Positronium intensity measurement preparation (GBAR)

SNU

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Understanding simulation from Amelia

Positron process

→in ‘Target’, positrons annihilate or make Ortho-Positronium directly without other process

- Although Geant4 can simulate denetration depth of positronium, we can’t simulate penetraion of positronium to outside of target..
- So the aim of simulation is just making positronium in surface and play with positronium in vacuum

→Normal physics process in the outside of ‘Target’

Check positronium simulation

Check list

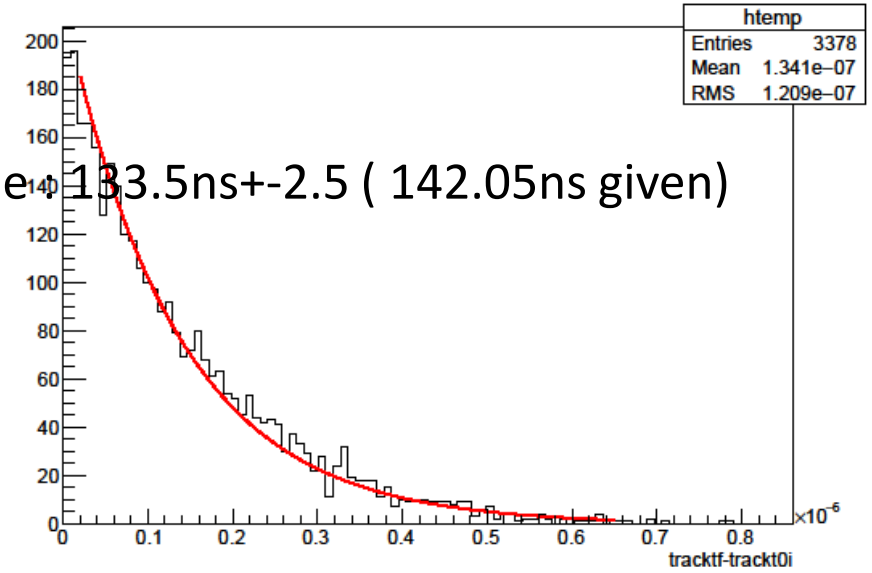
- Positronium fraction (o)

- 33.78% (30% given)

- Positronium decay (life time) (o)
- Positronium direction(isotropic) (o)
- Positronium Energy(maxwell-boltzman)(on-going)
- Positronium reflection (on-going)

Decay time distribution

- Life-time : 133.5ns+-2.5 (142.05ns given)



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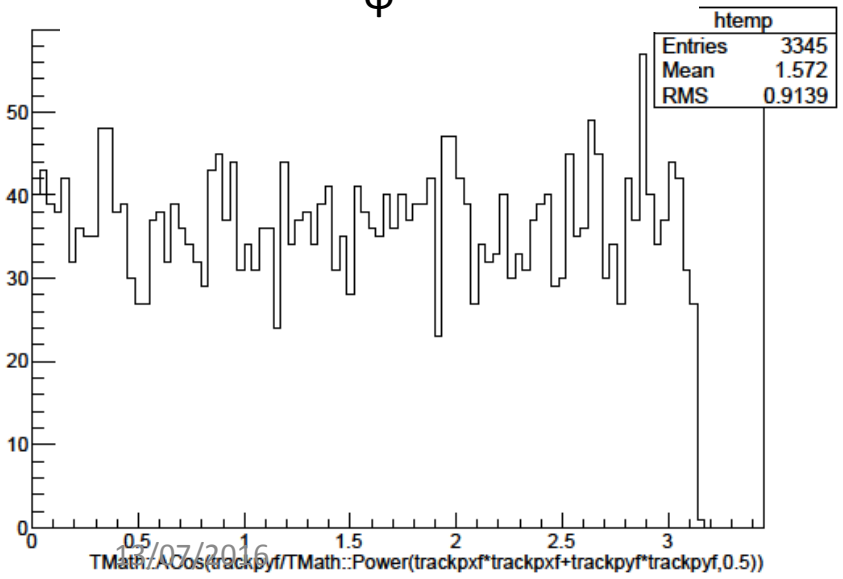

