

# Hit timing differences for GEANT4.9.4.p03 vs. GEANT4.9.5.p01

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# The Calorimeter Setup

SiPMs and  
Scintillator  
Tiles

C. Soldner

HCAL Setup

4.9.4.p01

4.9.5.p03

Conclusion

## GEANT4 Implementation of the calorimeter

- Sampling Calorimeter with 50 Layers (size  $1.3 \times 1 \times 1 \text{ m}^2$ )
- Particle gun 10cm in front of the calorimeter
- Tungsten or Steel absorber alternated by sensitive detector (scintillator + PCBMix. . .)
- Saving the global hit time and the position for each hit (with `G4Step step->GetTrack()->GetGlobalTime()` or `track->GetPosition().x()`)
- Aim: Investigate the time structure of hadronic showers
- Simulate with GEANT4.9.5p01 and GEANT4.9.4.p03

## Run Mode

- 10.000 Muons @ 180 GeV starting at  $x=-10\text{cm}$ ,  $y=0\text{cm}$ ,  $z=0\text{cm}$
- Histogram the X-Pos (Beam Direction) vs. the global hit time
- Compare LHEP, QGSP\_BERT\_HP, QBBC



# GEANT 4.9.4. patch 03 - LHEP

SiPMs and  
Scintillator  
Tiles

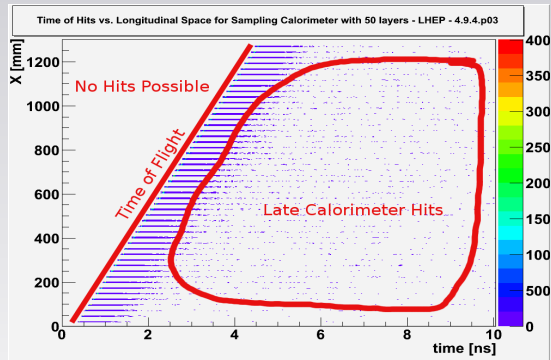
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Conclusion



## Run Mode

- Muon time of flight through the calorimeter visible → hits before would be faster than light
- Histogram the X-Pos (Beam Direction) vs. the global hit time
- Compare LHEP, QGSP\_BERT\_HP, QBBC



# GEANT 4.9.4. patch 03

SiPMs and  
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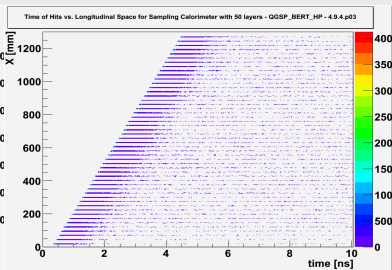
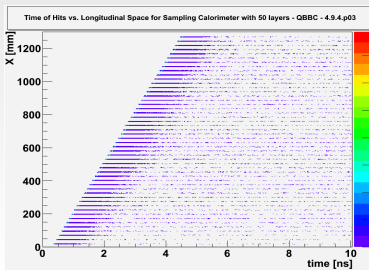
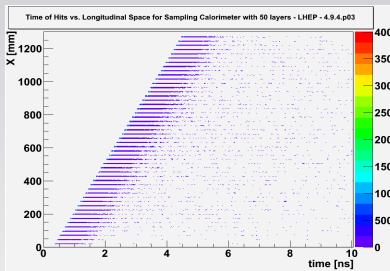
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4.9.4.p01

4.9.5.p03

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# GEANT 4.9.5. patch 01

SiPMs and  
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Tiles

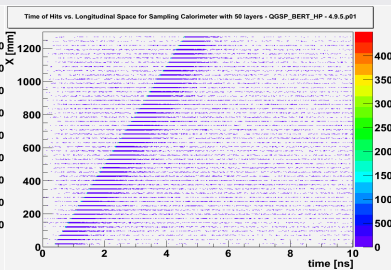
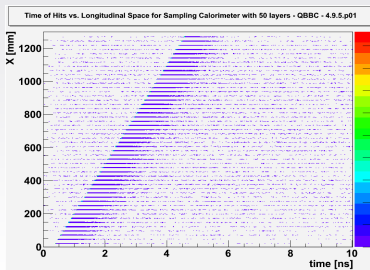
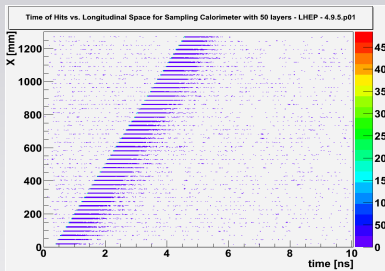
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HCAL Setup

4.9.4.p01

4.9.5.p03

Conclusion





# Conclusion

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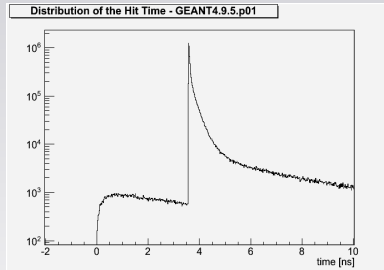
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HCAL Setup

4.9.4.p01

4.9.5.p03

Conclusion



- There seems to be an issue in the timing of GEANT4 hits
- Maybe the global time in the G4Step is not assigned correctly?
- First occurrence in the new GEANT4.9.5.p01
- For now we switch back to 4.9.4.p03