

Radiation Length Scans

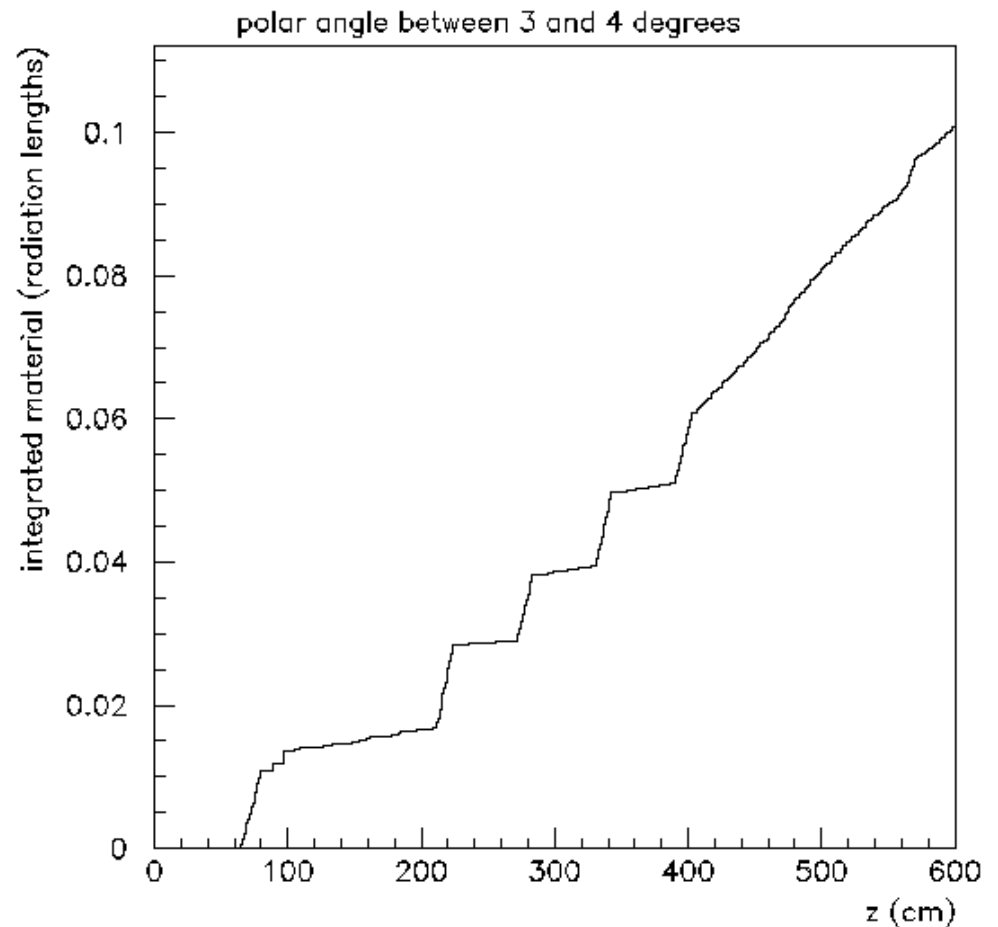
David Lawrence, JLab

July 17, 2007

March 2007 Collaboration Meeting

Richard Jones showed some “Radiation Length” scans of the current geometry

Comments were made that we should have a standard way to produce such plots quickly as designs are refined



June 5th Software Meeting

- Discussion of what information is output from hdgeant and what would be useful.

From the June 5th Meeting Minutes ...

- Add option to insert the "birth" and "death" points of every particle in the output stream.
- Add a second flag to determine whether or not the same info for secondaries is also added
- Add some info as to the mechanism in which the final state particles were created in the generator, possibly including info. on intermediate particles not tracked by GEANT.

The MCTrajectory Point Data Structure

```
typedef struct {  
    float          E;  
    float          dE;  
    int32_t        mech;  
    int32_t        part;  
    int32_t        primary_track;  
    float          px;  
    float          py;  
    float          pz;  
    float          radlen;  
    float          step;  
    float          t;  
    int32_t        track;  
    float          x;  
    float          y;  
    float          z;  
} s_McTrajectoryPoint_t;
```

added in June

added in March

Specifying Trajectory Points in *control.in*

...

c TRAJECTORIES = 0 don't store trajectory info

c TRAJECTORIES = 1 store birth and death points of primary tracks

c TRAJECTORIES = 2 store birth and death points of all particles

c TRAJECTORIES = 3 store full trajectory of primary tracks

c TRAJECTORIES = 4 store full trajectory of primary tracks and birth/death points of secondaries

c TRAJECTORIES = 5 store full trajectory for all particles

c

TRAJ 3

AUTO 0

...