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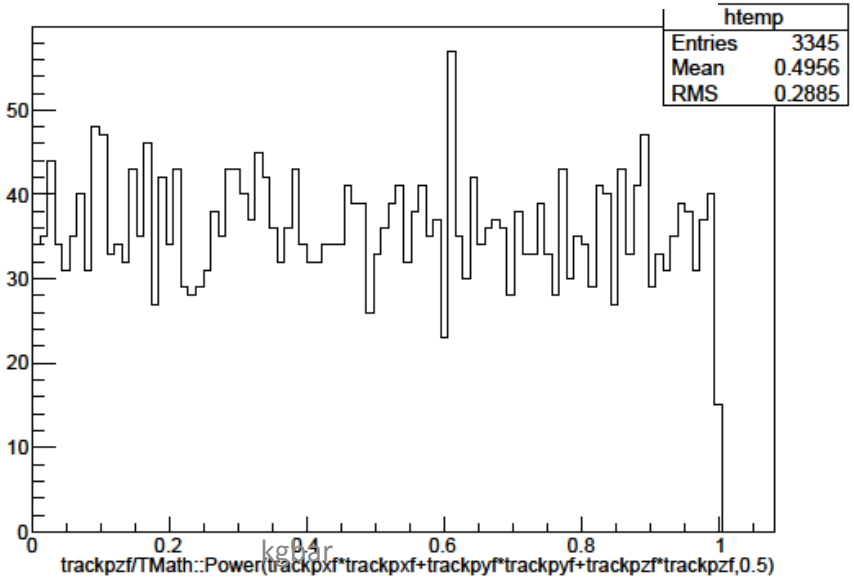
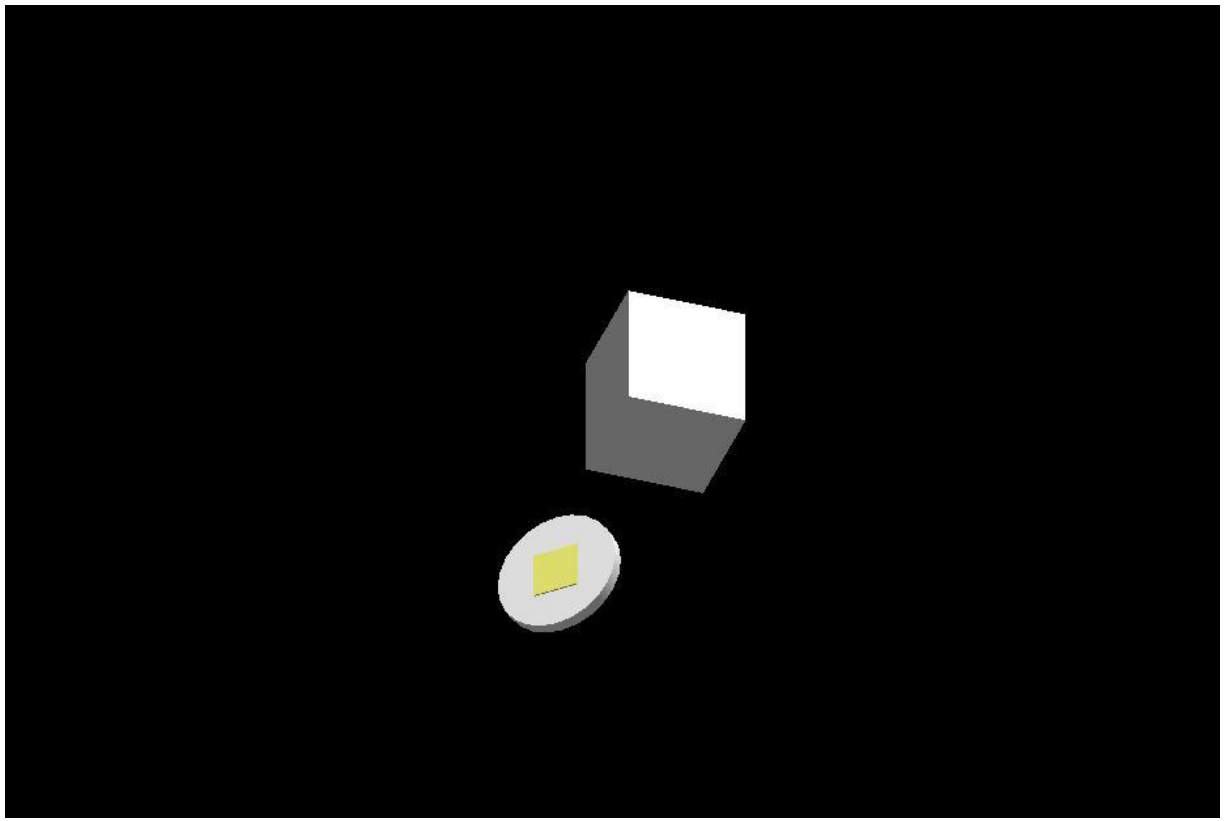


Simulation preparation



- Preparation is ongoing
- Target (yellow) will be changed as rectangular cavity at the end.
- After adding one layer in front of target, I will check reflection of positronium first.
- Then try to check positron distribution inside of cavity
- Ortho-positronium has 1~2eV reemission energy with 142.05ns lifetime. It means that it will hit cavity wall several times before decay and we need to simulate this issue.

Status in Saclay

- Almost every one is absent (almost no change after last meeting, even Patrice has vacation now)
- Beam status is now stable and beam tuning is ongoing for check.

To do list

- Laszlo will come 20/July and then we can discuss detail.
- I will check and develop positronium simulation.
- I will try to simulate ^{22}Na source detection by PWO detector with collimator to blind side of PWO crystal and if good, I will test.
- I need to study detail for positronium data from paper for simulation parameters and aim.