Layout Geometry Study

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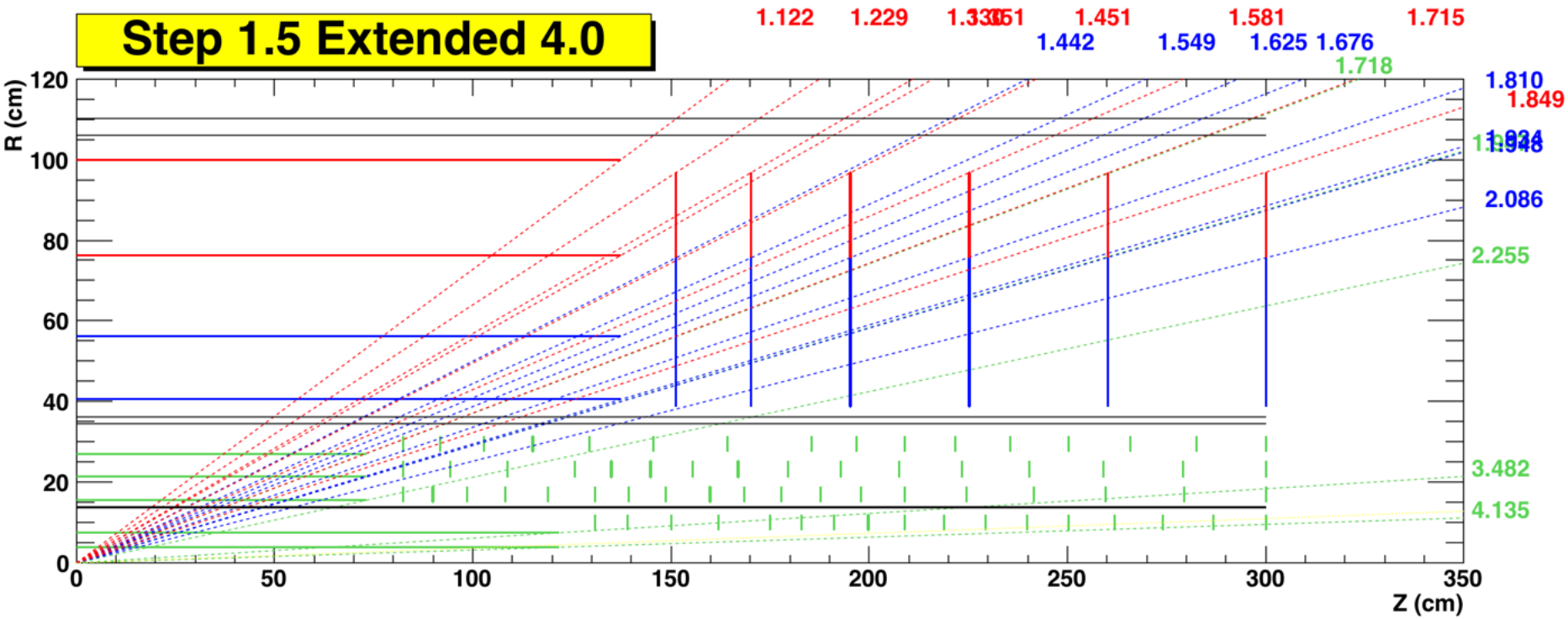
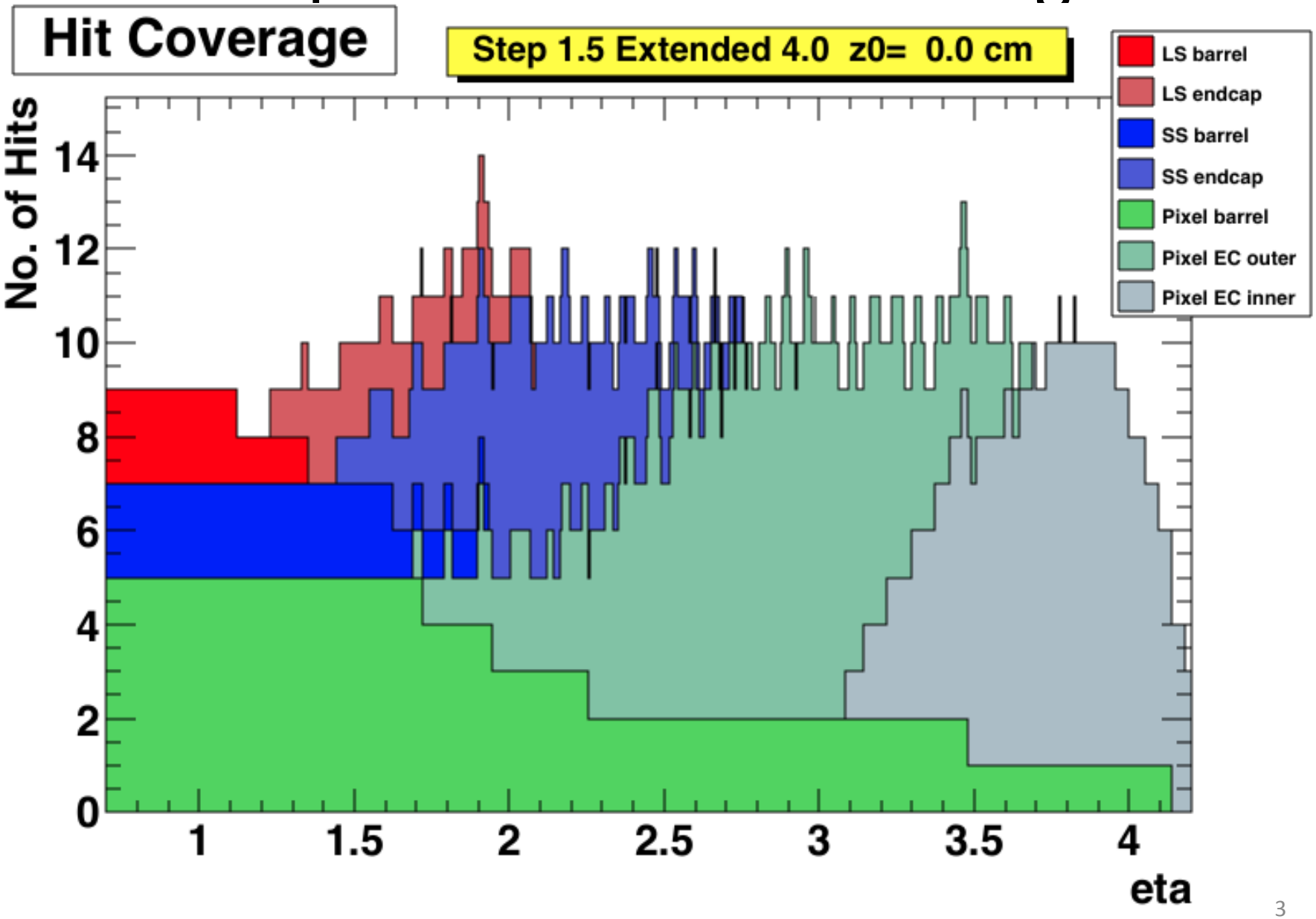
Default Extended 4.0

