 = 6e12

Fit up to 120 V:
Neff_w7 = 2.5e13
Neff_w14 = 8e12

Pri w14 precejšnja razlika če fit do 60 V ali do 120 V

Charge collection profile





- more charge collected at larger y (depth) because length of laser beam inside charge collection region increases because of the shape of the region

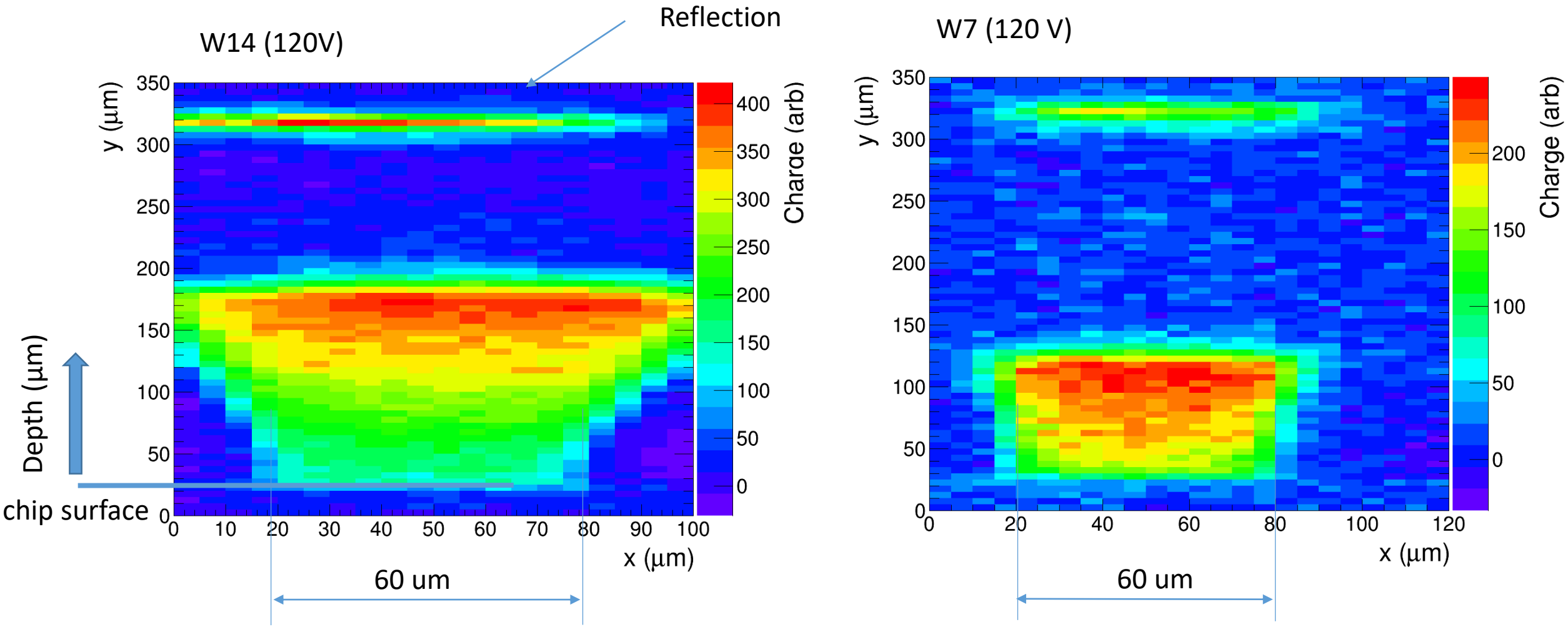
Čudna oblika depletiranega območja

➔ Kako dobro enačba opiše odvisnost d od V in Neff?

