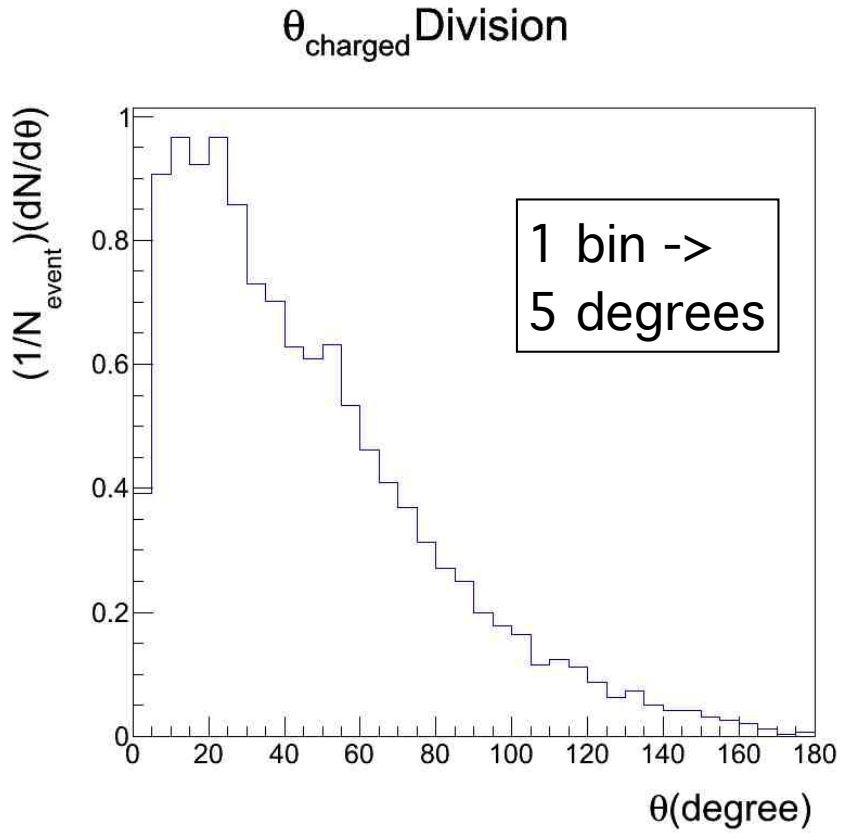
design of CHIMERA-like detector using AMD data

