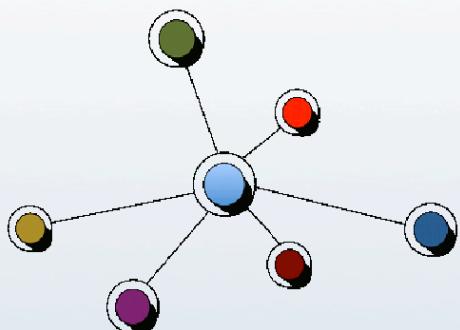
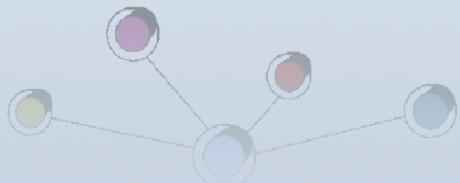


GEMC Tutorial



GEMC

GEWC



M. Ungaro

Background



1

Lesson 3:

Background



In this lesson:

Background:

- Time Window, Beam Bunches
- Simulating One Secondary Particles (GUI)....
- ... and gcard

Pre-requisites:

g3.gcard, available at gemc.jlab.org under “Documentation”.

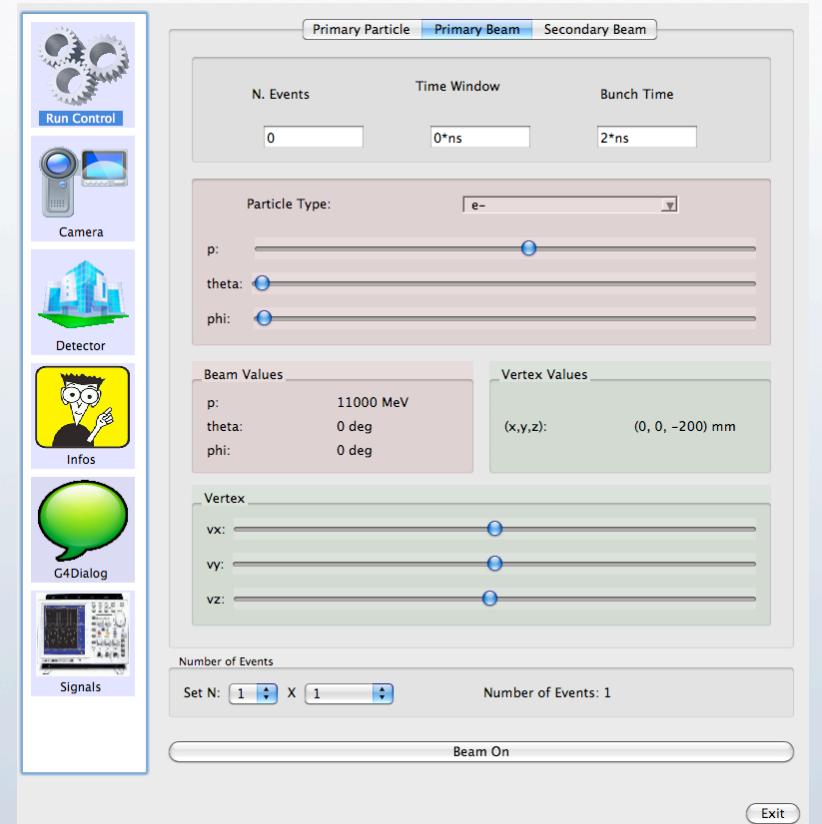
Beam On Target

10^{35} Luminosity on a 5cm LH2 target means
 $\sim 4.7 \times 10^{11}$ e-/seconds

The Normal Time Window of a detector is 100ns – that's 50K e-/s that can produce secondaries

Wanted:

- N “luminosity particles” / event
- on a given Time Window
- grouped in Beam Bunches

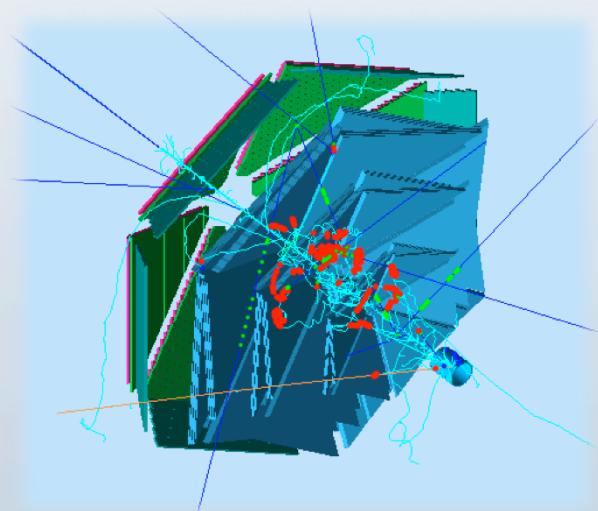


Beam On Target

Select a Proton as Primary Particle.

