

Fwd ECAL Geometry

SuperB Meeting La Biodola, Isola d'Elba

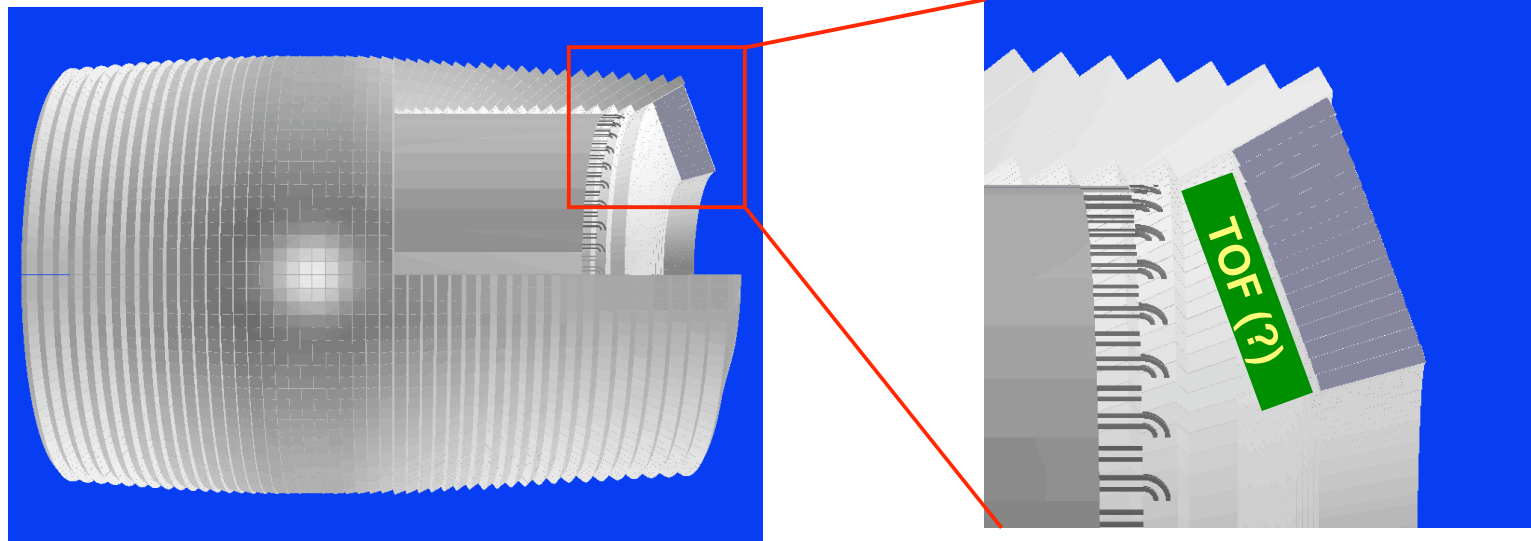
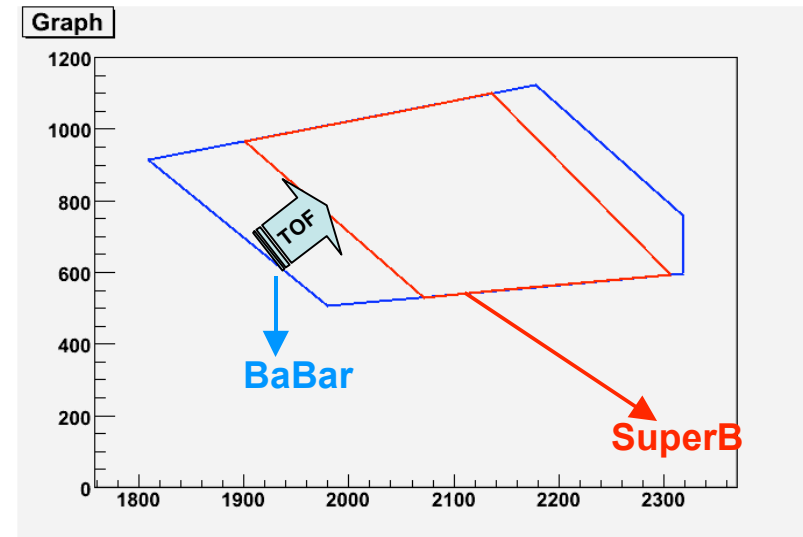


