Simulation of helicoil material.

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1 Primary simulation

A total of 1000 jobs were submitted of which 988 were completed. This make as a total of 98,800,000 primary events simulated. The distribution of events that hit the new geometry is shown in Figure 1. The total events that hit helicoil material (across all simulated files) is: 2091094 (area under the curve in 1).
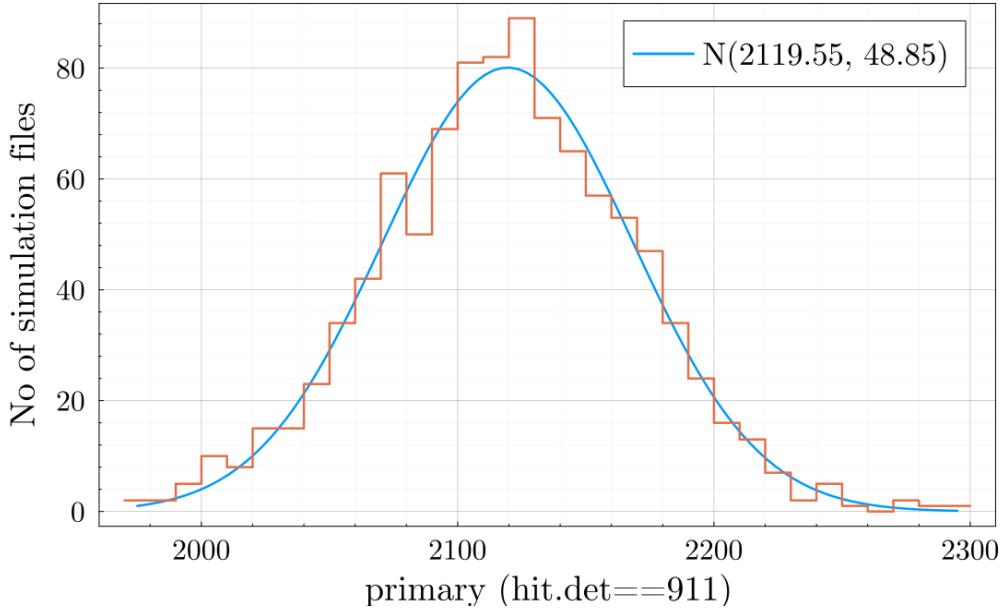

Figure 1: The distribution number of hits helicoil material (hit.det==911). The total primary simulated in each files is 100,000. So only about 0.2% make it to the helicoil material. The continuous curve is a gaussian fitted oveer histogram.

These hits can be various different particles. The particle of interest for the secondary is the primary electrons (hit.trid==1). The distribution of

number of hit of these electrons per fileis showin in 2. The total electron events hitting the helicoil materials is 10395. This ratio is

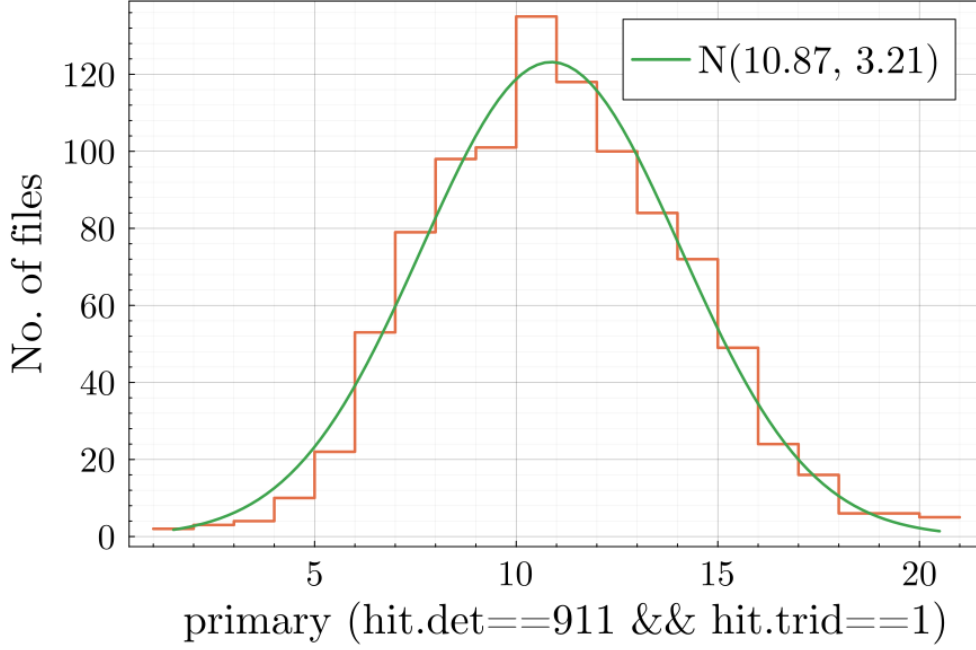$$\frac{10395}{98800000} = 1.05 \times 10^{-4}$$