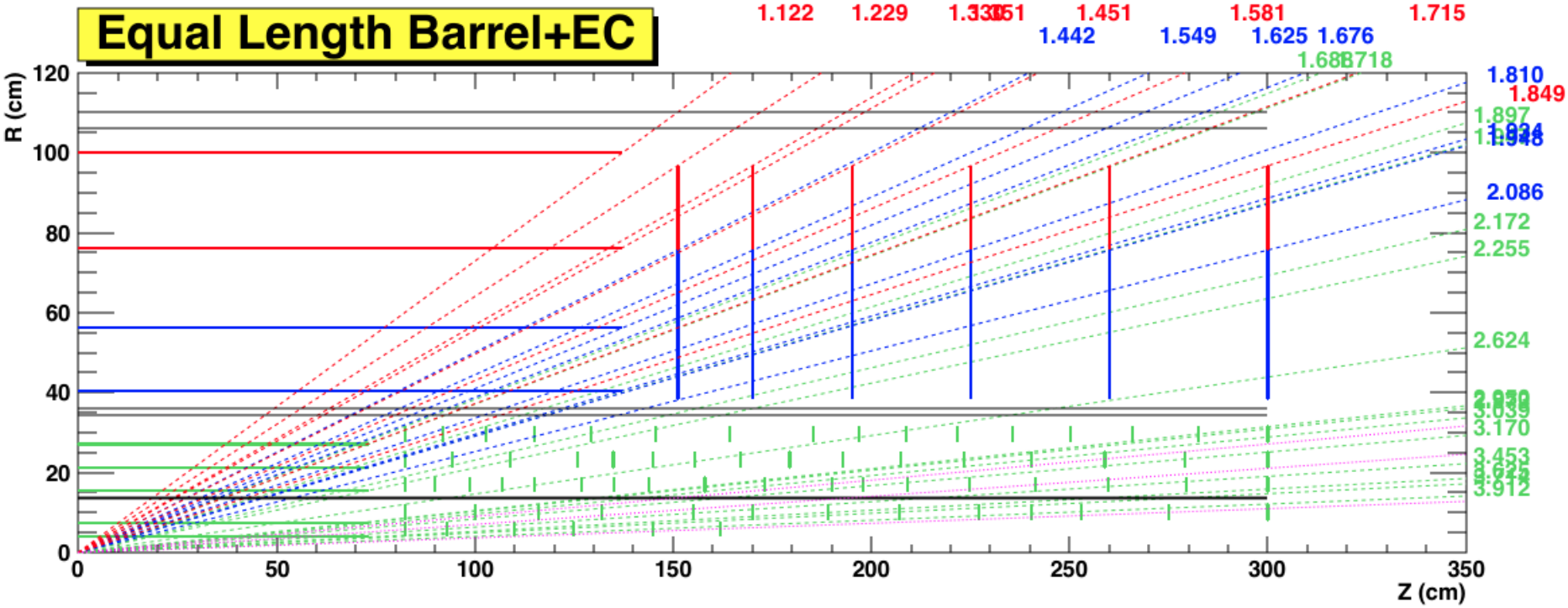


Old standalone parameterized geometry study tool

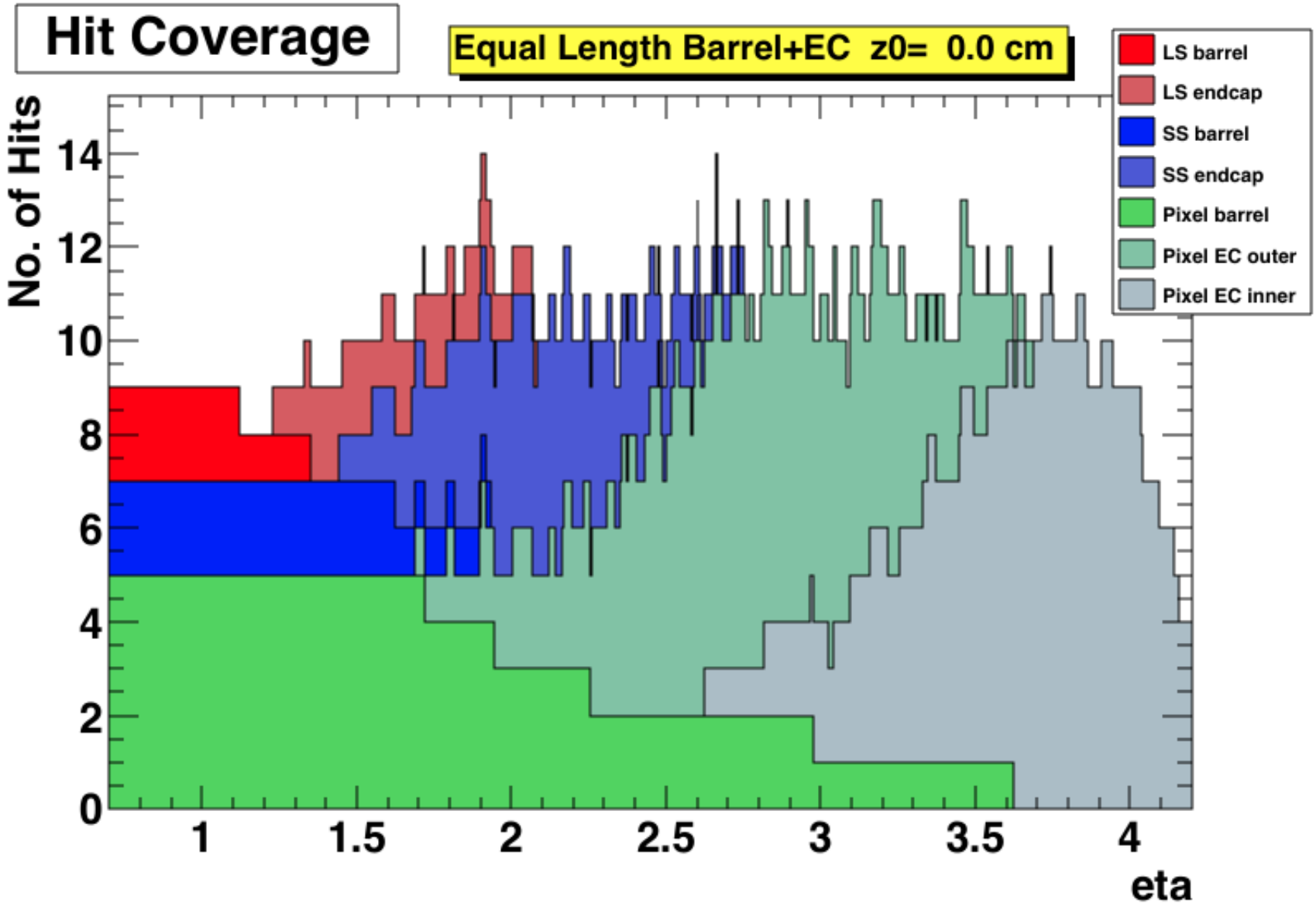
Step 1.5 Geom Hit Coverage