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31/05/08

Approach

- Fill the same BaBar angular region but
 - leave space for TOF: $\Delta Z = (100 \text{ mm}) \cdot \cos(22.7)$
 - Xtals material : LSO (LYSO)
 - Xtal depth = 200 mm ($\sim 17.5 X_0$)
 - Front face size close to Moliere Radius $\sim 25 \text{ mm}$
 - Carbon Fiber structure for 5x5 modules (CMS like)
 - CF thickness used for crystal size calculations
 - Inner Wall 400 μm
 - Outer Wall 200 μm



As in BaBar trapezoidal Crystals (see BaBar TDR p. 284)

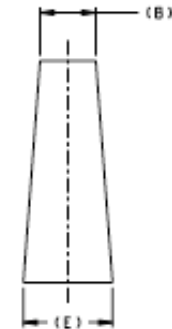
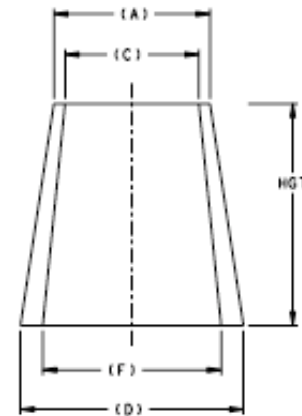
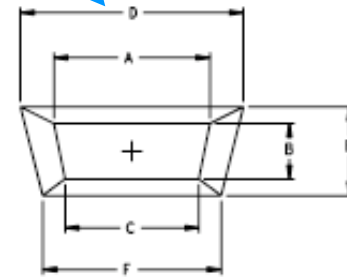
160 Xtals/Ring
 32 Modules

