PET Simulation

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What's new

Add some new features to simulation framework

Material Properties

Some updates

Property	
Absorption Length	50 m
Refractive Index	1.82
Scintilation Yield	26000 MeV^-1
Time Constant	40 ns

Property	
Detection Efficiency	1.0
Refractive Index	1.92

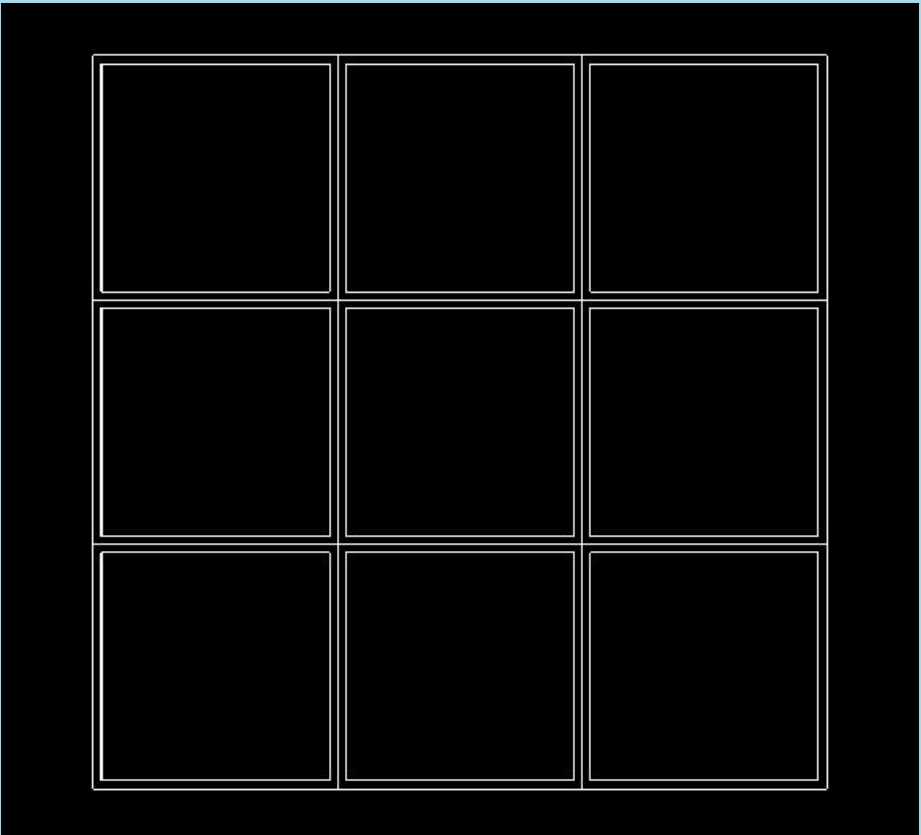**Updates of properties of LYSO**

Updates of surface properties of SiPM