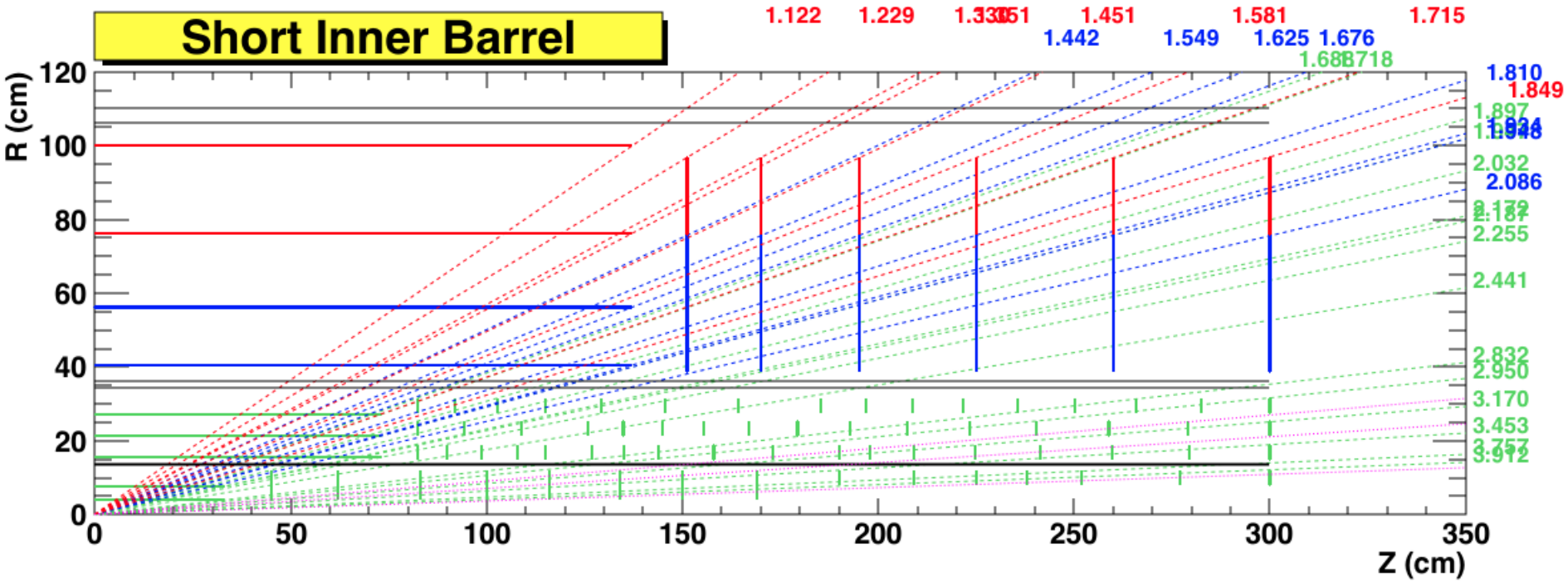
Crude Equal Length Barrel Attempt



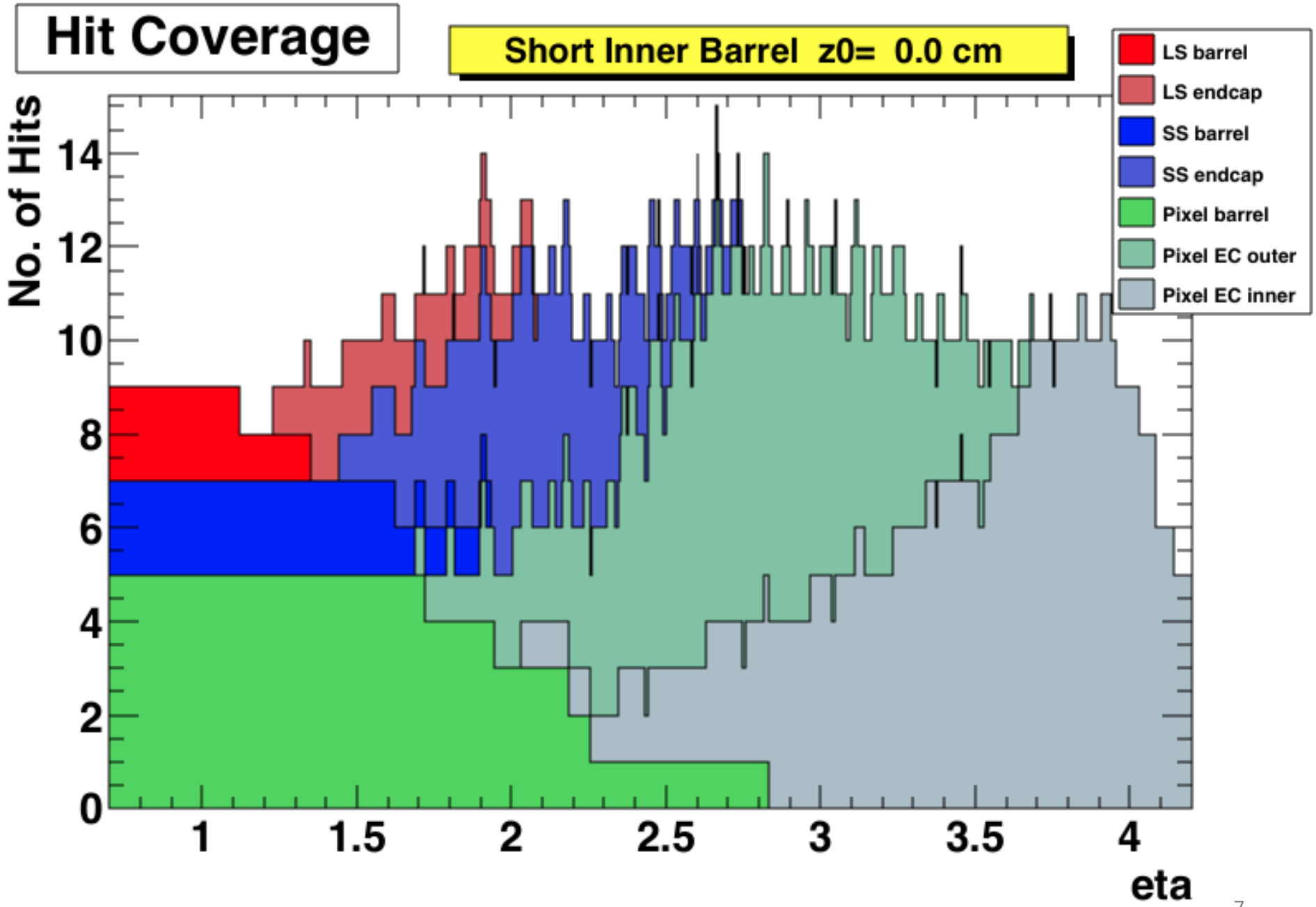
- First barrel remains at R=3.9cm (EC also kept at R>=3.9cm)
- Shortened inner barrel to same length as outer staves
- Added some inner most rings inside present inner most EC
- EC rings per side of (17,19,16,16) to (6,13,18,16,16)


