Update on Svt Background simulation with Bruno

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Introduction

- Better agreement between my and Trieste's results (see previous talk)

- After Elba meeting, packaged version of FullSim (BrunoApp) was available

- New productions available using this packaged version

- Additional hit information to remove cylindrical approximation when calculating rates

- Validation of packaged version is needed

BrunoApp and new productions

- While finishing transition to packaged version, additional debugging of Bruno (Geant4, too) was done by FullSim people

- Packaged version of FullSim (BrunoApp) was available only late, so not so much time for improvement

- New productions:

  - **Official-London**, RadBhabha (~3k evts, 11us, low stat): BrunoApp V0.0.0, 1mm step limit

    - Issue: old version of hits, not able to process those files using my macro w/o major changes

  - **Official-London**, Touschek/BeamGas: same as previous one, same issue, additional technical problem with normalization

  - **Personal**, 2photons (1.9M evts, 250us): BrunoApp V0.0.1, no step limit, single Coulomb scattering, improved hit information

- Following plot only from personal production

Development on packaged version

- Approximation: number of fired pixel/strip is calculated over a cylindrical surface, not on a flat one

- Removing that storing hit coordinates for the active silicon volume (plus module and wafer number)

- These coordinates can be retrieved from G4, now added to the hit classes

- Rate wafer by wafer, rate vs phi and more

- Svt hit (BrnSvtGHit, BrnRootSvtHit) are now classes derived from generic hit classes, BrnGHit and BrnRootHit

- Additional work to fix bugs from transition and adapt code to the new frame

  - E.g. compile a shared library to be loaded by Root macros

- Stuck simulation bug now understood: caused by a kind of volume, now replaced (thanks to Andrea and Alejandro)

Preliminary results

- Rates are much higher than before, specially for L0 (~x4)

- Usual problem with magnetic field, need to reprocess them

- Still using global coordinates, need more work to move to local coordinates

2photon (pairs)
Pixel rate in MHz/cm^2
prod 2011 Sep, BrunoApp
prod 2011 May, Bruno

Fired Pixels distribution vs Z on Svt Layer 0
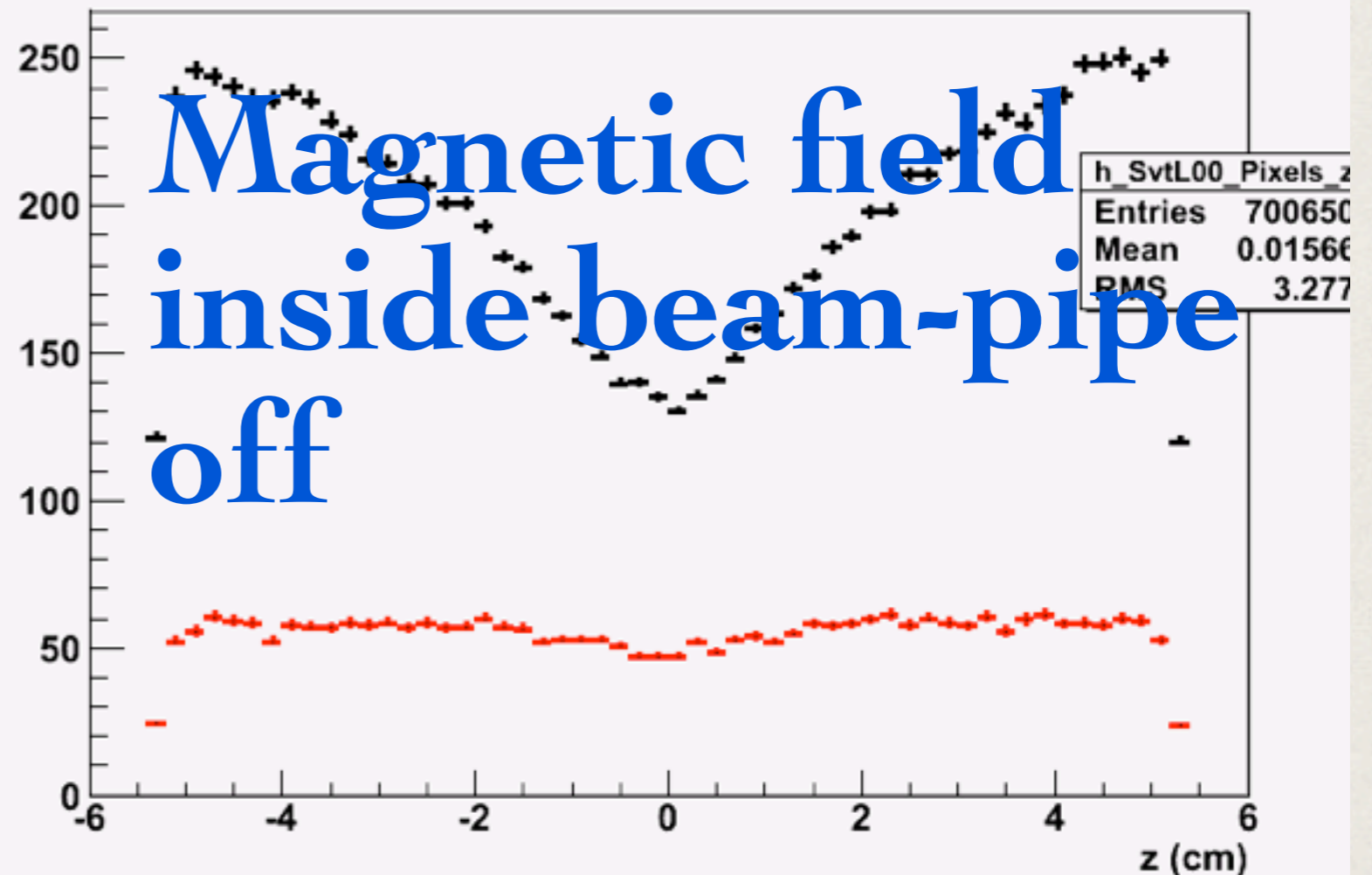
Magnetic field inside beam-pipe off