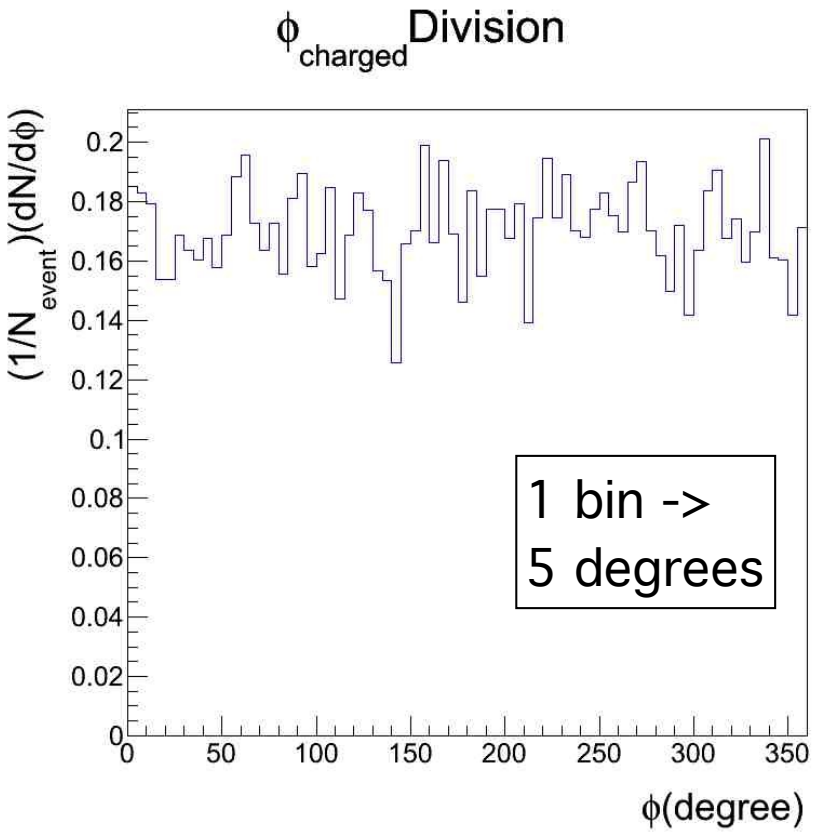
2014/ 02/ 28

Kim, ShinHyung

AMD data

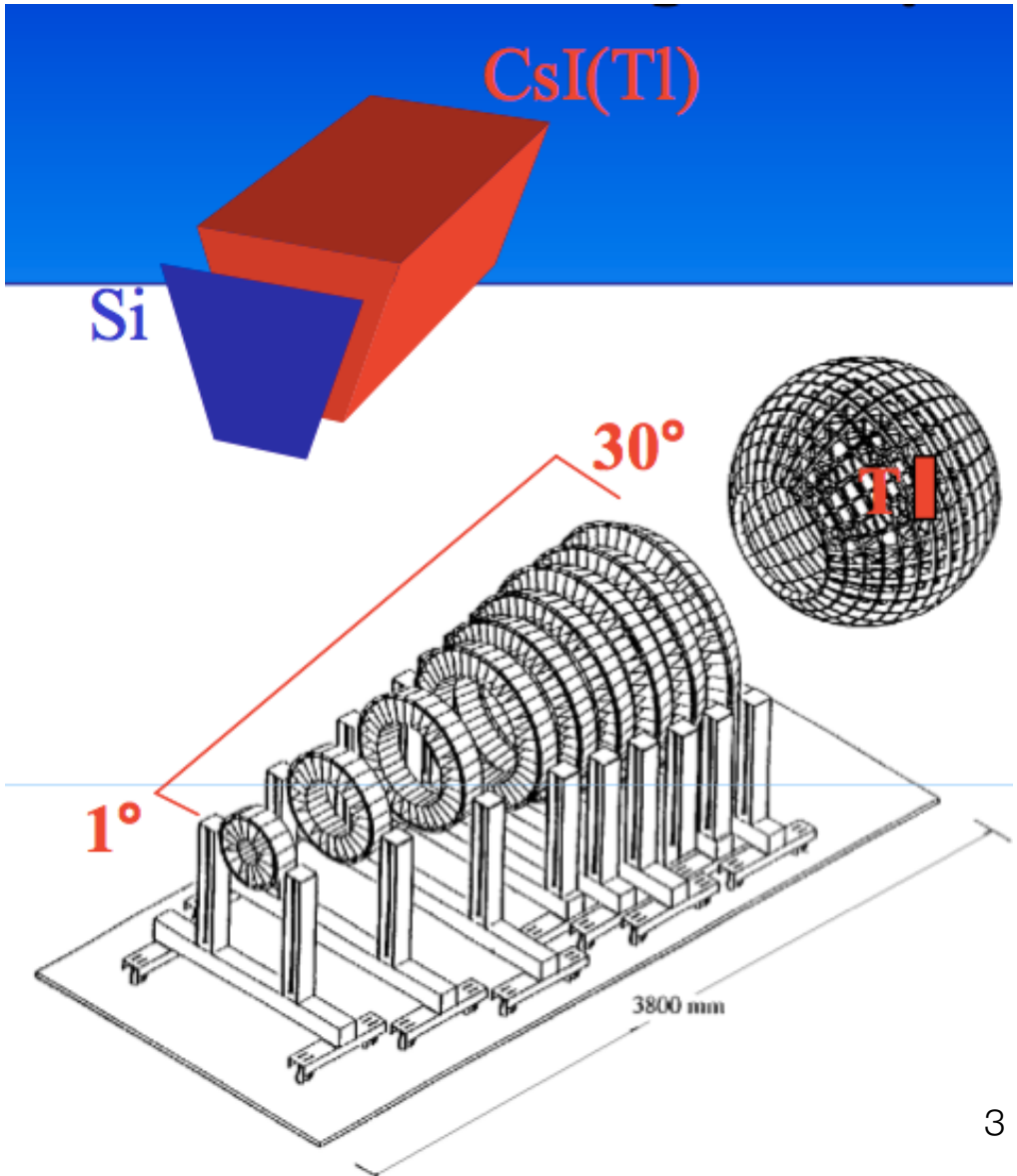
- beam: ^{132}Sn, 20 MeV/u
- target: ^{124}Sn