Hit Coverage
Equal Length Barrel+EC z0= 0.0 cm
LS barrel
LS endcap
SS barrel
SS endcap
Pixel barrel
Pixel EC outer
Pixel EC inner
No. of Hits
0
2
4
6
8
10
12
14
1
1.5
2
2.5
3
3.5
4
eta

Shorter Inner Barrels



- Inner barrel half lengths 73cm ->33cm
- Double ring disks kept on same plane for simplicity
- EC rings are (8,15,18,16,16) layers
- Inner barrel to inner endcap gap 12cm


Hit Coverage
Short Inner Barrel z0= 0.0 cm
LS barrel
LS endcap
SS barrel
SS endcap
Pixel barrel
Pixel EC outer
Pixel EC inner
No. of Hits
0
2
4
6
8
10
12
14
1
1.5
2
2.5
3
3.5
4
eta

Geometry Comparisons

Pixel layer surface area (m^2):

Geometry	Barrel Inner	Barrel Outer	Endcap Inner	Endcap Outer	Total
Step 1.5 ext 4.0	1.75	5.87	0.40	6.32	14.3
Equal length barrel	1.05	5.87	0.86	5.75	13.5
Short inner barrel	0.47	5.87	0.86	5.91	13.1

ITk space hit count pattern % fractions in η=1.5—4.0:

# of ITk space hits / Geometry	9	10	11	12	13	14	15	Mean Hits
Step 1.5 ext 4.0	12.8	43.6	31.2	10.2	1.4	0.8	0.0	10.46
Equal length barrel	5.6	32.0	39.0	18.0	4.4	1.0	0.0	10.87
Short inner barrel	4.6	32.0	31.4	21.2	8.6	2.0	0.2	11.04

Remarks

- *Very quick initial rough look at short barrel geometry*
- There should be good layout solutions for good coverage with less sensors and good lever arm
- Can make progress quickly from here
- Material, resolution studies next