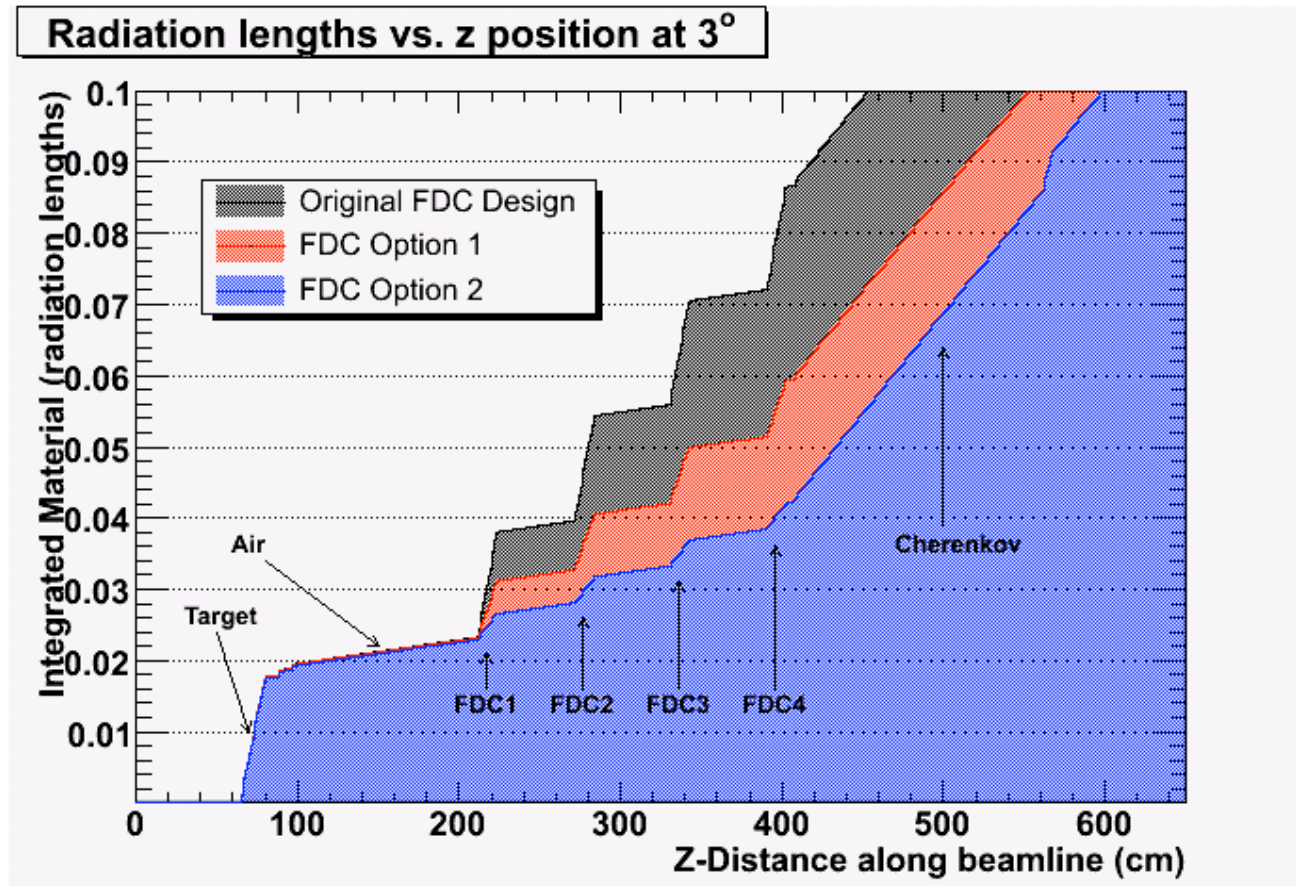
Two Methods for doing a Radiation Length Scan