h_SvtL00_Pixels_z	
Entries	700650
Mean	0.01566
RMS	3.277

z (cm)

Preliminary results

- Rates are much higher than before, specially for L0 (~x4)

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Magnetic field inside beam-pipe off

LAYER 0	Dec2010	May2011	Sep2011	
Cluster rate	6.44	6.37	31.3	MHz/cm2
Cluster multip	8.1	8.1	6.4	
Pixel rate	56.1	55.6	201.2	MHz/cm2
Fluency	4.79E+12	4.73E+12	1.26E+13	cm-2
Dose	3.61	3.58	15.6	MRad

LAYER 1	Dec2010	May2011	Sep2011	
Cluster rate	0.43	0.22	0.55	MHz/cm2
Cluster multip	2.12	10.88	6.4	
Pixel rate	0.91	2.56	3.5	MHz/cm2
Fluency	5.40E+10	1.80E+11	2.80E+11	cm-2
Dose	0.03	0.11	0.22	MRad

Conclusions

- Packaged version finally delivered, validation is still pending

- Better agreement between my and Trieste's results

- First production with BrunoApp, fake high bkg (wrong magnetic field)

- Cylindrical approximation has been removed, soon strip rate module by module

Results L0,1,2

- Same values for L0

- Lower cluster rate, but higher pixel rate, fluency and dose for other layers

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Cluster multip	8.1	8.1	
Pixel rate	56.1	55.6	MHz/cm2
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LAYER 1	Dec2010	May2011	
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Pixel rate	0.91	2.56	MHz/cm2
Fluency	5.40E+10	1.80E+11	cm-2
Dose	0.03	0.11	MRad

LAYER 2	Dec2010	May2011	
Cluster rate	0.23	0.12	MHz/cm2
Cluster multip	1.98	10.54	
Pixel rate	0.48	1.31	MHz/cm2
Fluency	2.91E+10	9.80E+10	cm-2
Dose	0.017	0.057	MRad

Results L3-5

- Same values for L0

- Lower cluster rate, but higher pixel rate, fluency and dose for other layers

LAYER 3	Dec2010	May2011	
Cluster rate	67.2	37.6	kHz/cm2
Cluster multip	1.91	9.96	
Pixel rate	131	342	kHz/cm2
Fluency	7.95E+09	2.57E+10	cm-2
Dose	5	15	kRad

LAYER 4	Dec2010	May2011	
Cluster rate	7.2	5.8	kHz/cm2
Cluster multip	1.63	7.68	
Pixel rate	11.9	31.6	kHz/cm2
Fluency	5.90E+08	1.88E+09	cm-2
Dose	0.5	1.8	kRad

LAYER 5	Dec2010	May2011	
Cluster rate	3.8	3.4	kHz/cm2
Cluster multip	1.66	6.97	
Pixel rate	6.1	15.3	kHz/cm2
Fluency	2.18E+08	7.00E+08	cm-2
Dose	0.3	1.0	kRad

Multiplicity comparison

- Comparison with values from Trieste (Apr 2011)
- Different geometry, but now same pitches
- Updated results from Trieste should be presented tomorrow by Lorenzo V.

LAYERS	Old geometry Apr2011 (Trieste) Multipl.	May2011 Multipl.	May2011 Rates [MHz/cm2]	May2011 Pixel rate [MHz/cm2]
L0 phi	5.3	4.1	23.3	55.5
L0 z	5.2	5.1	29.9	
L1 phi	7.3	6.5	1.5	2.0
L1 z	3.8	3.2	0.7	
L2 phi	7.1	5.9	0.72	0.96
L2 z	3.7	2.9	0.35	
L3 phi	8.2	4.9	0.194	0.25
L3 z	3.9	2.6	0.097	
L4 phi	3.9	2.0	0.012	0.014
L4 z	1.6	1.3	0.0076	
L5 phi	3.1	1.8	0.006	0.007
L5 z	1.9	1.3	0.0041	