Figure 2: The distribution of No. of primary electrons (hit.trid==1) that hit the new geometry (hit.det ==911).

All of these simulated files is combined into a single primary "Skimmed" root tree containing only the hit branch with "hit.trid==1 && hit.det==911" (here 911 corresponds to the detector id for the helicoil geometry).

2 Secondary simulation

With this skimmed file as an input generator to the simulation, a total 100 secondary simulation is run with 100,000 events each. One of the job failed with 9,900,000 secondary events.

The distribution of hits in the secondary simulation files is shown in Figure 3.

For the final detector the event distribution is shown in Figure 5.

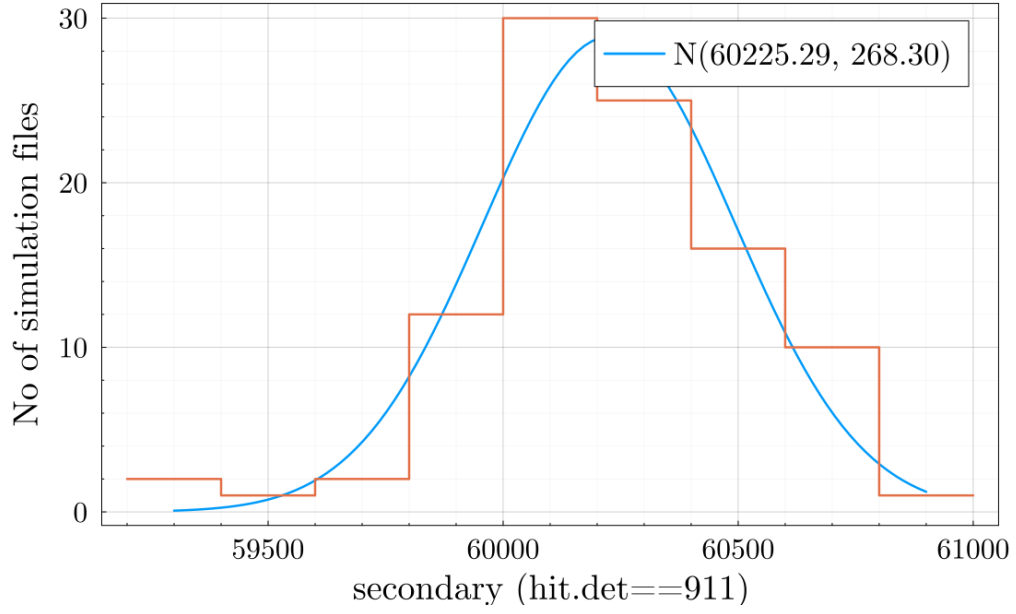$$\frac{281}{9900000} = 2.83 \times 10^{-5}$$