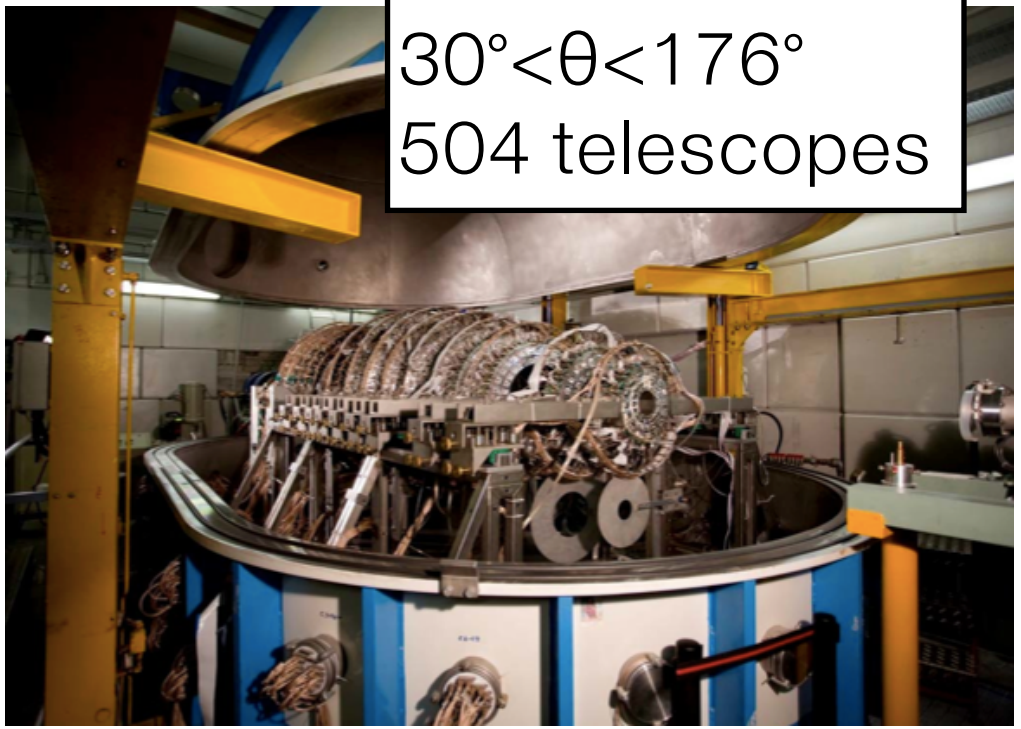
CHIMERA@LNS

(**C**harge **H**eavy **I**on **M**ass and **E**nergy **R**esolving **A**rray)