The DANA/ROOT Method

1. Run *hdgeant* with the proper flags set to output MCTrajectoryPoint data
2. Use the *radlen_hists* plugin to create and fill the histograms:

```
hd_root --plugin=radlen_hists hdgeant.hddm
```

Radiation Length Scans for 3 Geometries



The HBOOK/PAW Method

1. Edit `gustep.F` in the HDGeant directory and add the following:

```
#define HISTOGRAM_MATERIAL_SEEN_BY_FIRST_TRACK 1
```

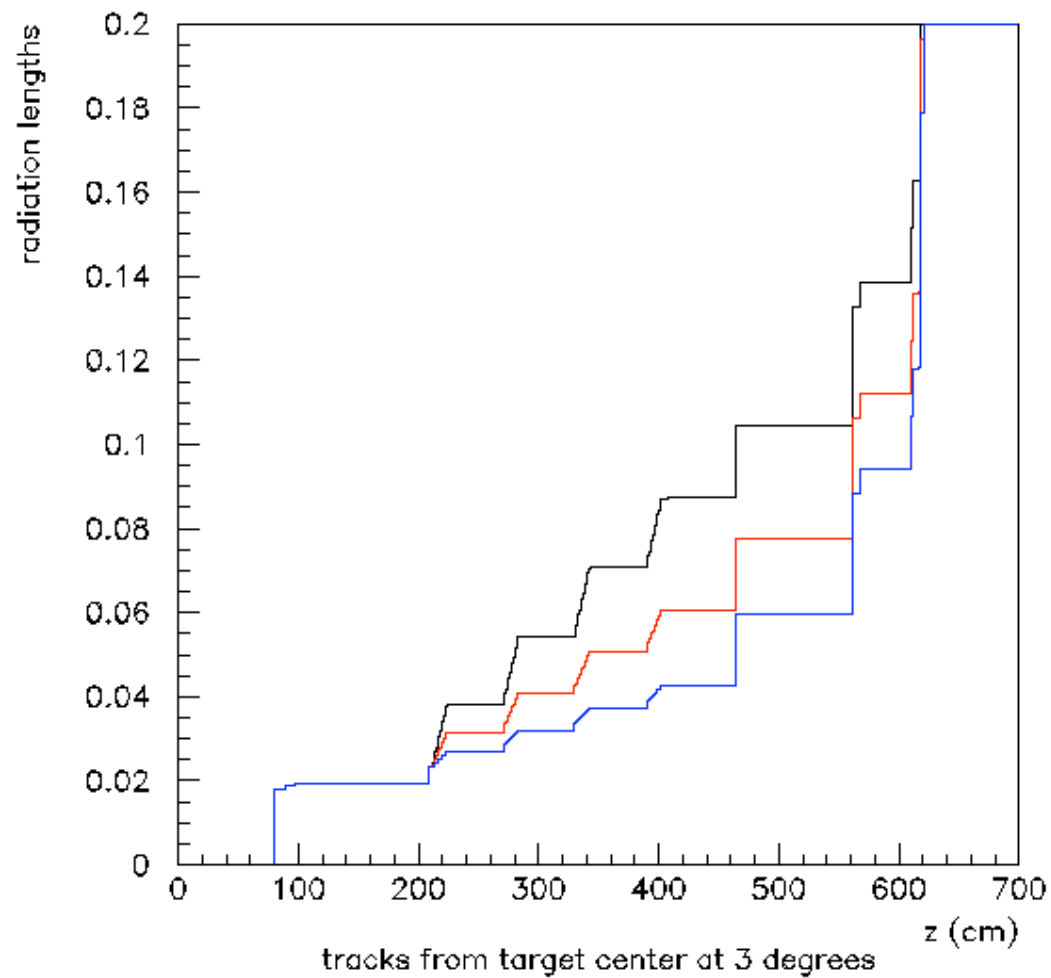
2. Recompile and run one event through `hdgeant`

The HBOOK/PAW Method

3. Integrate the histogram:

```
PAW > v/cre tmp(1000)  
PAW > vect/get 1000001 tmp  
PAW > sigma tmp=sum(tmp)  
PAW > vect/put 1000001 tmp
```

Radiation Length Scans for 3 Geometries



All of this is documented on the wiki

Go to GlueX Wiki:

<http://www.jlab.org/Hall-D/software/wiki>

-> “Offline Software”

-> “HOWTO do a Radiation Length Scan”