

# Flange and tube simulation data bin by bin check

Li Ye

Prad

04-11-2014

# Ep and moller events counts for all bins

Applied cut for ep events

( $E > 980 \text{ MeV}$  ,  $0.8\text{deg} < \text{Angle} < 4.05\text{deg}$  )

Hycal	:	21634	
Hycal + tube	:	21707	difference ~ 0.337%
Hycal + tube + flange	:	21664	difference ~ 0.139%

---

Applied cut for Moller events

( $200\text{MeV} < E < 980 \text{ MeV}$  ,  $0.8\text{deg} < \text{Angle} < 3.30\text{deg}$  )

Hycal	:	78848	
Hycal + tube	:	78851	difference ~ 0.0038%
Hycal + tube + flange	:	78944	difference ~ 0.122%

# Ep and moller events counts for different bins

Applied cut for ep events

( $E > 980$  MeV ,  $0.8\text{deg} < \text{Angle} < 4.05\text{deg}$  )

Table1: ep events bin by bin check

Angle Bin	Hycal	Hycal+tube	difference(%)	Hycal+tube+flange	difference(%)
0.80-1.05	9393	9452	0.628127329	9408	0.159693389
1.05-1.30	4599	4608	0.195694716	4653	1.174168297
1.30-1.55	2534	2499	-1.38121547	2469	-2.565114444
1.55-1.80	1566	1597	1.979565773	1563	-0.191570881
1.80-2.05	983	987	0.406917599	1026	4.374364191
2.05-2.30	718	721	0.417827298	706	-1.671309192
2.30-2.55	506	517	2.173913043	523	3.359683794
2.55-2.80	402	388	-3.482587065	380	-5.472636816
2.80-3.05	284	285	0.352112676	296	4.225352113
3.05-3.30	231	239	3.463203463	226	-2.164502165
3.30-3.55	173	168	-2.89017341	170	-1.734104046
3.55-3.80	160	156	-2.5	156	-2.5
3.80-4.05	85	90	5.882352941	88	3.529411765
total 0.80-4.05	21634	21707	0.33743182	21664	0.138670611

# Ep and moller events counts for different bins

Applied cut for Moller events

( $200\text{MeV} < E < 980\text{ MeV}$  ,  $0.8\text{deg} < \text{Angle} < 4.05\text{deg}$  )

Table2 : Moller events bin bu bin check

Angle Bin	Hycal	Hycal+tube	difference(%)	Hycal+tube+flange	difference(%)
0.80-1.05	21093	21069	-0.113781823	21223	0.61631821
1.05-1.30	11770	11774	0.033984707	11694	-0.645709431
1.30-1.55	7955	7959	0.050282841	7930	-0.314267756
1.55-1.80	6279	6351	<b>1.146679408</b>	6340	0.971492276
1.80-2.05	5548	5503	-0.8111031	5499	-0.883201154
2.05-2.30	5143	5170	0.524985417	5214	<b>1.380517208</b>
2.30-2.55	5074	5064	-0.197083169	5080	0.118249901
2.55-2.80	5127	5115	-0.234055003	5098	-0.565632924
2.80-3.05	5343	5266	<b>-1.441137937</b>	5294	-0.917087778
3.05-3.30	5516	5580	<b>1.160261059</b>	5572	<b>1.015228426</b>
total 0.80-3.30	78848	78851	0.003804789	78944	0.121753247

From table1 and 2 , some of angle bins have more than 1% difference. But the results from previous study( 0.1-0.4deg 320s ep events) shows that it will probably be fine. The large difference because of the low statistics.

So, keep study to check data taking region, higher statistic run is running.

