Bubble Update 11/24/2020

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Updated Wiki of GitHub Repo

https://github.com/dneto1729/BubbleChamberSim/wiki/Bubble-Chamber-Simulation-Using-Geant4

- Should have all the steps needed to go from login of ifarm to running a simulation

8. Modify geometry.pl do
   `nano geometry.pl`
   uncomment line 4 `#use lib ("$ENV{GEMC}/api/perl");` -> `use lib ("$ENV{GEMC}/api/perl");`
   comment out line 5 `use lib ("$ENV{GEMC}/io");` -> `#use lib ("$ENV{GEMC}/io");`

   Save changes by exiting nano (Ctrl-x) and saving the buffer (y) overwriting the old version

9. You can now do
   `./geometry.pl config.dat`

10. Modify bubble.gcard do
    `nano bubble.gcard`
    The gcard holds most of the variables relevant to a beam simulation. On line 5 you can change the beam momentum values, where it has the following format
    `<option name="BEAM_P" value"beam_particle, beam_momentum, beam_angle_theta, beam_angle_phi"/>`
    for example
    `<option name="BEAM_P" value"e-, 8.00*MeV, -1.90*mrad, -3.42*mrad"/>`
    On line 6 you can define the beam spread (format is `value="momentum_spread, beam_spread_angle_theta, beam_spread_angle_phi"`
    On line 7 you can define the beam vertex (format is `value="(x_pos, y_pos, z_pos)pos_unit"`)
    On line 12 you can define the name and location for the output file.

11. To check overlaps do
    `gemc bubble.gcard -USE_GUI=0 -CHECK_OVERLAPS=10`

Minor Misunderstanding with gcard input

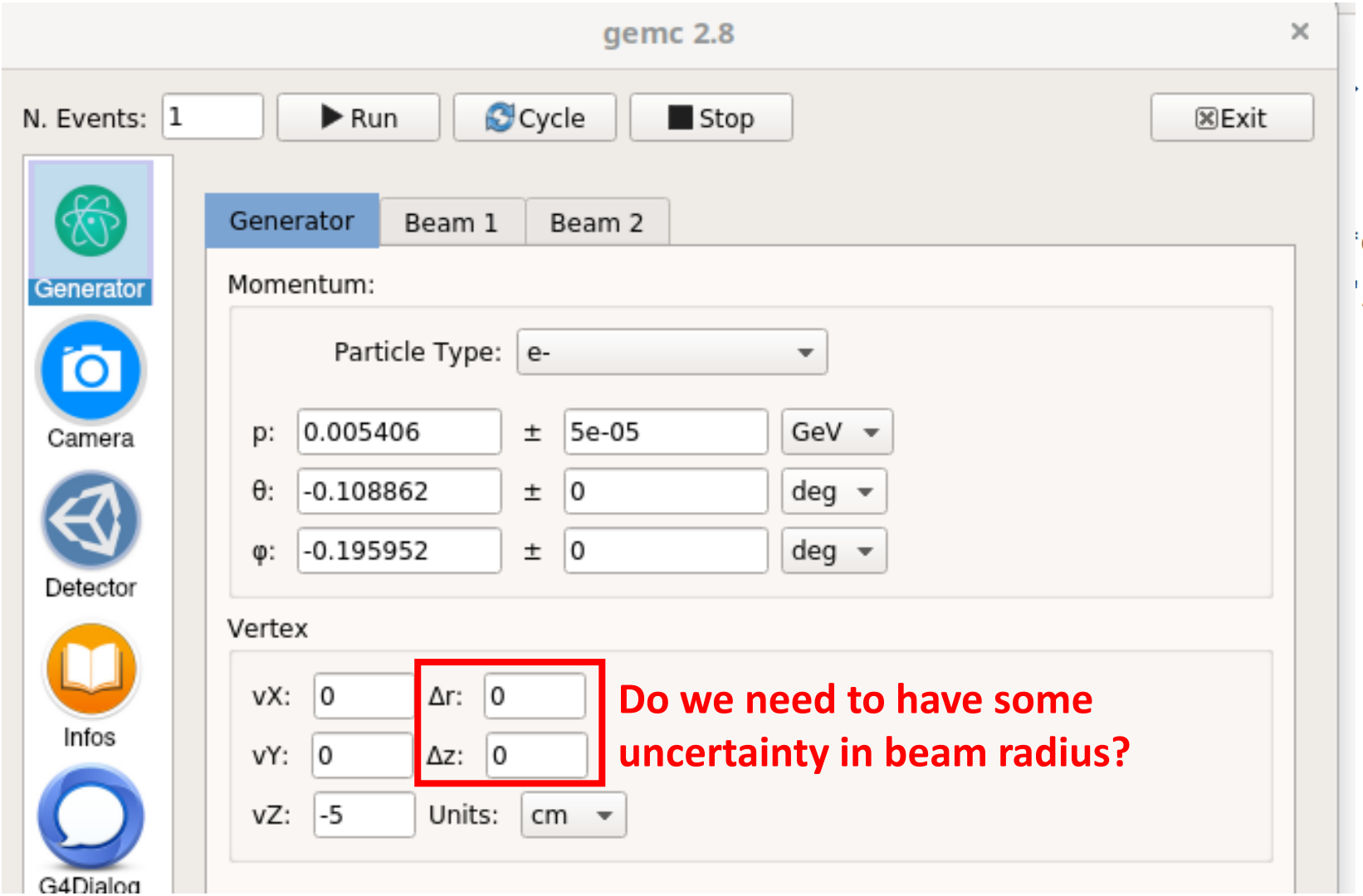
```
<gcard>
        <detector name="bubble" factory="TEXT" variation="original"/>
        <option name="geometry" value="1400x1200"/>

        <option name="BEAM_P"         value="e-, 5.0*MeV, 0.*deg, 0.*deg"/>
        <option name="SPREAD_P"       value="0.050*MeV, 0*deg, 0*deg"/>
        <option name="BEAM_V"         value="(0., 0., -5.)cm"/>

        <!--  Will print message every 10 events -->
        <option name="PRINT_EVENT"    value="1" />

        <option name="OUTPUT" value="evio, /scratch/daneto/out.ev"/>


        <!-- PhysListEmLivermore -->
        <option name="PHYSICS" value="FTFP_BERT + LIV"/>
```