Reflective Film

Add Reflective to Geometry

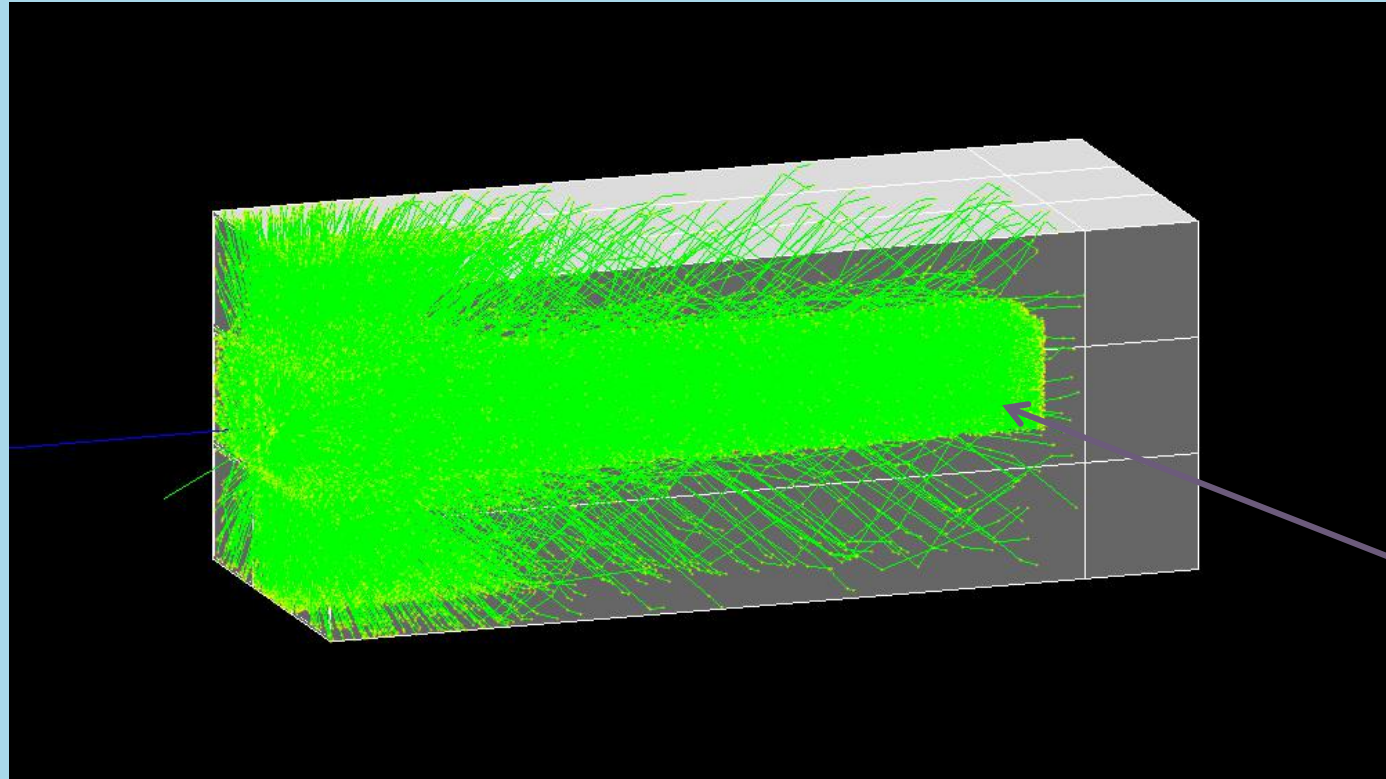| Property	
Material	Mylar (Polyethylene Terephthlate)
Reflective Ratio	1.0
Thickness	0.1 mm
Refractive Index	1.65

Properties of Reflective Film

PET modules after reflective film is added

Geometry Update

Simulation pictures of the new geometry

Most optical photons are transported inside one module due to the reflective film

