Proposal of mapping induced current

Version-2

28 July, 2010

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Proposal of mapping induced current

There are three major points for improvement:

(1) Use Electric field based on FEM (instead of uniform field).
(2) Use induced current (instead of hole charge arrived).
(3) Follow the time sequence (instead of fixed threshold at 30 ns).

However, transportation of each electrons and holes in the bulk requires too much CPU time.

Proposal :

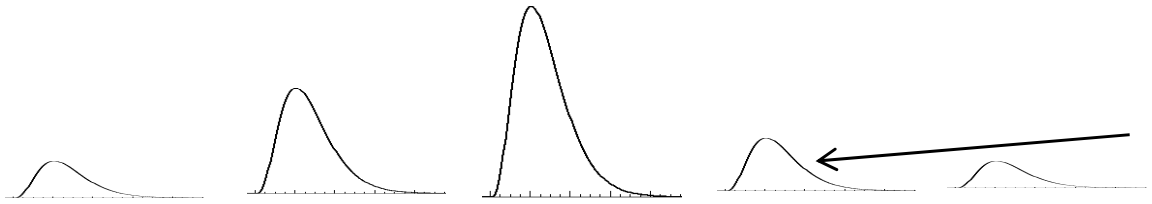
make a map of induced current at various points under one strip size.

Test point : B=2 tesla, V_D=65V, V_B=150V, T=0^{o}C

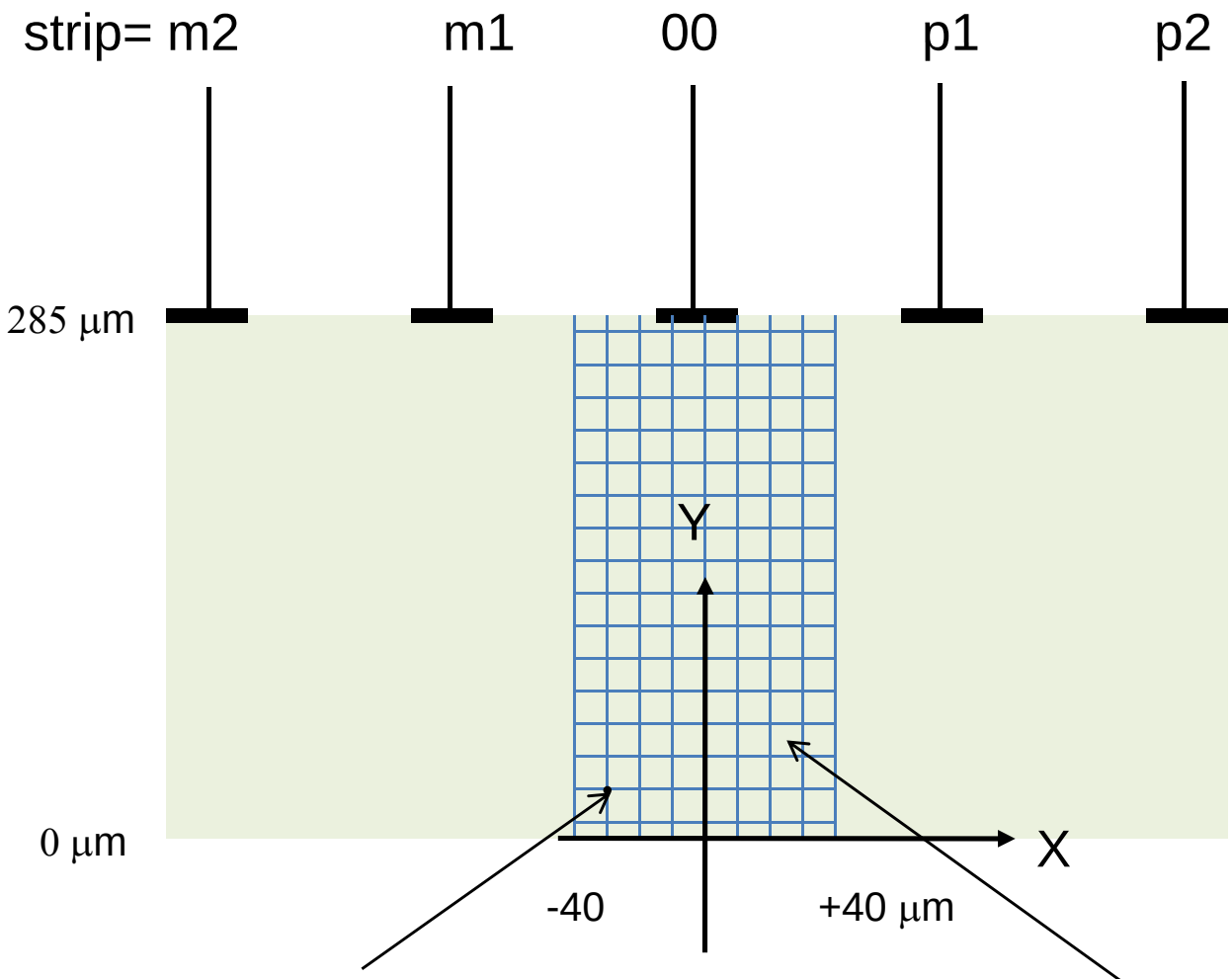
Map data and readout programms can be picked up at