beam_ θ, beam_ ϕ

Δp, Δθ, Δϕ

beam vertex x, y, z

Minor Misunderstanding with gcard input



Double values of beam parameters?

Table 6: Beam Positions and Angles at the radiator (RHCS) listed in the same order as Tables 4 and 5

Measured p (MeV/c)	Horizontal angle (mrad)	Horizontal position (mm)	Vertical angle (mrad)	Vertical position (mm)
5.299	-0.64	2.26	-1.06	-1.15
5.406	-1.90	0.99	-3.42	-5.24
5.517	-1.61	-0.26	0.00	0.66
5.517	-1.63	-0.29	-0.38	0.10
5.605	-3.67	-0.78	-1.17	-1.17
5.703	-3.73	-2.36	0.20	1.03
5.703	-2.36	0.45	-0.39	0.23
5.840	-2.60	0.32	-0.96	-0.91
5.840	-2.30	1.02	-0.66	-0.46
5.887	-3.58	0.95	4.02	0.86

Tests with N=1E+6 events

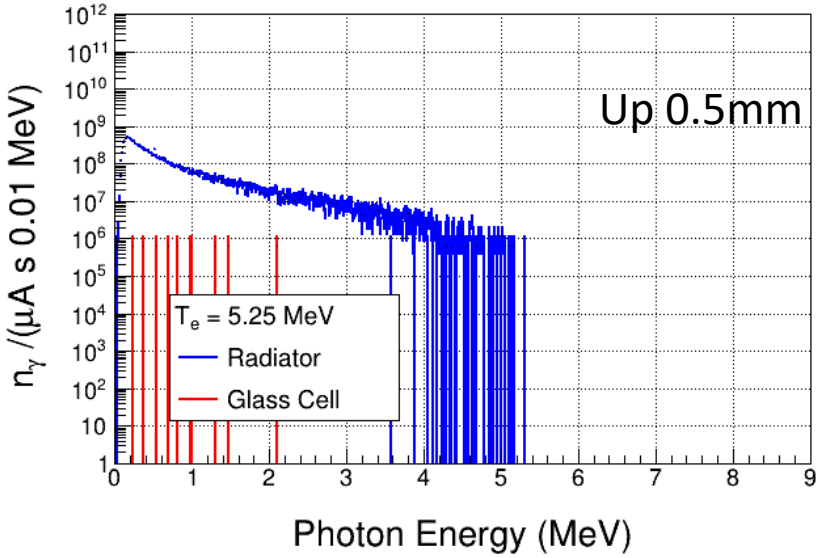
Requested T [MeV]	Delivered P [MeV/c]	ΔP [MeV/c]	P_θ [mrad]	P_ϕ [mrad]	BEAM_Vx [mm]	BEAM_Vy [mm]	Total Nγ/(uA s) in cell
4.75	5.299	1.76E-3	-0.64	-1.06	2.26	-1.15	1.56055E+8
4.85	5.406	1.72E-3	-1.90	-3.42	0.99	-5.24	2.59688E+7
4.95	5.517	1.27E-3	-1.63	-0.38	-0.26	0.66	1.61673E+8
5.05	5.605	1.17E-3	-3.67	-1.17	-0.78	-1.17	1.66042E+8
5.15	5.703	1.28E-3	-3.73	0.20	0.45	0.23	1.89763E+8
5.25	5.840	1.50E-3	-2.60	-0.96	0.32	-0.91	1.83521E+8
5.35	5.887	1.88E-3	-3.58	4.02	0.95	0.86	1.91011E+8