Figure 3: The distribution of hit in the helicoil geometry for secondary simulation. Only $\sim 60\%$ of the events hit the new geometry.
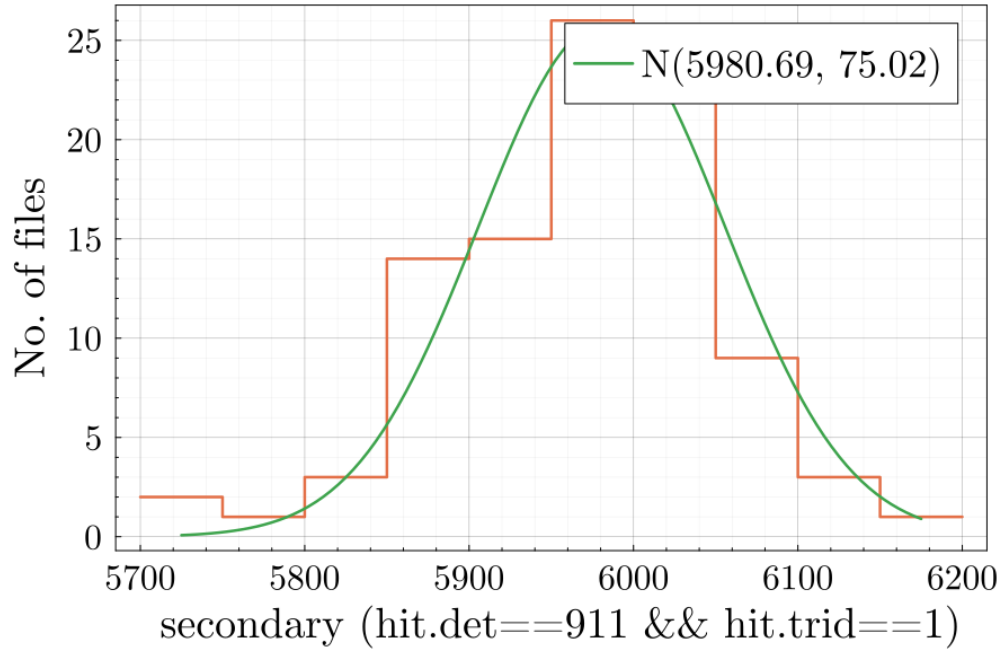

Figure 4: The distribution of No. of electrons (hit.trid==1) that hit the new geometry (hit.det ==911)
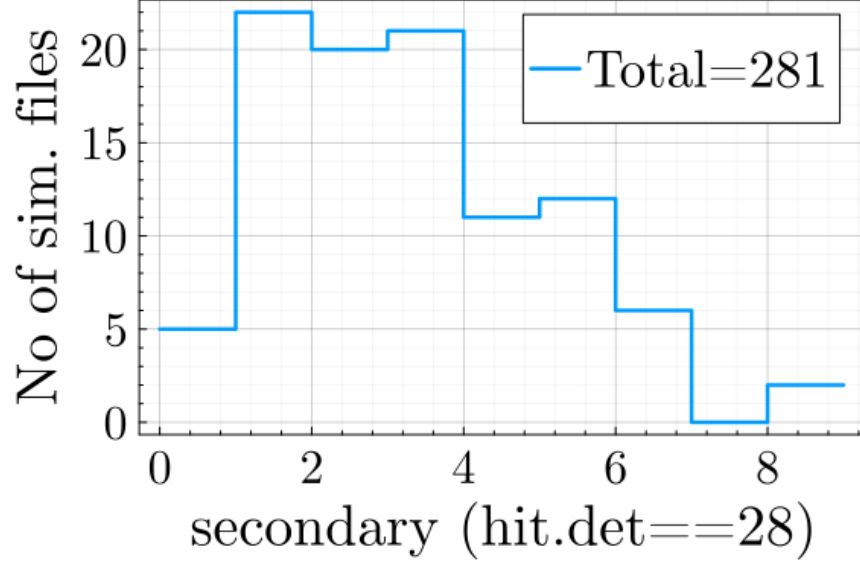
Figure 5: The distribution of number of events per 100,000 secondary simulation in the final detetector (hit.det==28). A total of 281 events make it to the detector, of the total simulated 9,900,000 secondary events.

2.1 Energy distribution

All of the secondary simulation files are combined into a single root file.

Energy[hit.e] (MeV)	Primary(9.88×10^7) det==911&& trid==1	Secondary(9.9×10^6) det == 911	det==911&& trid==1	det ==
0.00 - 0.01	0	36	0	
0.01 - 0.10	0	191606	0	
0.10 - 1.00	11	3876080	72764	
1.00 - 10.00	829	889937	459323	
10.00 - 100.00	9018	66011	58572	
100.00 - 1000.00	432	6026	34	
1000.00 - 100000.00	104	61	0	
Total	10394	5029757	5029757	

Energy[hit.e] (MeV)	Primary(9.88×10^7) det==911&& trid==1	Secondary(9.9×10^6) det == 911 && trid==1	det == 28
0.00 - 0.01	0	0	
0.01 - 0.10	0	182	
0.10 - 1.00	11	85	
1.00 - 10.00	829	10	
10.00 - 100.00	9018	2	
100.00 - 1000.00	432	2	
1000.00 - 100000.00	104	0	
Total	10394	281	