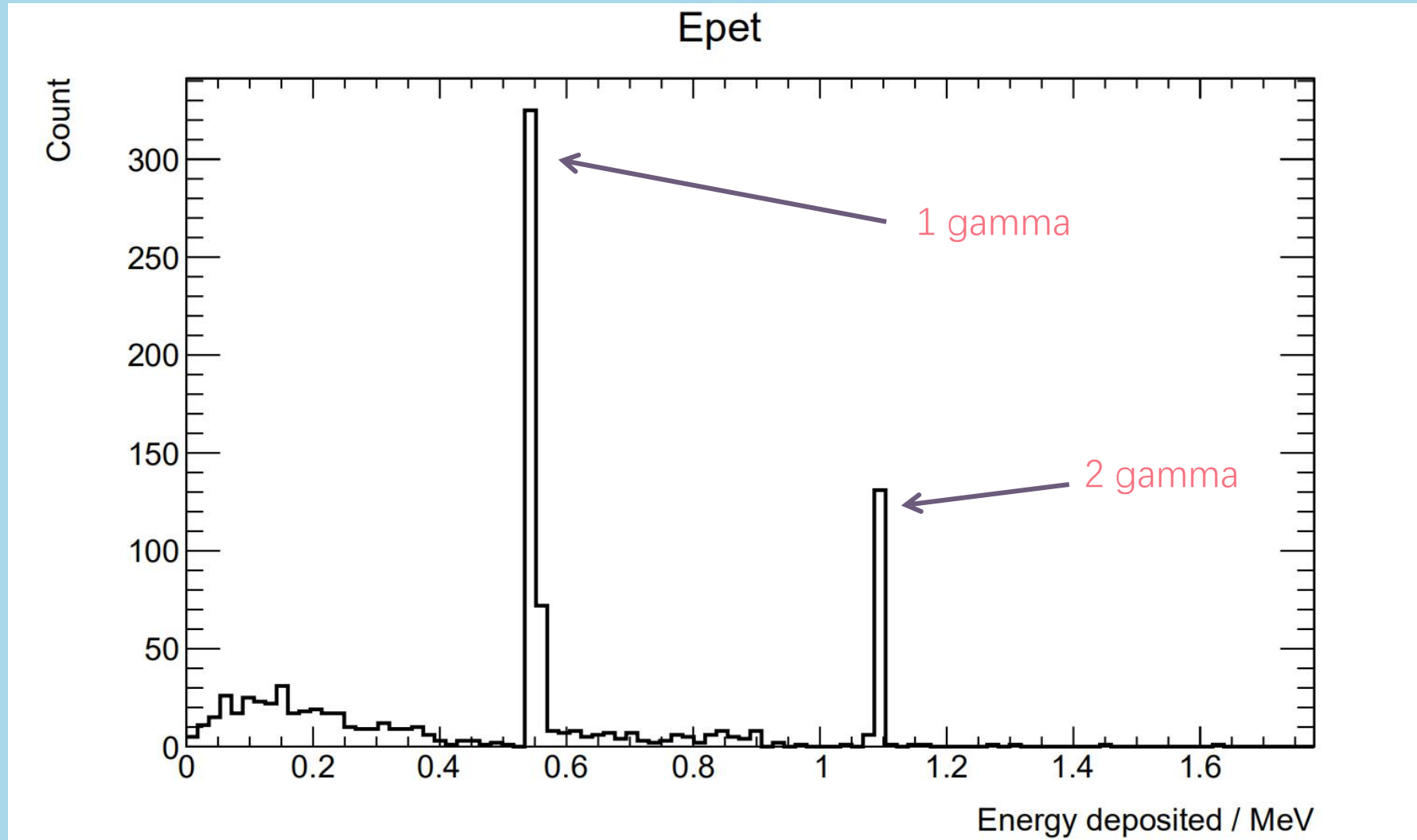Simulation pictures of the new geometry

What I get

Some simulation results of the new geometry

Energy deposited

Total energy deposited in modules of PET

Energy deposited (1000 events)

Hits

Hits detected by SiPM

11.7	23.24	12.97
28.59	685.7	23.38
11.71	21.65	14.33

Average number of scintillation photons
detected by SiPM (1000 events)

- Most optical photons hits the SiPM of middle module
- As the detection efficiency of SiPM is assumed to be 100% for now, the number will be smaller in real case

Hits

Hits detected by SiPM for each event

7	14	7
783	837	24
23	14	7

2 gammas

0	12	1
9	797	8
4	8	5

1 gammas

0	2	0
0	96	0
1	1	0

0 gammas

Conclusions

- Properties of LYSO crystal have been updated

- Surface properties of SiPM have been updated

- Add reflective film to geometry

- For each event, detector can get signals of 0, 1 or 2 annihilation gammas

What's the next

Future work

The Next Work

The next work

More real

More real parameters will be implemented to the simulation framework, such as detection efficiency and spectra of optical devices.

Alternative choice

Some gaseous detectors will be considered as an alternative choice for detection of positron. The simulation work may begin with MRPC due to my former experience.

More detailed

Geometries wil be optimized continuously and the detector design will be more detailed.

Further work

The time when scintillation photons hit SiPM can be got so that the time waveform is available. Reconstruction work will be considered for future.

Thank You For Watching !

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