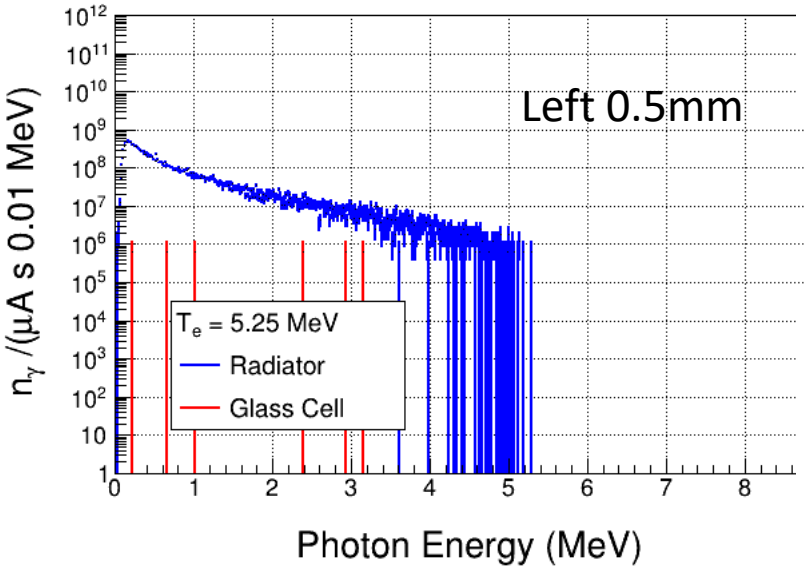
Tests with 1e+5 events and moving beam

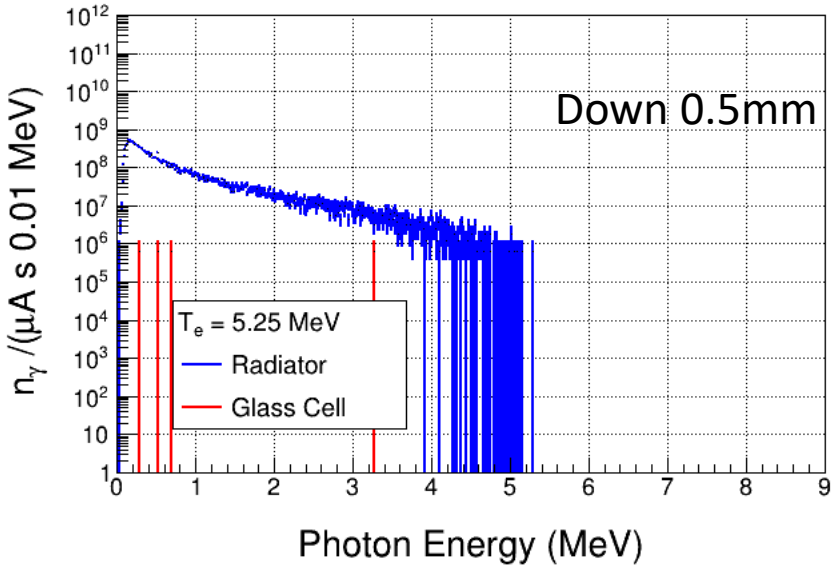
50	POS SCAN	5.25	0.10			~3560	105	'Right by 1cm'
51	POS SCAN	5.25	0.10			~2020	140	'Left by 5 mm' position scan
52	POS SCAN	5.25	0.10			~2530	108	'Down by 5mm'
53	POS SCAN	5.25	0.10	18	90	~730	56	'Up 5mm'

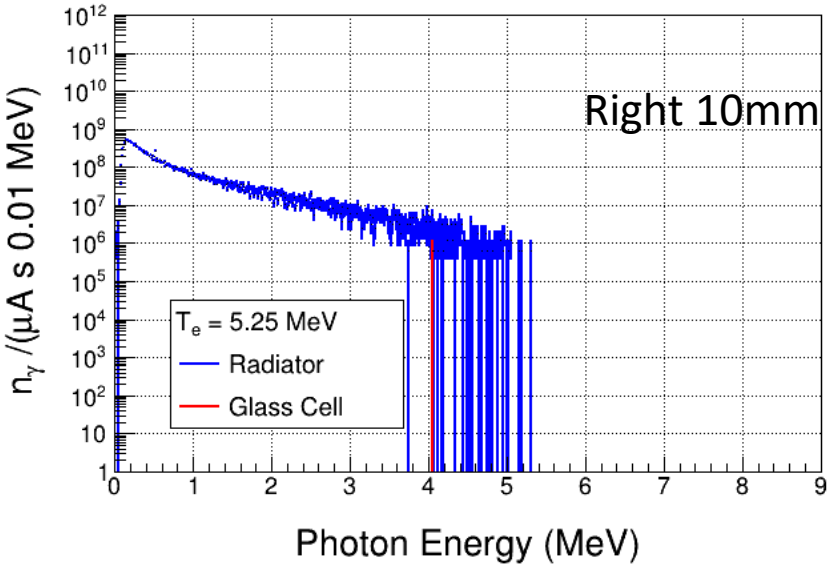
Tests with 1e+5 events and moving beam

Move	Total Nγ/(uA s) in cell
Right 10mm	6.2422E+5
Left 5mm	3.74532E+6
Down 5mm	2.49688E+6
Up 5mm	6.2422E+6









Moving Forward

- This Week
  - Test run with Batch instructions from wiki
  - Just want to test submission and make sure everything works with the old code before any modifications

- Next Week
  - Prepare new Geometry
  - Move to batch farm and full production run