http://atlas.kek.jp/si-soft/map/index.html

Based on Richard's recommendation on 27 July 2010 TF meeting, the raw induced signals are saved for mapping now.



Save time shapes for 5 strips
(0.5ns interval up to 25ns)
Note the change in time step!



Data array:
Pulse[5][17][57]50]
[5] : strips (m2,m1,00,p1,p2)
[17] : -40,-35, ……,+40 μm
[57] : 2.5, 7.5, …..,282.5 μm
[50] : 0, 1, 2, ….., 49 ns

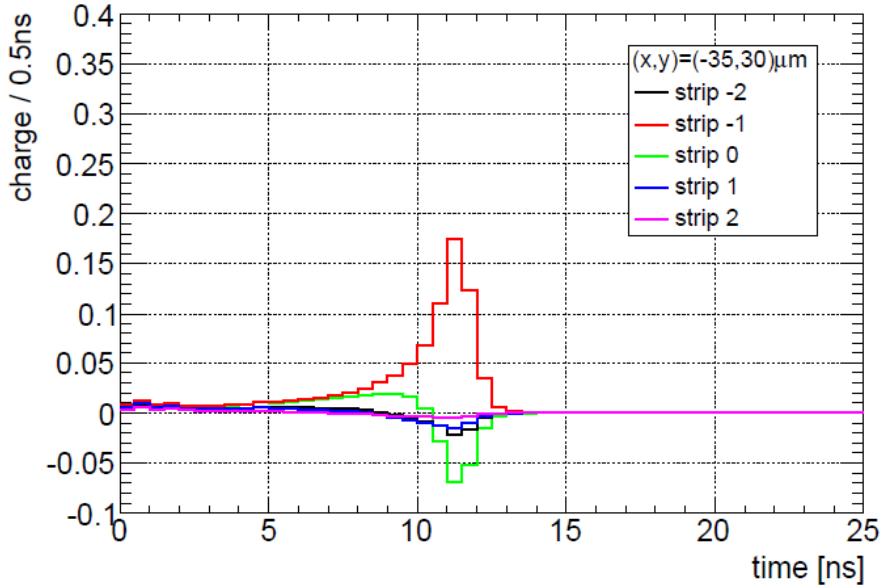
associated programmes:
inducedChargeArray(I,x,y,time)
init_inducedChargesArray()
GetCharge150(I,j,k,l)

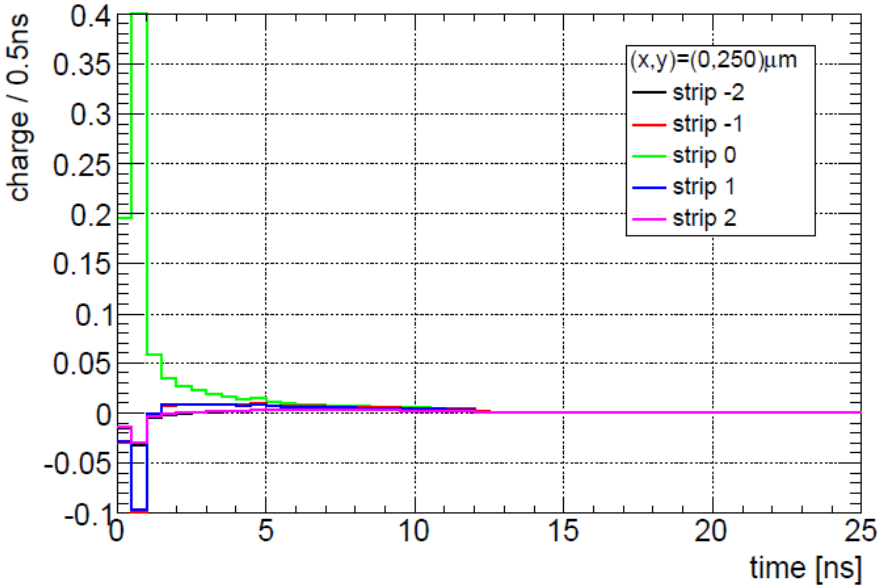
Interpolation for use:
inducedCharges (istrip,x,y,time)