$$d = d_0 + \sqrt{\frac{2\varepsilon\varepsilon_0}{e_0 N_{eff}} \cdot V_{sub}}$$

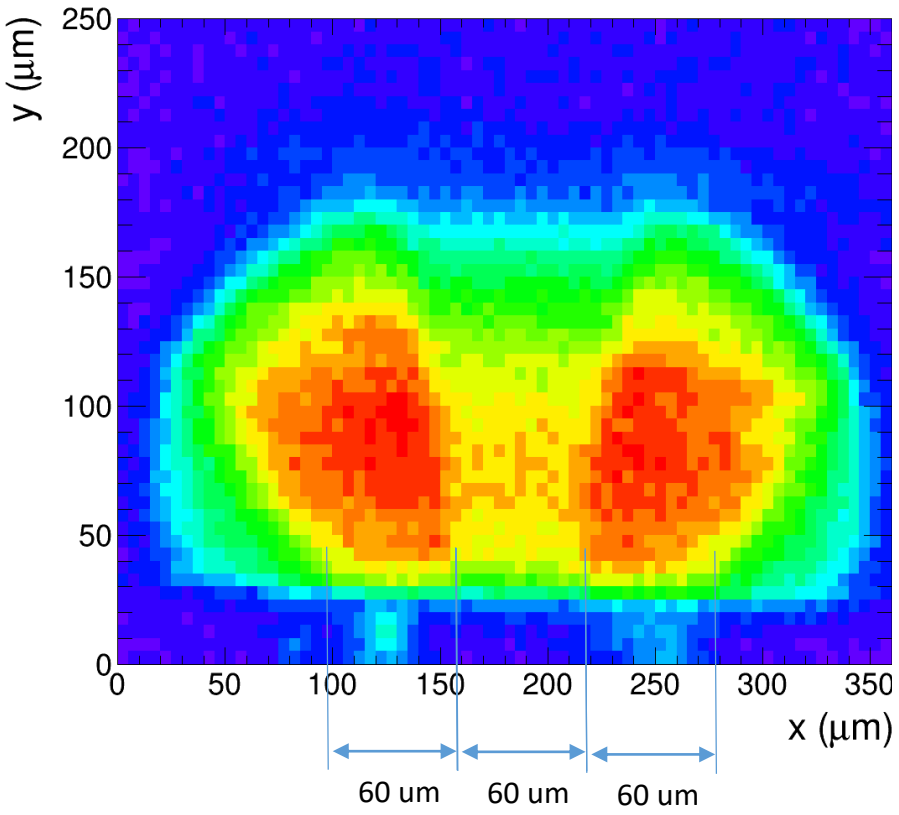
➔ Bi se dalo to študirati za magisterij npr. s KDetSim ?