- **RINGS**:
1°<θ<30°
688 telescopes

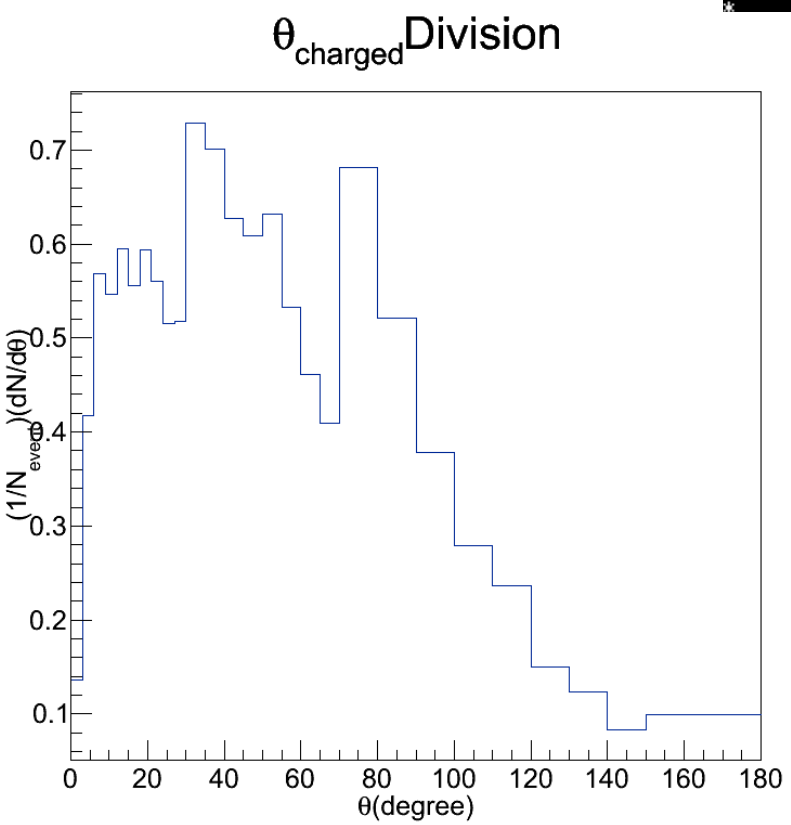
- **SPHERE**:
30°<θ<176°
504 telescopes



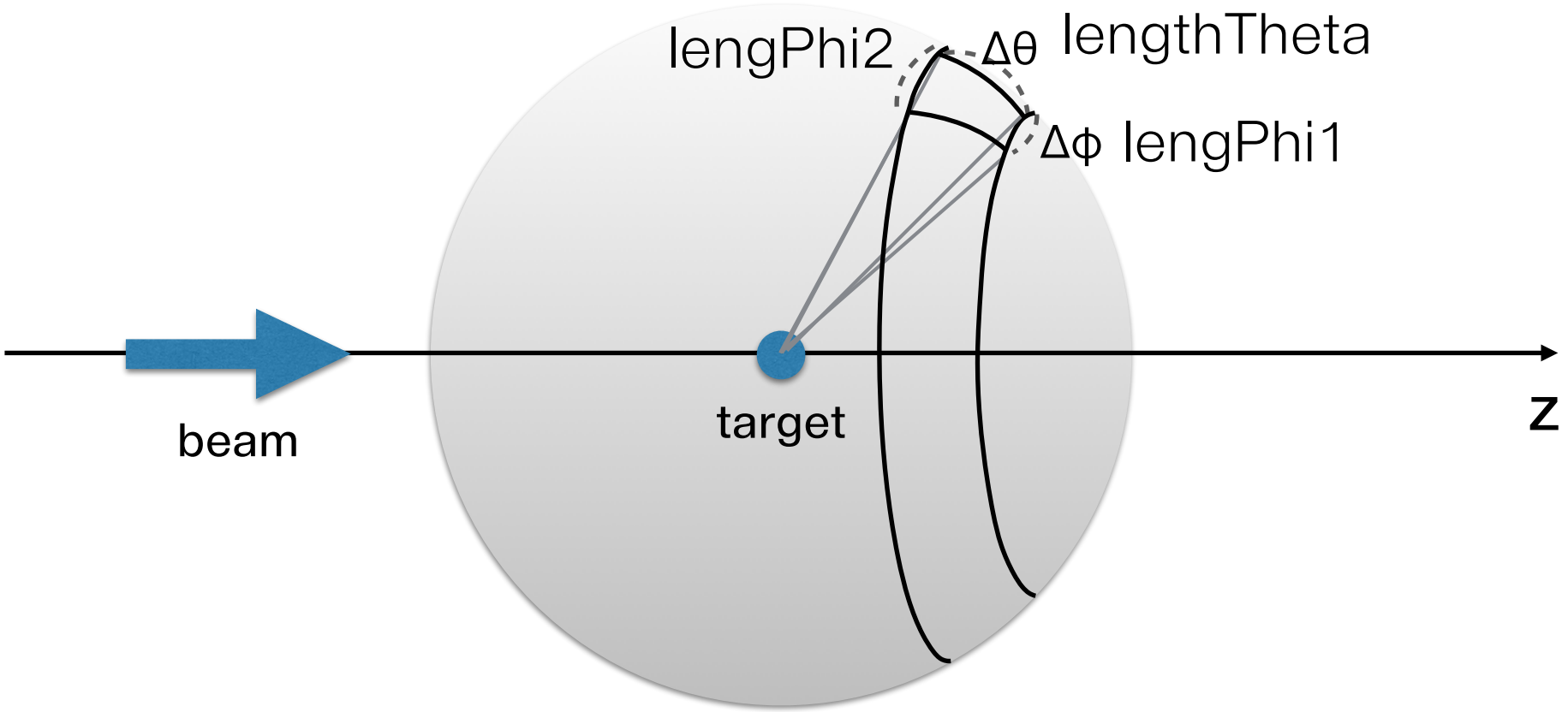
If Only Sphere,

too short to make !

R=30 cm
occupancy=2%



degFrom	degTo	numOfDete	phi	lengthThe (cm)	lengthPhi (cm)
0	3	7	51.428571	1.5707963	0.7048106
3	6	21	17.142857	1.5707963	0.7041667
6	9	29	12.413793	1.5707963	0.8483033
9	12	28	12.857142	1.5707963	1.2266665
12	15	30	12	1.5707963	1.4666129
15	18	28	12.857142	1.5707963	1.9117684
18	21	30	12	1.5707963	2.0971307
21	24	29	12.413793	1.5707963	2.4870995
24	27	26	13.846153	1.5707963	3.1207754
27	30	26	13.846153	1.5707963	3.4589243
30	35	37	9.7297297	2.6179938	2.7363907
35	40	36	10	2.6179938	3.1864560
40	45	32	11.25	2.6179938	3.9782921
45	50	31	11.612903	2.6179938	4.4815938
50	55	32	11.25	2.6179938	4.6717542
55	60	27	13.333333	2.6179938	5.8861149
60	65	24	15	2.6179938	6.9643564
65	70	21	17.142857	2.6179938	8.2900921
70	80	35	10.285714	5.2359877	5.1954778
80	90	27	13.333333	5.2359877	6.9459271
90	100	19	18.947368	5.2359877	9.8705279
100	110	14	25.714285	5.2359877	12.988694
110	120	12	30	5.2359877	14.218187
120	130	8	45	5.2359877	19.276327
130	140	7	51.428571	5.2359877	19.016768
140	150	5	72	5.2359877	21.595887
150	180	5	72	15.707963	9.6461709


