The New Mokka SIT Driver (SIT01)

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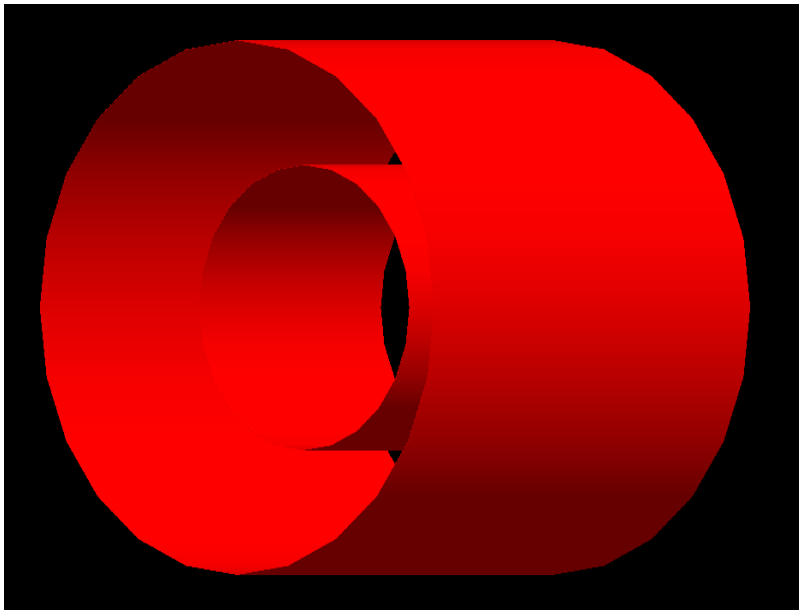
Motivation

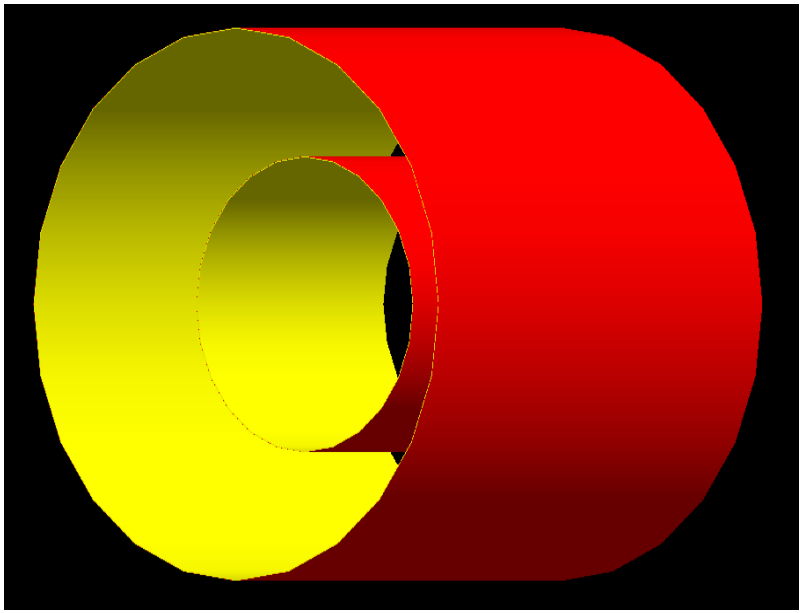
- Strange Material: "silicon_8.72gccm"
  - Atomic number (A=26.98) , same as Silicon
  - Charge number (Z=13) , same as Silicon
  - Density 8.72 g/cm^3 (pure Silicon is 2.33 g/cm^3)
  - Radiation Length (X_0 = 93.7*2.33/8.72 = 25 mm), where 93.7 mm is the radiation length of pure silicon
- Exist since Brahms
  - TESLA Simulation and Reconstruction software
  - To account for the additional effects which are caused accompanying materials come together with the silicon sensors.
- Still Existing in Mokka SIT00 and FTD00 Drivers

An Alternative Solution

- Proper Solution for Accompanying Material:
  - Introduce a support layer together with each sensitive silicon layer
  - New Mokka SIT Driver (SIT01) Implemented
    - 'real' silicon instead of the strange one



SIT00



SIT01

Geometry of SIT01

- **Basic Geometry:**

layer_id	inner_radious (mm)	half_z (mm)
1	160	380
2	300	660

- **Materials and Thickness (for one layer)**
  - Thanks to Aurore Savoy Navarro and SiLC Team to provide the information of thickness of silicon and total thickness in X0

