

Status of the SciTil implementation in pandaroot

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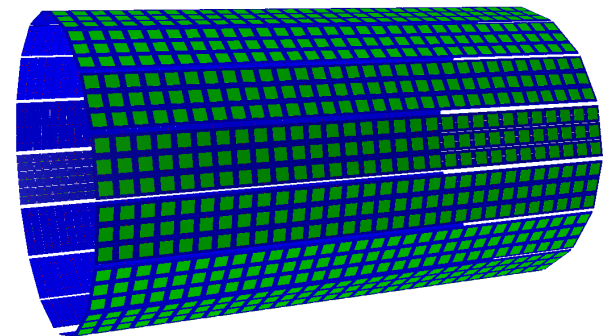
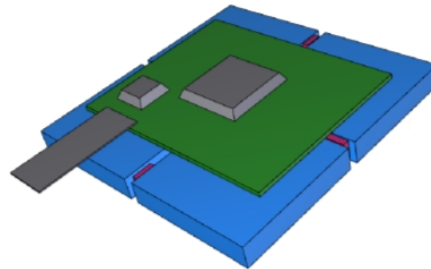
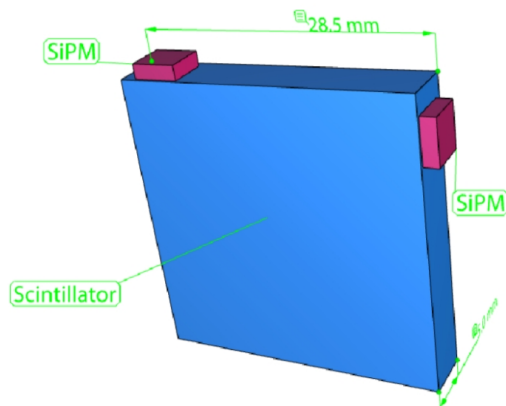
Outline

- Introduction
- Geometry update
- Time based simulation
- General update
- Summery

Introduction

- SciTil Boundary Conditions
 - Time resolution < 100 ps
 - Fast readout
 - Simple and robust, reliably from day-one
 - Reference for calibrating other detector systems
 - Limited space
 - Minimum material budget
 - Mechanics shared with DIRC

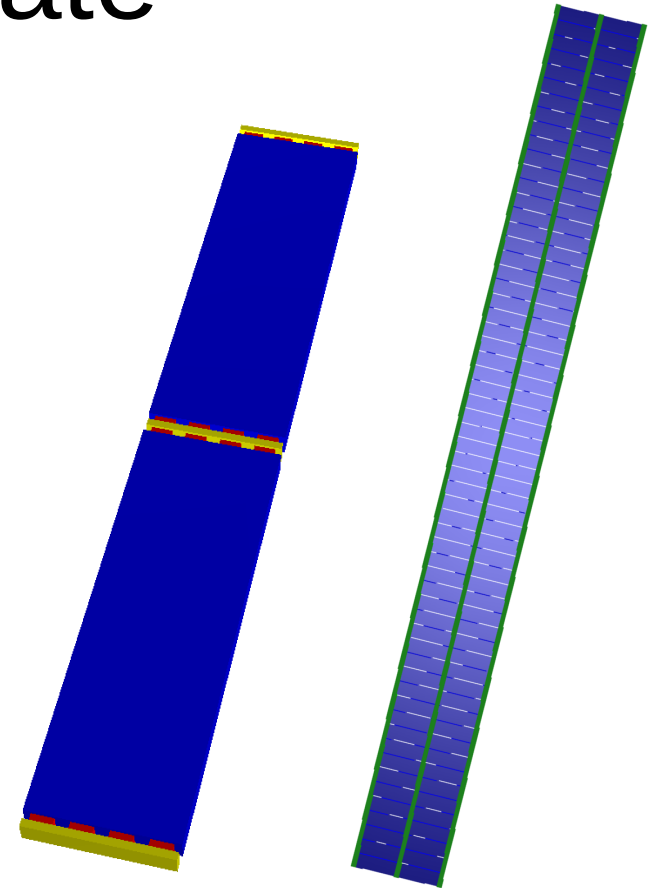
- Raison d'être
 - Event timing, t_0
 - Pattern recognition
 - Relative timing, PID
 - Preshower detection and correction



K. Goetzen et al., Proposal for a scintillator barrel hodoscope for PANDA

Geometry update

- Tile size
 - $\sim 3 \times 3 \text{ cm}^2 \rightarrow \sim 3 \times 9 \text{ cm}^2$
 - In total 1920 scintillating tiles
 - 4 SiPMs per Tile per side
 - better timing
 - well below 100 ps
 - Position resolution
 - Formally limited to tile geometry
 - Time difference provide position information
- Implementation of SiPMs
- Implementation of readout cards
 - lower material budget

