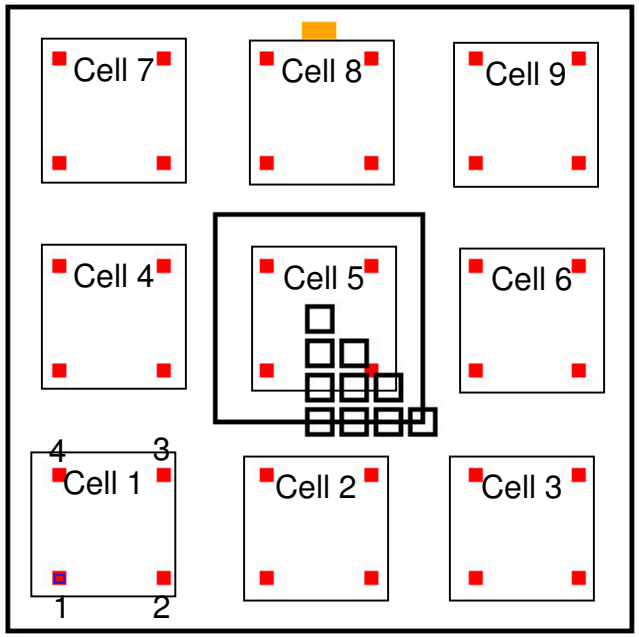
CALICE D4 simulation results

G.Villani feb. 06



Cell size: 25 x 25 μm^2

Epitaxial thickness: 20 μm

Diode location: S4

Diode size: 1.5 x 1.5 μm^2

Cell := enclosing of 4 diodes whose Charge add (as in cell 5)

Diode bias: 2V

PWell bias: 0V

Substrate bias: floating

10 hits simulated: mirroring over central cell and transformation over 3 x 3 cells allows surface reconstruction of $Q_{coll}(x,y)$

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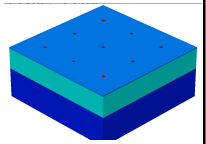
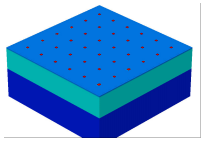
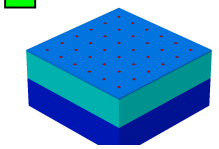
thickness	single	multi
15 μm		
20μm		

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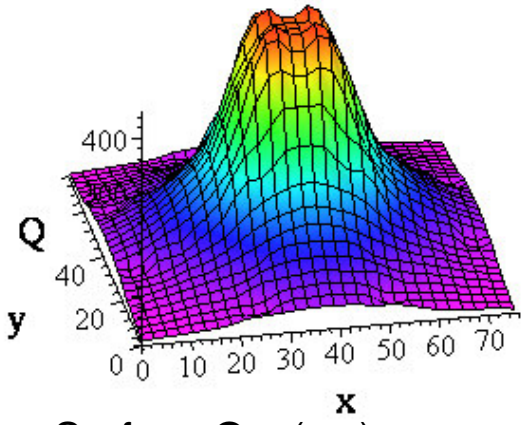
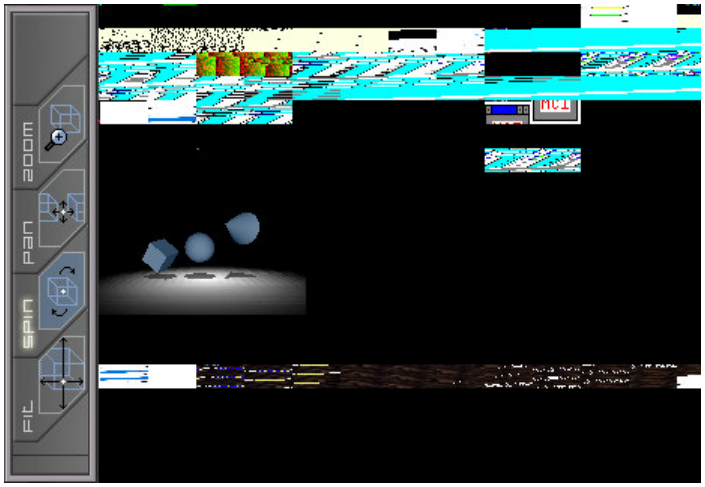
Epitaxial thickness: 20 μm



Surface $Q_{coll}(x,y)$

4	10	15	15	10	4
10	26	43	42	25	10
15	44	105	106	43	15
15	44	105	106	44	15
10	26	44	44	26	10
4	10	15	15	10	4

Single diode $Q_{coll}(x,y)$ hit 1



$Q_{coll}(x,y)$ = 1092

50	116	49
118	422	118
51	118	50

Sum diode $Q_{coll}(x,y)$ hit 1

Normalized surface $Q_{coll}(x,y)$ vs. max(Qcoll(x,y))