Select 100 "Luminosity" events
100*ns Time Window
2*ns Bunch Time

Click on Beam On (1 event)



Run Control Camera Detector Infos G4Dialog Signals

Primary Particle Primary Beam Secondary Beam

N. Events	Time Window	Bunch Time
100	100*ns	2*ns

Particle Type: e-

p: theta: phi:

Beam Values

p: 11000 MeV	Vertex Values
theta: 0 deg	(x,y,z): (0, 0, 0) mm
phi: 0 deg	

Vertex

vX: vY: vZ:
0 0 0

Number of Events

Set N: 1 X 1	Number of Events: 1
--------------	---------------------

Beam On

Exit

Let's do it with the g3.gcard:

```
<gcard>

<!-- Central Detectors: -->
<sqltable name="LH2target" />
<sqltable name="CTOF" />

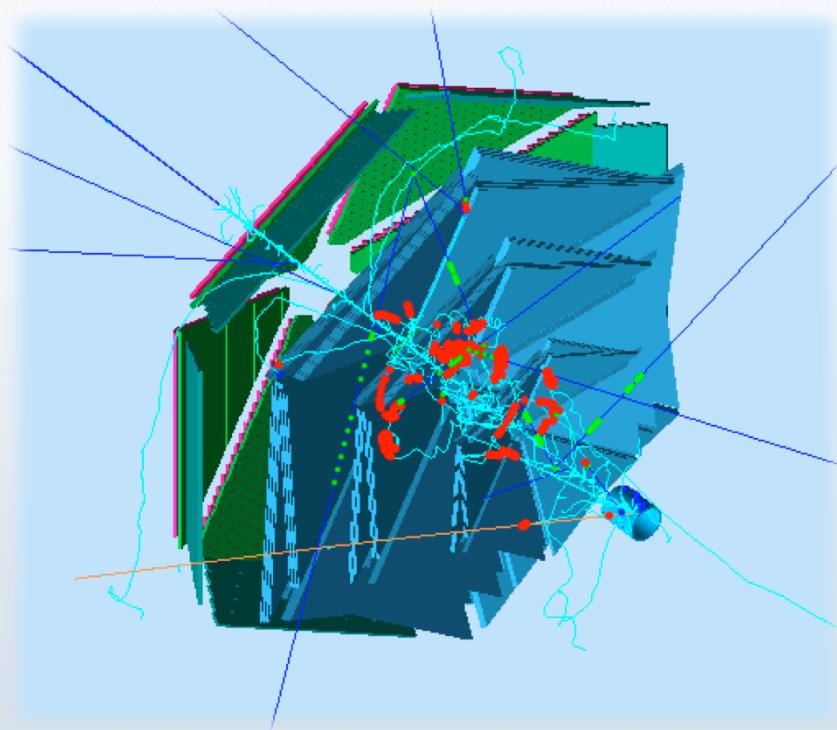
<!-- Forward Detectors (NEED SECTOR): -->
<sqltable name="SECTOR" />
<sqltable name="DC12" />
<sqltable name="OTOF" />

<option name="PRINT_EVENT" value="1"/>
<option name="OUTPUT"      value="txt, out.txt" />
<option name="BEAM_P"      value="proton, 0.8*GeV, 60*deg, 0*deg" />
<option name="LUMI_P"      value="e-, 11*GeV, 0, 0" />
<option name="LUMI_V"      value="(0, 0, -10)cm" />
<option name="LUMI_EVENT"  value="100, 100*ns, 2*ns" />

</gcard>
```

It has various CLAS₁₂ components: a LH₂ target, the Central Detector and the Drift Chambers and the Outer Time of Flight.
It has the Primary Particle and Luminosity Beam definitions

Beam On Target



The mess near the drift chambers can be eliminated with shields... but what about on the central detector?