# Events check for data taking region

Simulation geometry setup change:

Vacuum box :

material:Al, thickness 1mm , 35cm distance

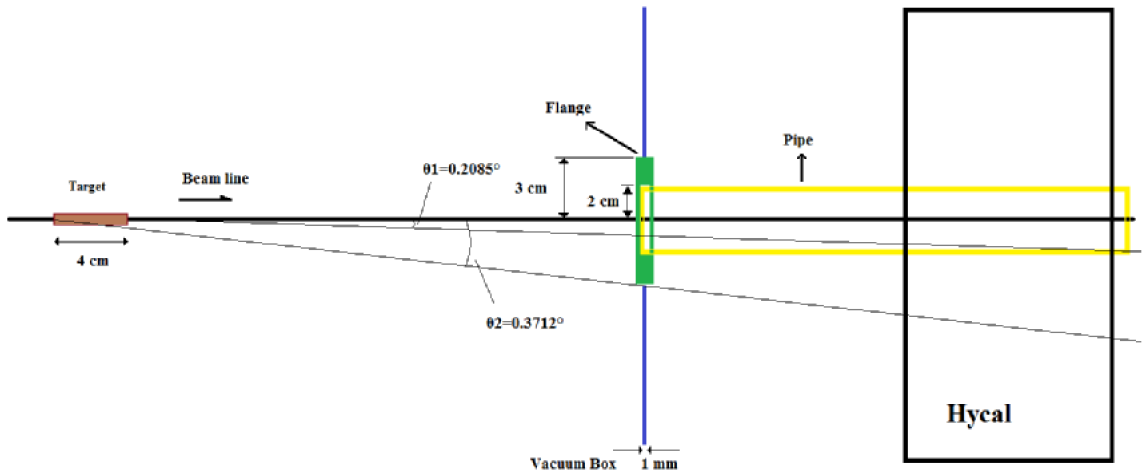
Flange:

material Al, outer radius 3cm , inner radius 2cm, thickness 1cm

Pipe:

material Al, outer radius 2cm, inner radius 1.9cm, length 60cm

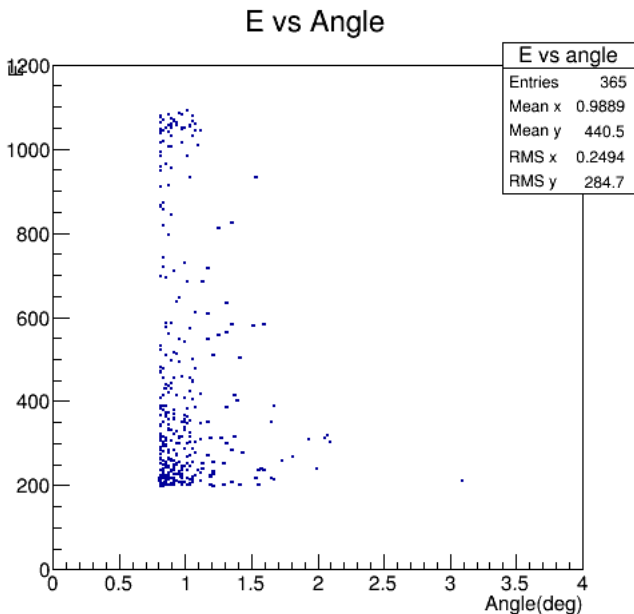
Angle change from  $\theta_2=0.3596^\circ$  to  $\theta_2=0.3712^\circ$



# Events check for data taking region

Input data from event generator :

1200s beam time Ep and Moller events, Angle : 0.18 - 0.5 deg



Applied cut :

( $E > 200\text{MeV}$  ,  $\text{Angle} > 0.8\text{deg}$  )

365 background for 1200s beam time

$\sim 0.089\%$  of the data taking rate

These backgrounds can be cut off  
by using gem or fiber detector  
information ? ( Will simalate )

# Summary

From the 0.18-0.5deg ep and moller simulation, the effect of adding a pipe and flange is small ( less than 0.1% of total ep moller events).

Need bin by bin check to verify that, which is still in progress.  
Requires a lot more statistics which is taking time