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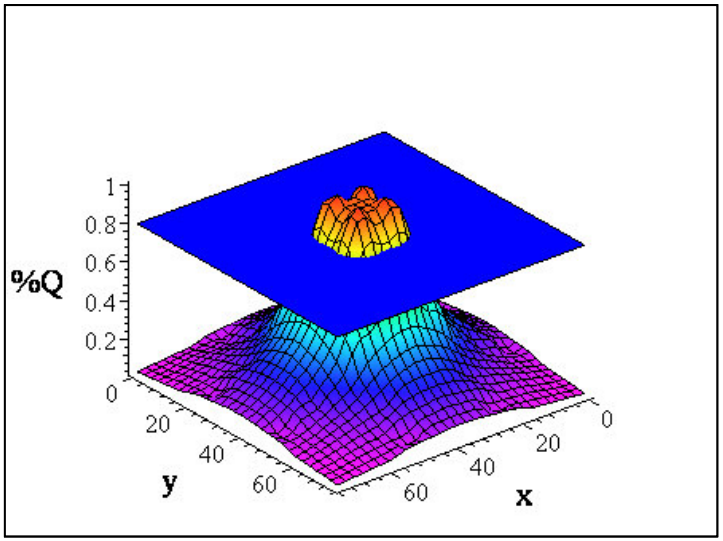
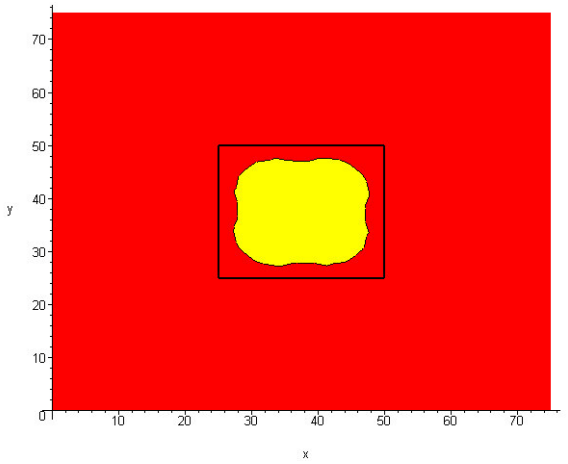
Epitaxial thickness: 20 μm



Normalized surface $Q_{coll}(x,y)$ vs. max(Qcoll(x,y))



20%

40%

60%

80%

Contour plot of cell charge at different % of total collected charge

Increasing number of threshold levels reduces spatial error

Minimum error around ≈ 57 % (need further analysis)

CALICE D4 simulation results

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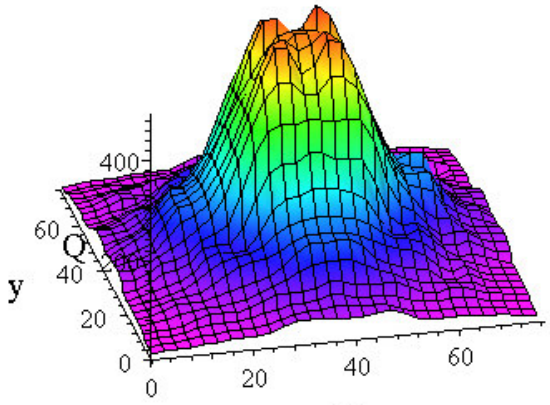
Epitaxial thickness: 15 μm



Surface $Q_{coll}(x,y)$

4	9	17	19	10	7
9	24	45	45	25	9
14	41	115	119	44	14
14	41	110	113	43	14
8	23	40	40	30	9
3	8	23	18	10	5

Single diode $Q_{coll}(x,y)$ hit 1

Normalized surface $Q_{coll}(x,y)$ vs. max(Qcoll(x,y))

$Q_{coll}(x,y) = 1122$

46	126	51
110	457	115
43	121	53

Sum diode $Q_{coll}(x,y)$ hit 1

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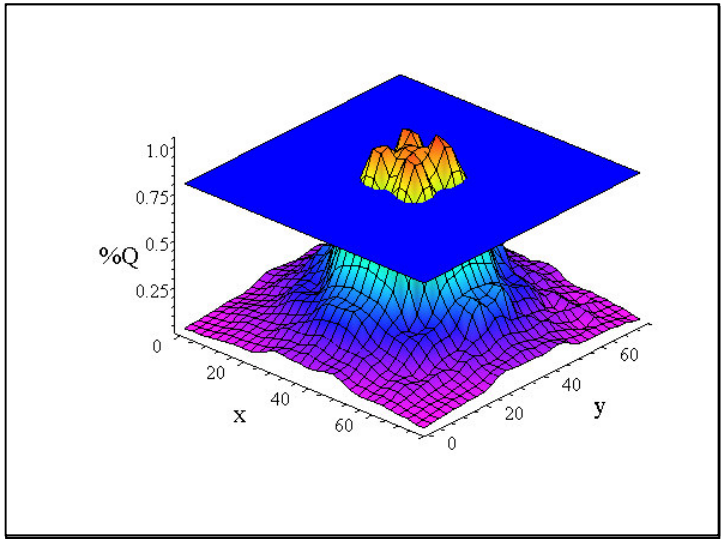
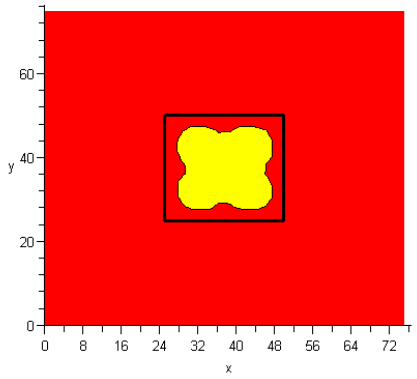
Epitaxial thickness: 15 μm





20%

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80%

Contour plot of cell charge at different % of total collected charge

Normalized surface $Q_{coll}(x,y)$ vs. max(Qcoll(x,y))

Increasing number of threshold levels reduces spatial error

Minimum error around ≈ 57 % (need further analysis)

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Conclusions

- Maximum signal around 420 - 460 e^- when Σ
- Effect of spread of charge can be limited by increasing number of levels threshold
- Is there an 'optimum' thickness of epitaxial layer ?

Collection with different thicknesses

15 μm

20 μm