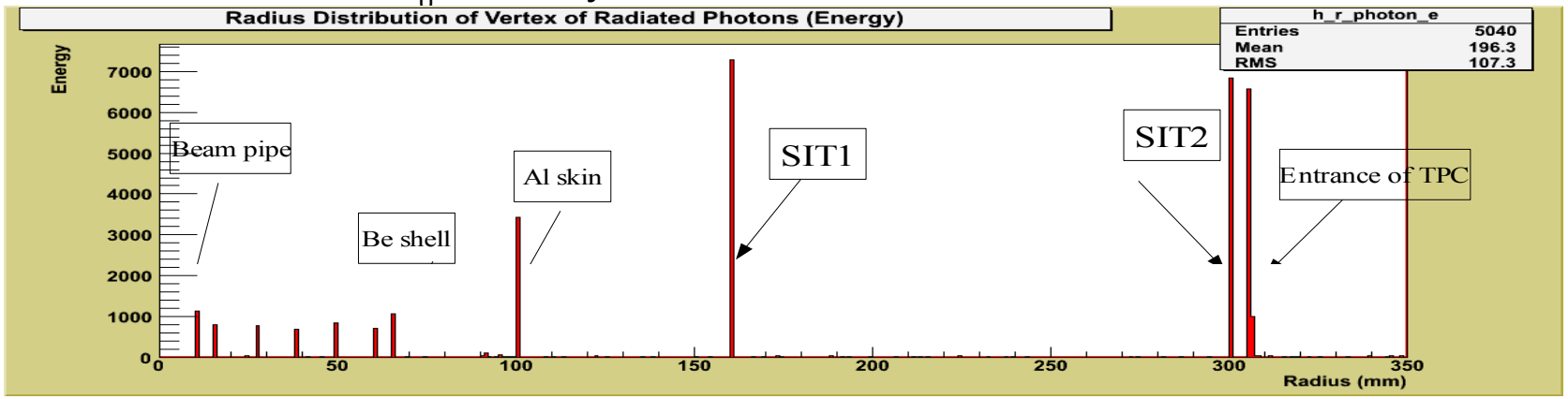
	Material	X0 (mm)	Thickness (mm)	Thickness in X0
sensitive part	Silicon	93.7	0.2	0.21 %
support part	Beryllium	352.8	1.01	0.29 %
Total				0.5 %
				1.2 % (SIT00)

Comparations of SIT00 and SIT01

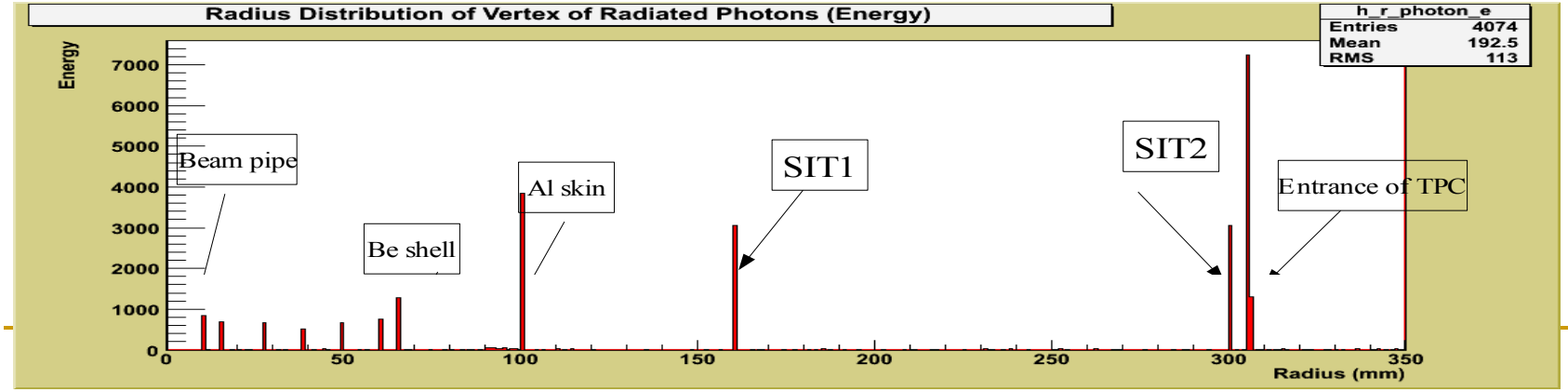
- Material Budget
  - **Energy loss of electrons when passing through the trackers**
  - **(Due to Bremsstrahlung)**