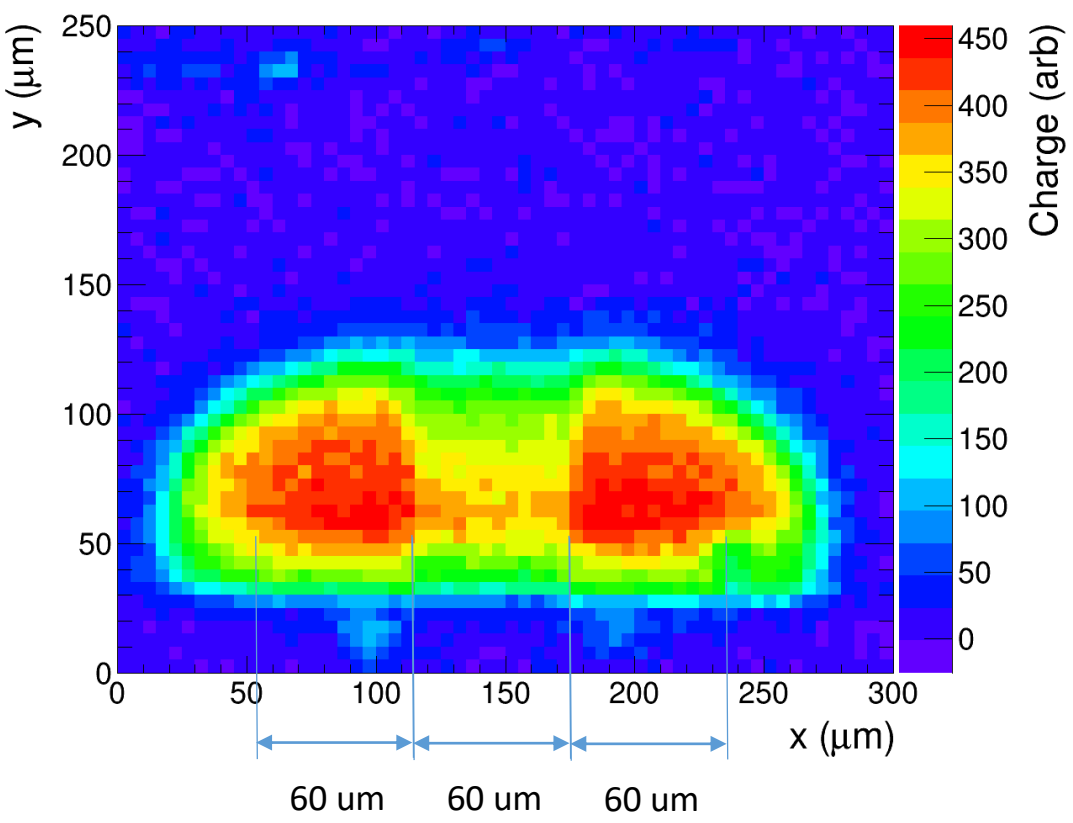
Scan x and y under central pixel



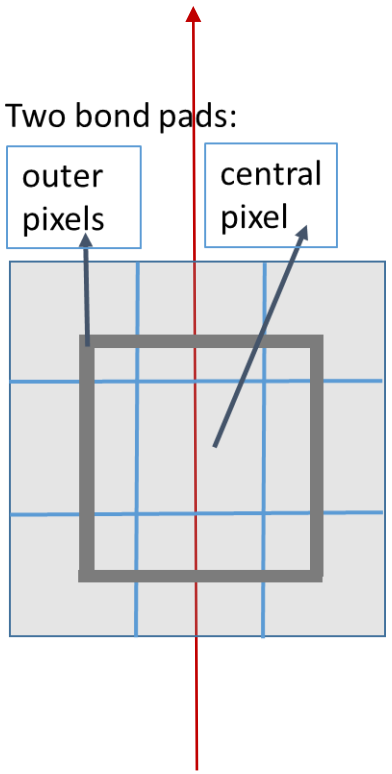
- charge collection region width increases at large depletion depths
- Known effects, seen before in several other samples

Charge from induced signals on outer 8 pixels (without central one)





Top view:



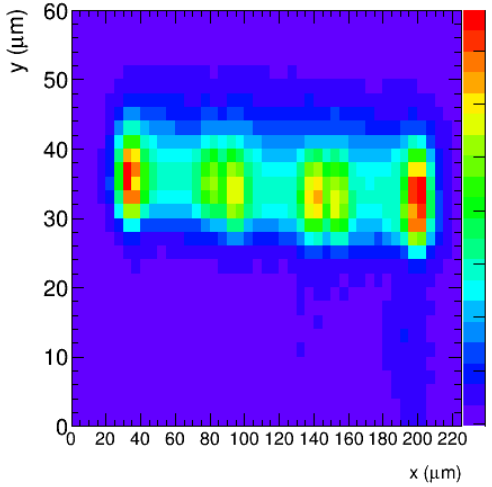
IR laser direction in E-TCT

Charge collection region extends beyond dimension of the test structure
→ depletion region shape and diffusion from undepleted substrate