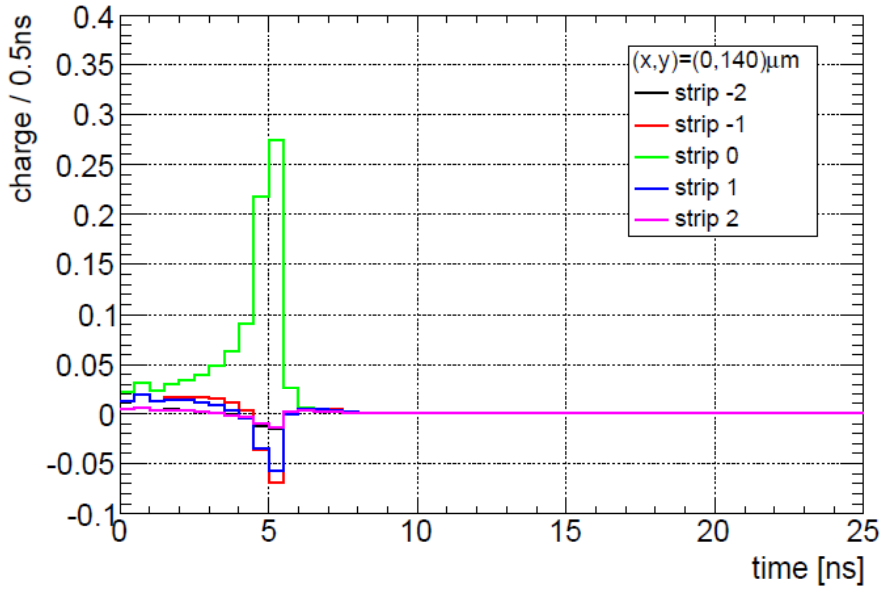
Calculate induced current for
17 x 57 mesh points every 5 μm.

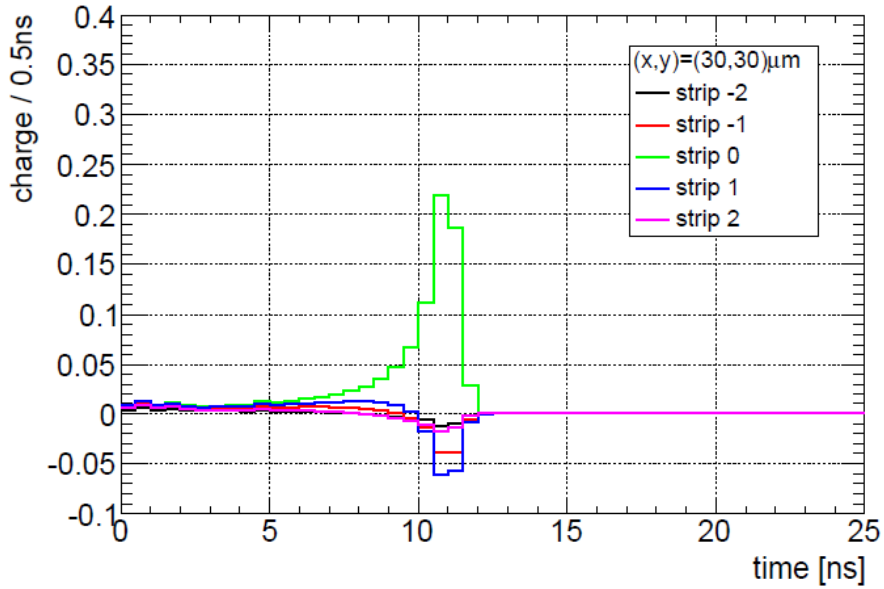
Use interpolation of
adjacent 4 mesh points

Plot s of some sampling points









Some remarks

- Shaun pointed the space charge should not be included when the weighting potential is calculated. In fact, Hans-Günther Moser's review (Progress in Particle and Nuclear Physics 63 (2009) 186–237) says

  "Only the geometry needs to be considered, no space charge is involved".

  I updated my weighting potential accordingly.

- Map data and readout programmes can be picked up at http://atlas.kek.jp/si-soft/map/index.html

- Richard successfully used the mapping in the SCT digitization programme (see his talk at the meeting on 27 Jul 2010)

- Based on Richard's recommendation, the raw induced signals instead of amplified ones are saved for mapping.