10000 Events, single electron, 50° to Z axis

- SIT00: 1.2%X_0 each layer



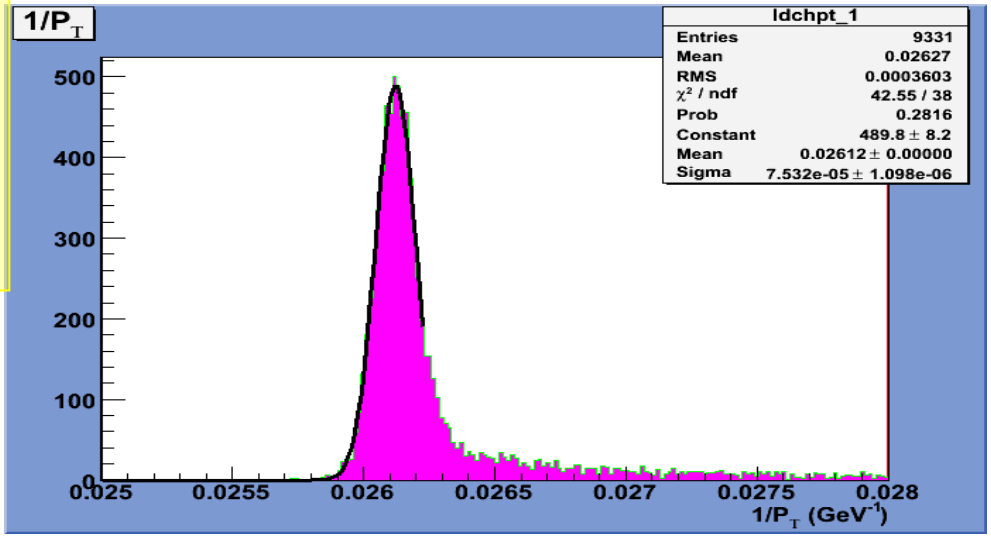
- SIT01: 0.5%X_0 each layer

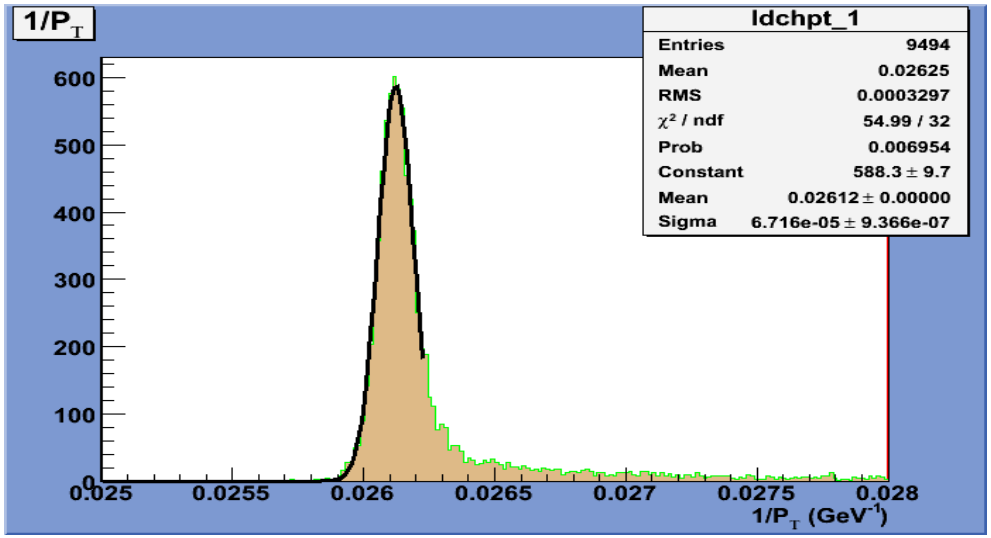


Comparisons of SIT00 and SIT01

10000 Events, single electron, 50° to Z axis, One track events considered

- Reconstructed Transverse Momentum
  - SIT00:
    - Sigma: 7.532×10^{-5}
    - Events # in peak: ~500
  - SIT01:
    - Sigma: 6.716×10^{-5}
    - Events # in peak: ~600
  - Sigma Decrease 10.8%
  - Events # in Peak Increase 20 %





