Simulations Update

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INTRODUCTION

Last update at CMS week Dec 12, 2012

Since then

- Phase II Simulatioin Workshop

- Division of coordination between E(H)CAL projects and various Upgrade Working (Sub)Groups

I am not going to summarize it
I will mention it were appropriate w.r.t. our activities

**IMPLEMENTATION FOR EVOLUTION MODEL
OF PRESENT ECAL/HCAL INTO CMSSW**

Ongoing/Legacy

- One of the topics of our activities since long time ago

- Our priority was FastSim, then FullSim

- We have private release FastSim 4_2_X with ECAL/HE/HF

- HF model was actively developed/implemented during last month
  (James Wetzel) and discussed at FCAL TF meetings

IMPLEMENTATION FOR EVOLUTION MODEL OF PRESENT ECAL/HCAL INTO CMSSW

Changes

- is coordinated by ECAL/HCAL projects and Offline Computing

- many of us are involved in this work

- Priority is FullSim, uncertainty in plans for FastSim

- We are interested in having both (specifically FastSim 6_1_X)

- Long-term: new detector implementation in CMSSW

CMSSW simulations are interesting and useful provided:

- physics case defined (outside of FCAL TF)
- algorithms developed/modified (outside of FCAL TF)

STANDALONE SIMULATIONS

We employed two types so far:

- Genat4-based
- Optical photon transport (SLitrani)

Geant4 Standalone with wide range of options

- EE+HE
- homogeneous or sampling ECAL
- materials for absorber and scintillator
- segmentations

**We don't have Standalone HF or alternative to HF
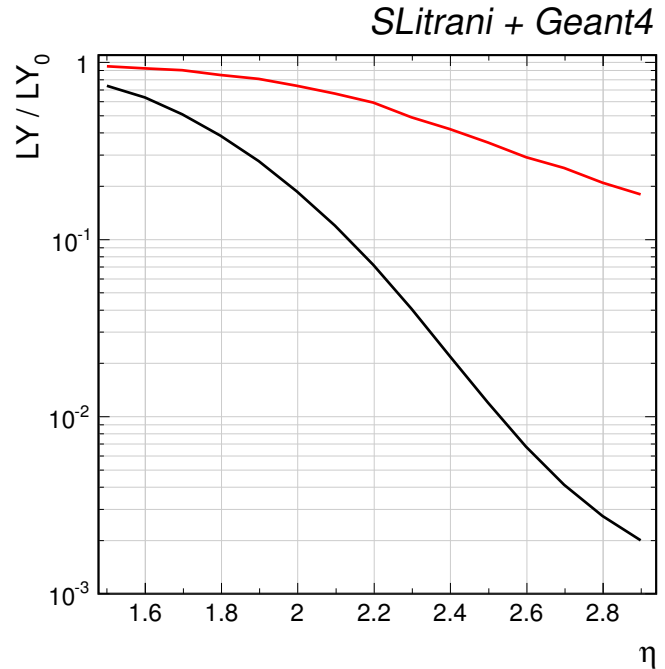New manpower to start this effort**

STRAWMAN ECAL = SHASHLIK
Advantage is in radiation resistance

SLitrani + Geant4

Degradation in light output from
EM showers reaching
   VPT in current EE (black)
   Quartz fiber in Strawman (red)
after 3000 /fb

Additional loss of transparency
in quartz fibers is not taken into
accout for red line

SHASHLIK STUDIES

Shilpi Jain doing various studies with standalone setup
Unfortunately, she did not have chance to present her recent results

Preview

- SLitrani simulation of Shashlik based on Kevin's setup

- Simulated light collection is used in Geant4 Standalone

- Non-uniformity of LY results in additional resolution term
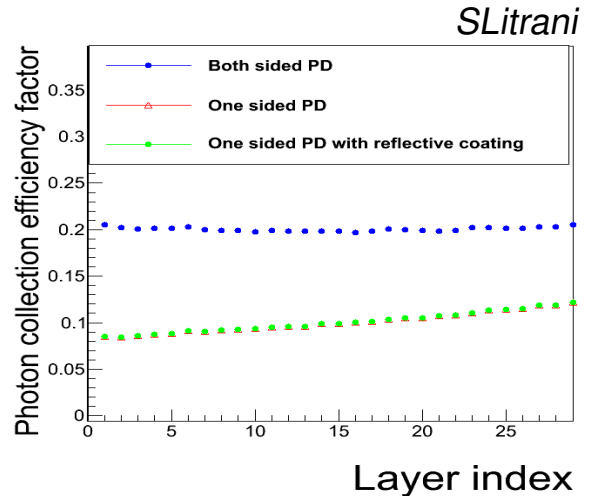
STRAWMAN SIMULATION NEEDS

Inputs (cannot be simulated, should come from R&D)

- expected light outputs (emmition spectra, QE etc)
- noise levels wrt expected signal amplitudes

Specific questions for simulation:

- find resolution of X in conditions Y for configuraion Z
- scan configuration Z (or condition Y) in a range from A to B
- parameterize V as a function W

Reminder: we know how to parameterize Sampling ECAL with certain configuration for FastSim. General implementation exists in our 4_2_X release.

SUMMARY

- **Focus on studies for new detector concepts with standalone**

- **Simulation depends on inputs from R&D**

- **Efficient way to proceed:
  specific question + conditions→ simulation → answer**