lengPhi2
Δθ
lengthTheta
Δϕ
lengPhi1
beam
target
z

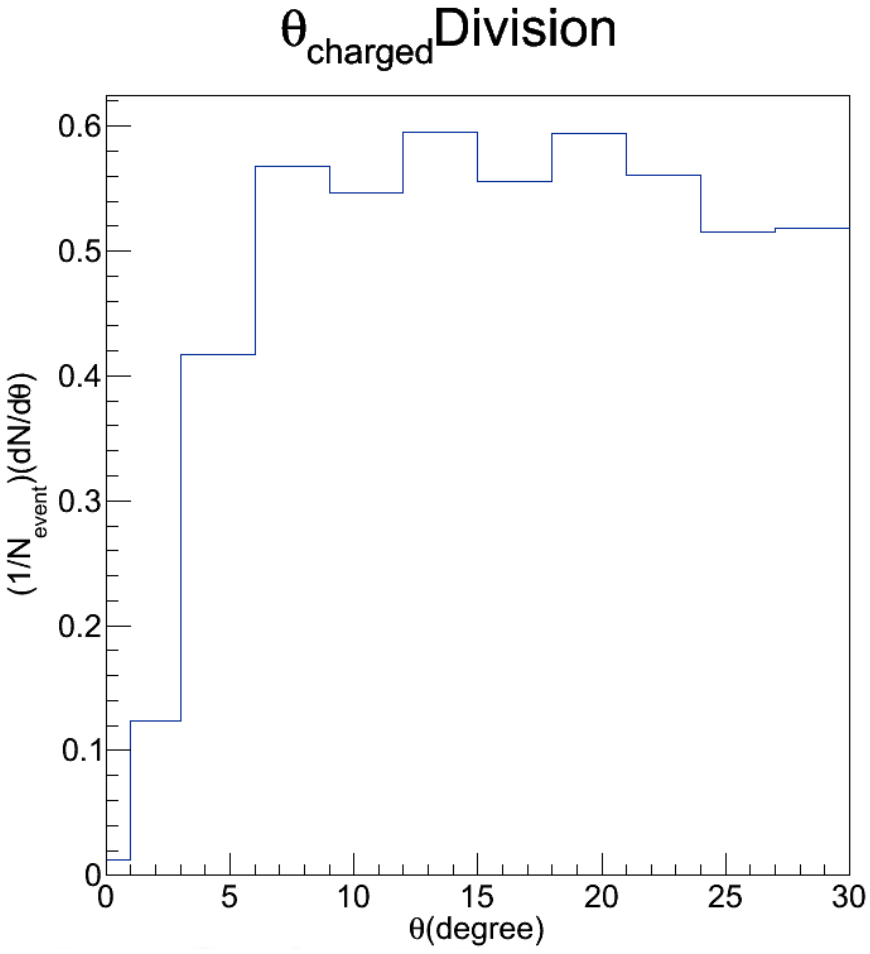
RINGS (1°<θ<30°)

bin size(degree) :

0~1 -> 1

1~3 -> 2

else -> 3



SPHERE(30°<θ<170°)

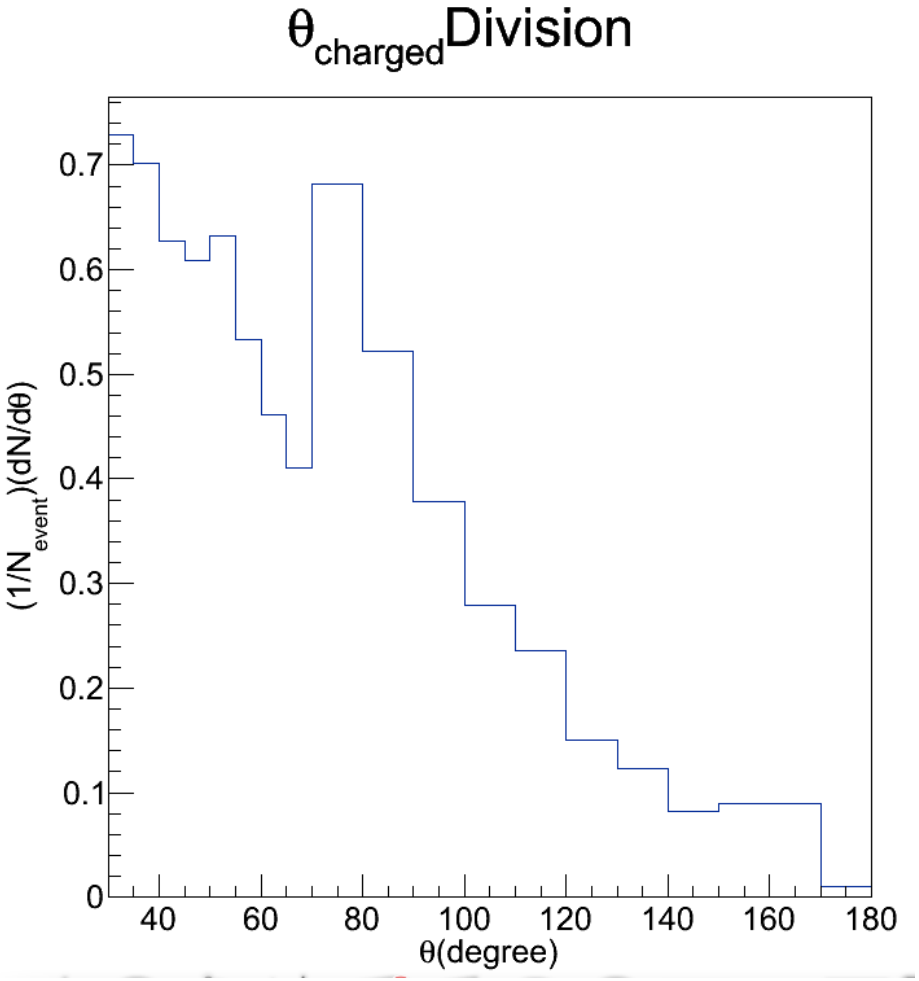
bin size(degree):