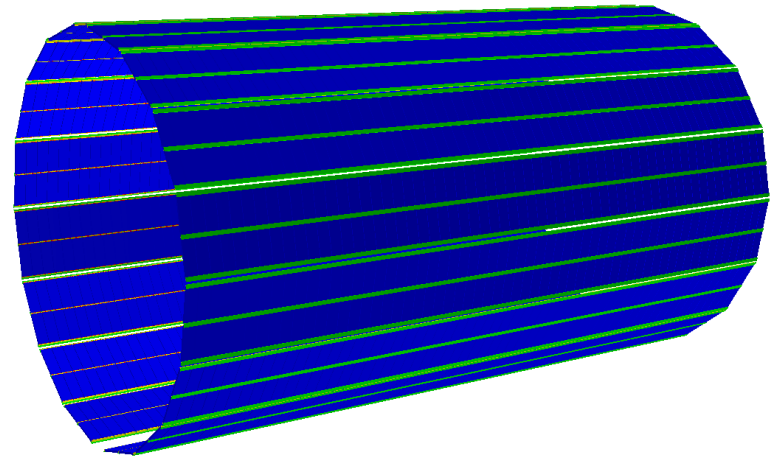


Right: Outline of scintillator tiles(blue), read out by 4 SiPM (red) on each side and the corresponding connector cards (yellow) Left: SciTil Module composed of 120 Tiles and 960 SiPMs

Geometry update

- SciTil_20150601.root
 - Latest geometry
- SciTil_201505.root
 - Proposal geometry
 - Updated to support current code
- SciTil_latest.root
 - Symbolic link pointing to latest geometry
 - Updated if new geometry is committed
- **Old geometry files no longer supported!**

```
PndSciT *SciT =  
    new PndSciT("SCIT",kTRUE);  
SciT->SetGeometryFileName(  
    "SciTil_latest.root");  
fRun->AddModule(SciT);
```



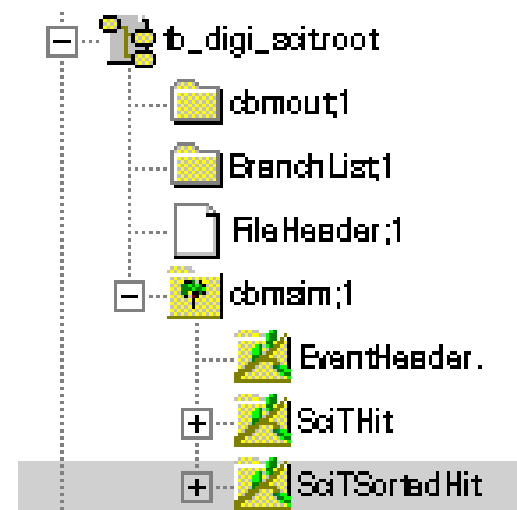
Time based simulation

- Time based simulation implemented
 - Using manual of the Workshop at GSI, September 2011
 - new classes
 - PndSciTHitWriteOutBuffer
 - Final electronics uncertain
 - Only a basic digitization implemented
 - TOF-PET under consideration,
 - Provide Timing, Time over Threshold
 - Two Thresholds for timing and energy
 - PndSciTHitSorterTask
 - PndSciTHitRingSorter
 - FairLinks not implemented yet
 - Will be added as soon as I know how to

Time based simulation

- (old) PndSciTHitProducerIdeal
 - Still usable for event based simulation
 - Not updated any more
- PndSciTDigiTask
 - Event based & Time based
 - Call SciTDigiTask → RunTimeBased() for time based simulation
 - Automatically manage sorting of data
 - Single tile dead time
 - Default value = 1000 ns
 - Modifiable: SciTDigiTask → SetDeadTime(deadtime) // in ns
- Example macros
 - Trunk/macro/scitil/timebased

```
PndSciTDigiTask* SciTDigi =  
    new PndSciTDigiTask();  
SciTDigi->SetDeadTime(SciTDeadtime);  
SciTDigi->RunTimeBased();  
fRun->AddTask(SciTDigi);
```



General updates

- Rearranged folder structure
 - Scitil/SciTMC
 - Scitil/SciTDigi
- Parameter modification
 - Simulation: **PndSciT**
 - → SetThreshold(threshold) // in GeV
 - Default = 0.1 MeV
 - Digitization: **PndSciTDigiTask**
 - → RunTimeBased()
 - → SetDeadTime(deadtime)
 - → SetTimeResolution(dt)
 - Default = 0.1 ns

```
PndSciT *SciT =  
    new PndSciT("SCIT",kTRUE);  
SciT->SetGeometryFileName(  
    "SciTil_latest.root");  
SciT->SetThreshold(SciTThreshold);  
fRun->AddModule(SciT);
```

```
PndSciTDigiTask* SciTDigi =  
    new PndSciTDigiTask();  
SciTDigi->SetDeadTime(SciTDeadtime);  
SciTDigi->SetTimeResolution(SciTdt);  
SciTDigi->RunTimeBased();  
fRun->AddTask(SciTDigi);
```


General updates

- PndGeoHandling implemented
 - Unique “shortID” stored in simulation and digitization output as “fDetectorID”
 - Full volume path still stored as “fDetName”
- Reworked stored data
 - Redundant functions cleared
 - Redundant stored data in SciTPoint and SciTHit cleared
 - Position Error “dpos” equal to tile size
 - Coordinates in corresponding Tile frame
 - Check respective header files for access functions

- SciTPoint

- Event ID, Track ID
- Detector ID (short Id), DetectorName
- HitPositionIn, HitPositionOut
- Momentum In, Momentum Out
- Time
- TrackLength, Energyloss

- SciTHit

- Detector ID (short Id), DetectorName
- HitPosition, PositionError
- Time, TimingError
- Energyloss
- MC Index

Summery

SciTil in Pandaroot:

- updated to current project status
- Timebased simulation ready to use
- Updates will be provided
 - digitization, electronics, timing

To do

- Give me feedbacks
 - Anything missing? Anything strange?
- Use the SciTil for higher level analysis
 - T0, pattern recognition, PID, preshower ...
- Give feedbacks again
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