Let's use the solenoid to align the luminosity electrons



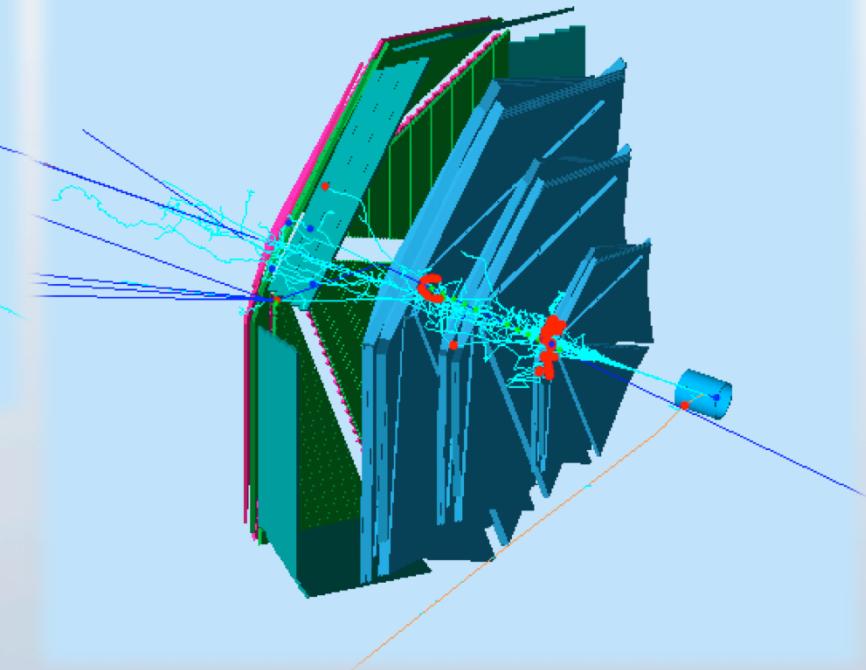
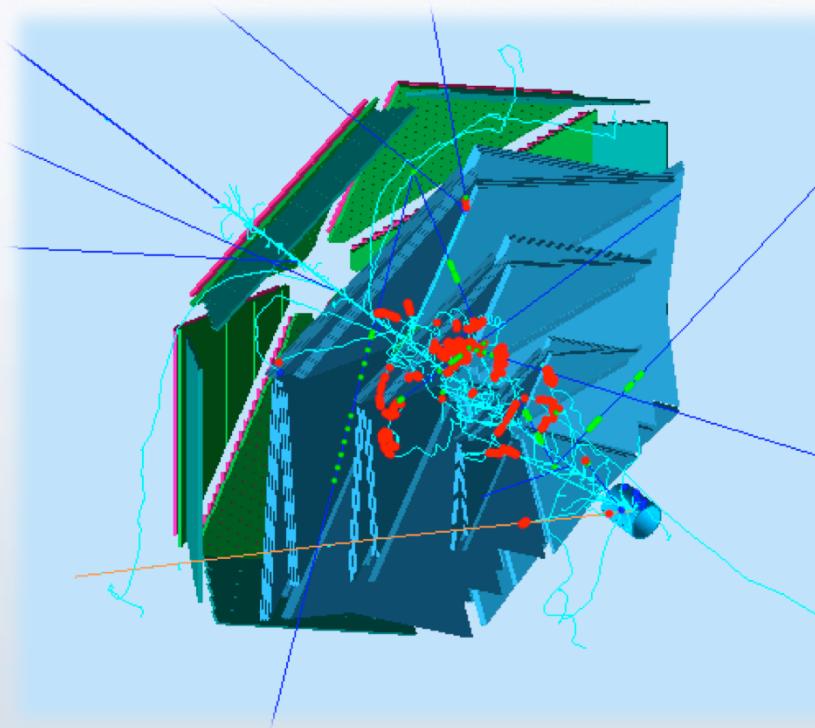
Add this line to the gcard:

```
<option name="HALL_FIELD" value="srr-solenoid"/>
```

Beam On Target

Restart genc. Notice that now the solenoid field will load....

... and voila', all e's near the central detectors are aligned.

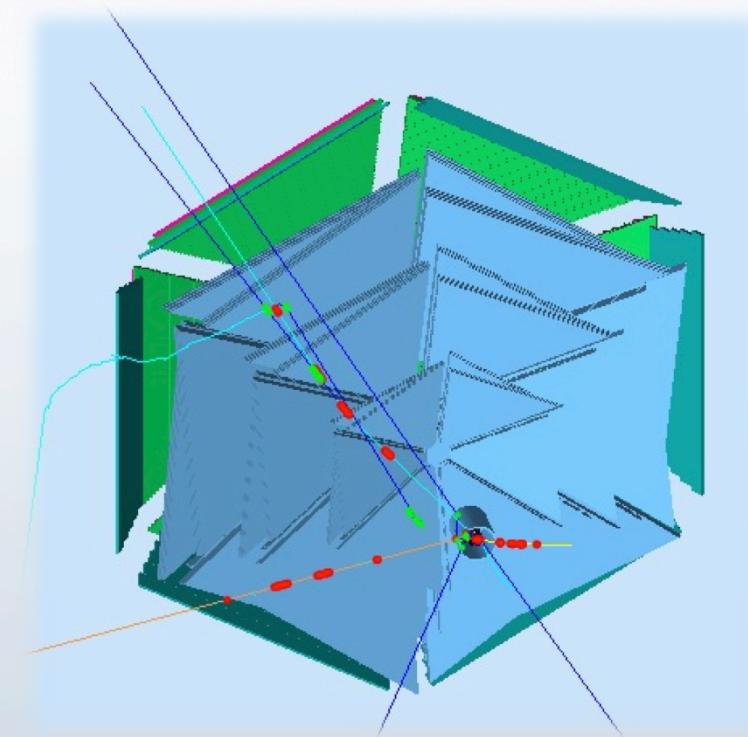


Secondary Beam

Secondary Beam?



- ✓ Originally designed for EIC luminosity studies
- ✓ Can also be combined with Primary Particle, Primary Beam to produce 3 independent tracks in each event: Set N. Events to 1 on both beams, and time-window to 2 ns.



e-, P, pi- using Primary Particle, Primary and Secondary Beam

End of Lesson 3: Background