Backup Slides

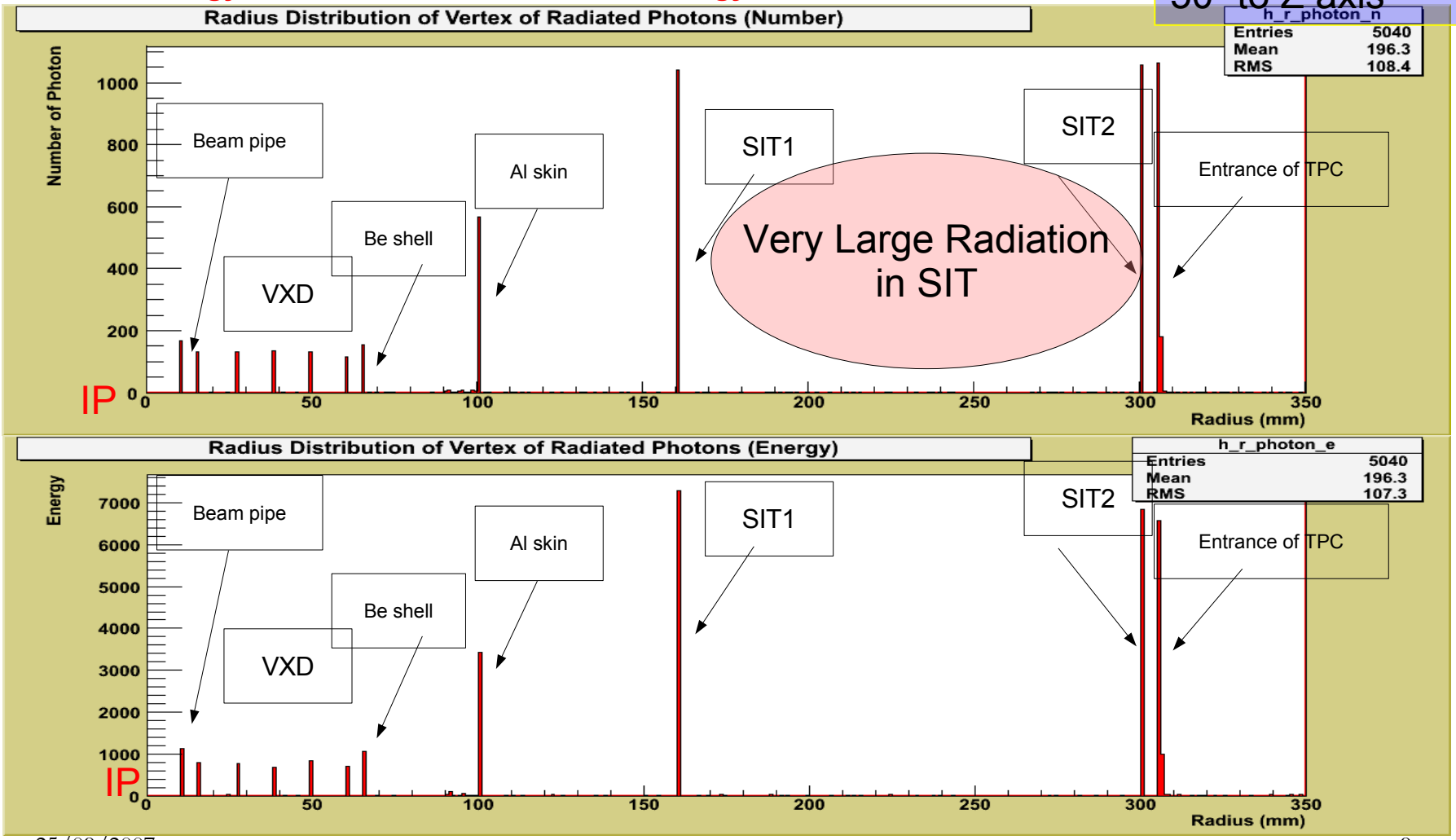
OUTLINE

- Introductory Remarks of Track Reconstruction
- What we want to do
- Problems we meet
- Techniques of LDC Track Reconstruction
- Some studies after understanding
- New SIT Driver
- Next Steps..

Material Budget in LDC01Sc

- **'Landscape' of passive material (Play with Monte Carlo Truth)**
  - **Where and How many photons radiated?**
  - **Energy loss of electrons ⇔ Photon Energy?**

10000 Events, single electron, 50° to Z axis



Conclusion and Next Steps…

- SIT01 driver will be included in next Mokka version, same job will be done for FTD
- Optimize the electron measurement
  - High efficiency and purity electron finder

Techniques of LDC Track Reconstruction