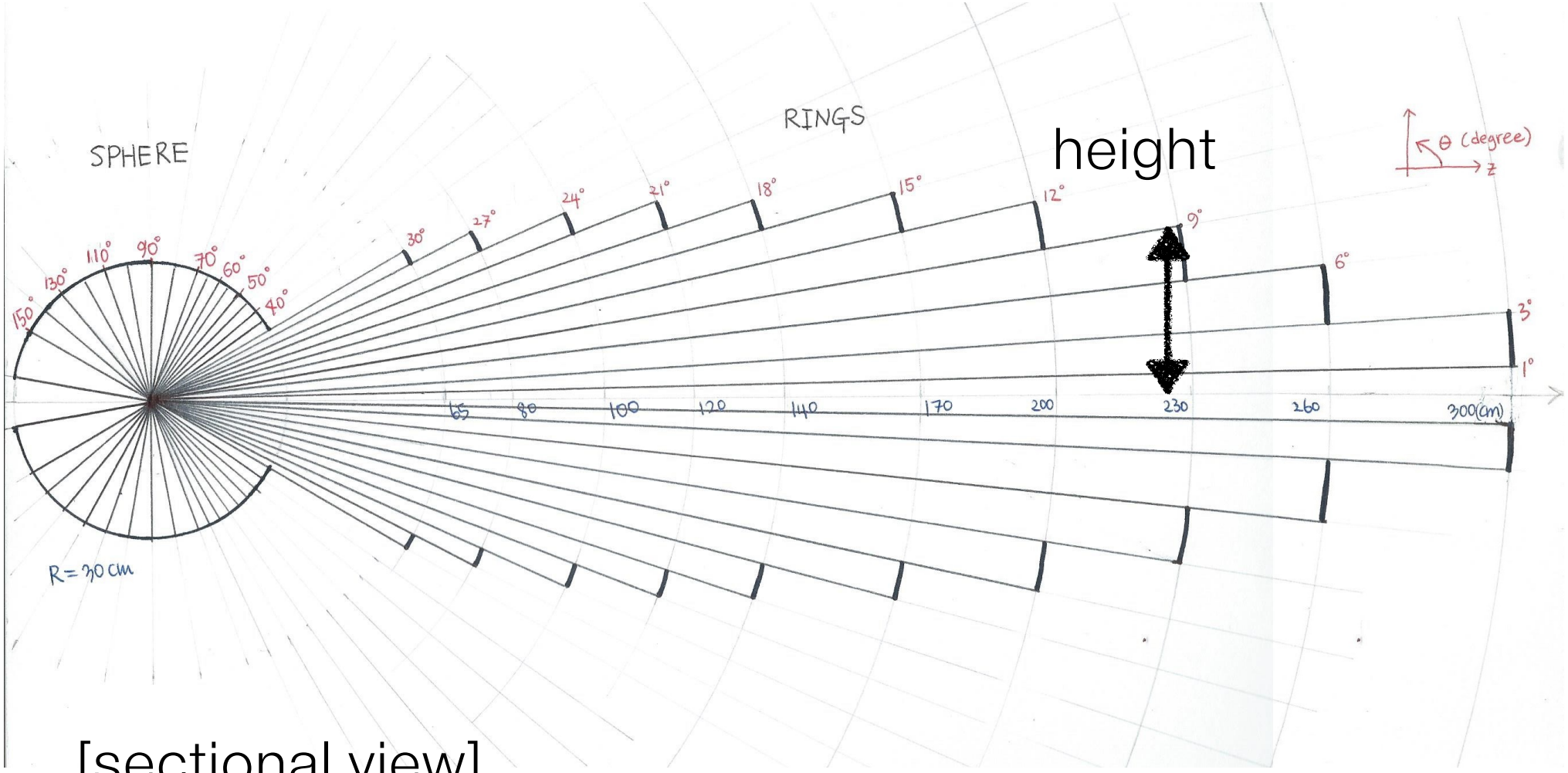
30~70 -> 5

70~150 -> 10

150~170 -> 20

170~180 -> 10





[sectional view]

(simply considered SiCsI detectors as bold lines)

RINGS (occupancy = 2%)

bin (degree)	# of Detectors	phi (degree)	radius (cm)	area per detector (cm^2)	lengthTheta (cm)	lengPhi1 (cm)	lengPhi2 (cm)	height (cm)
~~0~1~~	~~1~~	~~360~~	~~300~~	~~86.13~~	~~5.24~~	~~0~~	~~32.90~~	~~5.24~~
1~3	7	51.43	300	98.41	10.47	4.70	14.09	15.70
3~6	21	17.14	260	83.08	13.61	4.07	8.13	27.18
6~9	29	12.41	230	78.32	12.04	5.21	7.80	35.98
9~12	28	12.86	200	85.64	10.47	7.02	9.33	41.58
12~15	30	12	170	73.98	8.90	7.40	9.22	44.00
15~18	28	12.86	140	65.40	7.33	8.13	9.71	43.26
18~21	30	12	120	52.71	6.28	7.77	9.01	43.00
21~24	29	12.41	100	43.41	5.24	7.76	8.81	40.67
24~27	26	13.85	80	34.86	4.19	7.86	8.78	36.32
27~30	26	13.85	65	33.96	3.93	7.13	7.85	32.5

SPHERE (occupancy = 2%)

bin (degree)	# of Detectors	phi (degree)	radius (cm)	area per detector (cm^2)	lengthTheta (cm)	lengPhi1 (cm)	lengPhi2 (cm)