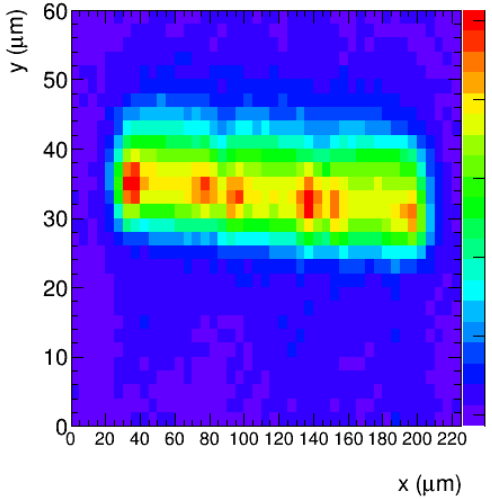
Charge from central pixel not included

Charge collection profiles

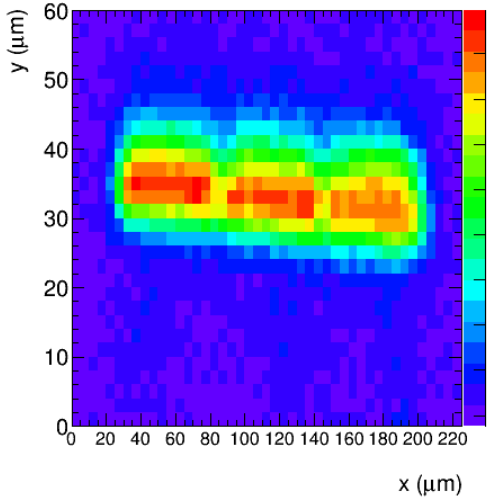
100 V



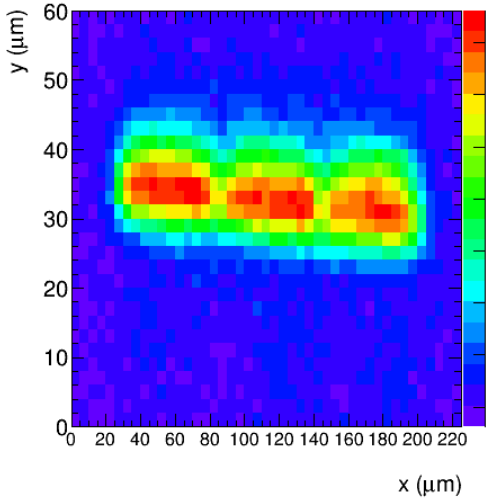
80 V



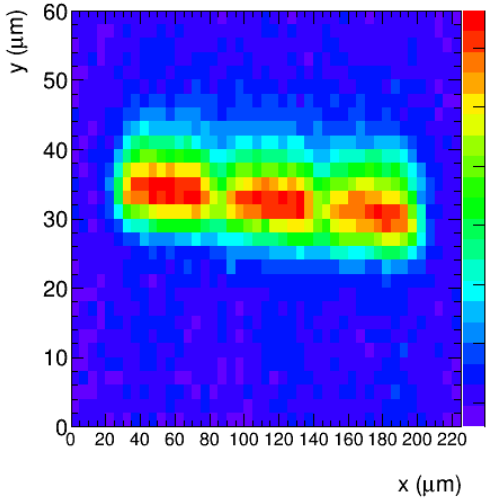
60 V



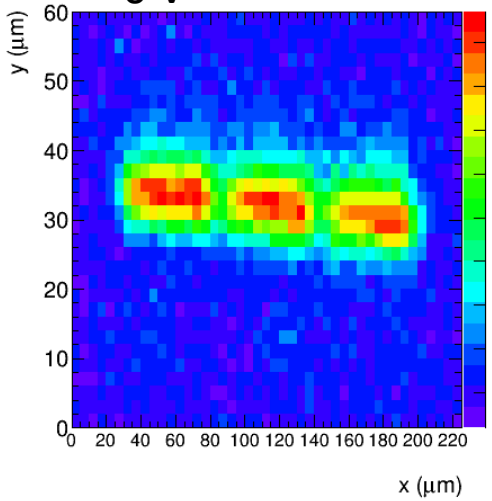
40 V



20 V

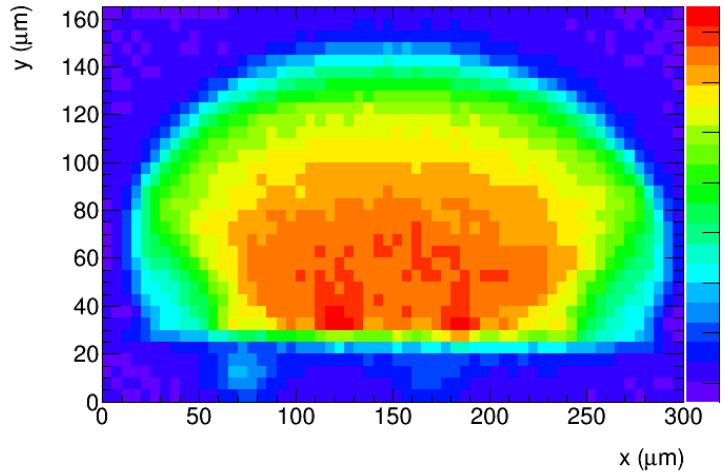


0 V



W5: → at high bias voltage more charge near pixel edges
→ at lower bias gaps between pixels → looks like not depleted
→would be interesting to compare to simulations

W11, 120 V



No structure in x directon
For higher resistivities