30~35	37	9.73	30	7.16	2.62	2.55	2.92
35~40	36	10	30	8.34	2.62	3.00	3.37
40~45	32	11.25	30	10.42	2.62	3.79	4.17
45~50	31	11.61	30	11.73	2.62	4.30	4.66
50~55	32	11.25	30	12.23	2.62	4.51	4.83
55~60	27	13.33	30	15.41	2.62	5.72	6.05
60~65	24	15	30	18.23	2.62	6.80	7.12
65~70	21	17.14	30	21.70	2.62	8.13	8.43
70~80	35	10.29	30	27.20	5.24	5.06	5.30
80~90	27	13.33	30	36.37	5.24	6.88	6.98
90~100	19	18.95	30	51.68	5.24	9.92	9.77
100~110	14	25.71	30	68.01	5.24	13.26	12.65
110~120	12	30	30	74.45	5.24	14.76	13.60
120~130	8	45	30	100.93	5.24	20.41	18.05
130~140	7	51.43	30	99.57	5.24	20.63	17.31
140~150	5	72	30	113.08	5.24	24.23	18.85
150~170	5	72	30	134.34	10.47	18.85	6.55
~~170~180~~	~~1~~	~~360~~	~~30~~	~~85.91~~	~~5.24~~	~~32.73~~	~~0~~

Plan

- change the values of radius or theta range(bin size) to find better design
- using GEANT4, draw detectors & simulate AMD data
- think about more effective design for detectors

back up