200 Xtals/Ring
 40 Modules

240 Xtals/Ring
 48 Modules

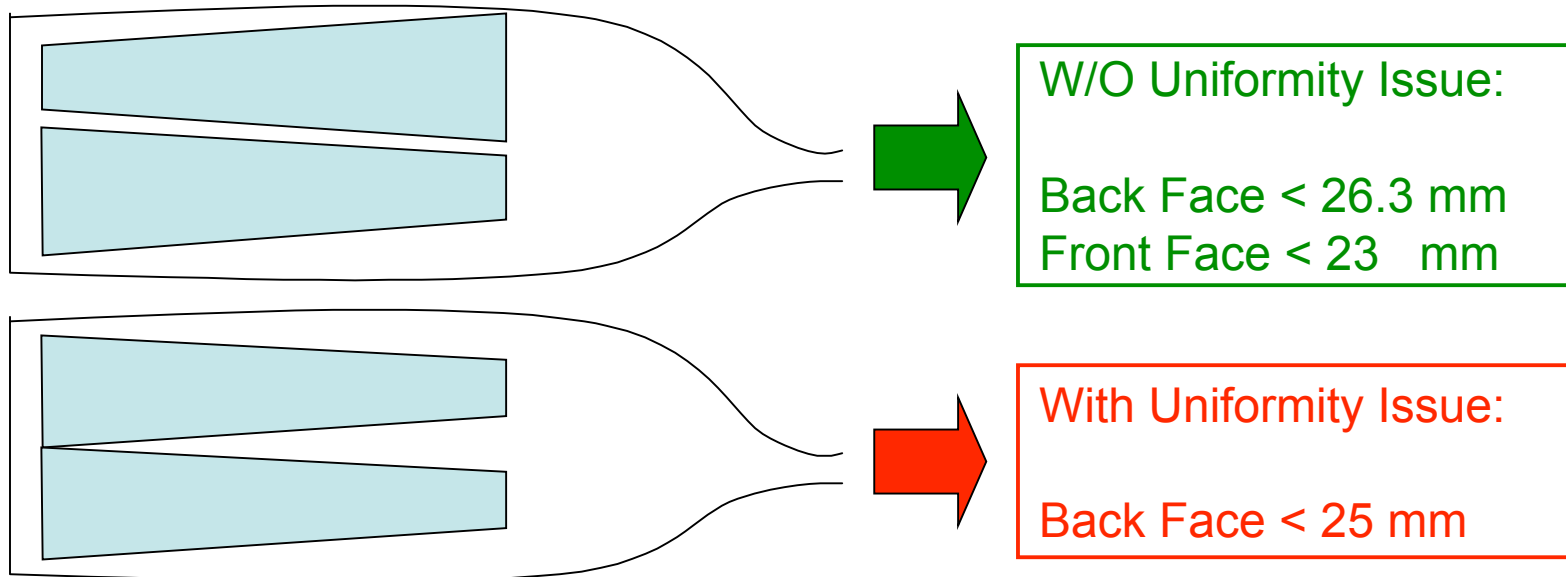
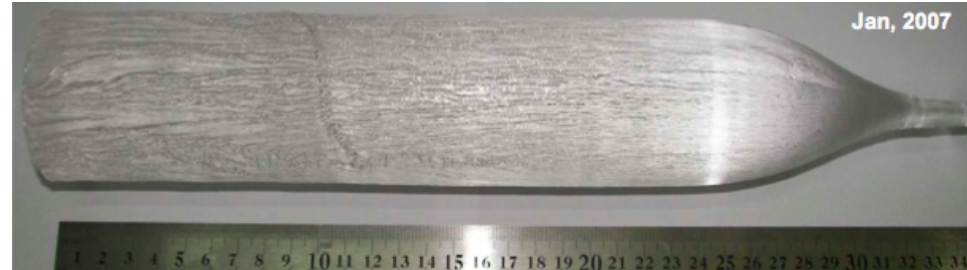
Ring	A	B	C	D	E	F
1	21.63	30.94	20.51	23.72	34.31	22.48
2	22.77	30.94	21.65	24.98	34.31	23.74
3	23.90	30.94	22.78	26.24	34.31	25.00
4	25.04	30.94	23.92	27.50	34.31	26.25
5	26.17	30.94	25.05	28.75	34.31	27.51
6	21.80	30.94	20.91	24.04	34.31	23.05
7	22.71	30.94	21.82	25.05	34.31	24.06
8	23.62	30.94	22.72	26.06	34.31	25.06
9	24.53	30.94	23.63	27.06	34.31	26.07
10	25.44	30.94	24.54	28.07	34.31	27.07
11	21.92	30.94	21.17	24.26	34.31	23.43
12	22.68	30.94	21.93	25.10	34.31	24.27
13	23.43	30.94	22.69	25.93	34.31	25.10
14	24.19	30.94	23.44	26.77	34.31	25.94
15	24.95	30.94	24.20	27.61	34.31	26.78

3000 Crystals



Crystal size constraints

- Due to maximum boule size (SIPAT) there are new constraints on Crystal size
- Crystal size constraints depend also on whether Ce doping uniformity will be an issue
 - For production
 - For ECAL performances



Xtals Dimensions: Back <2.63cm Front < 2.3 cm

Rule: minimum allowed number of crystals multiple of 5

Ring	A	B	C	D	E	F	
175 Xtals/Ring 35 Modules	1	19.48	23.12	18.72	21.37	25.65	20.52
	2	20.26	23.12	19.50	22.23	25.65	21.38
	3	21.04	23.12	20.28	23.09	25.65	22.25
	4	21.82	23.12	21.05	23.96	25.65	23.11
	5	22.60	23.12	21.83	24.82	25.65	23.97
205 Xtals/Ring 41 Modules	6	19.92	23.12	19.27	21.95	25.65	21.22
	7	20.59	23.12	19.94	22.68	25.65	21.96
	8	21.25	23.12	20.60	23.42	25.65	22.70
	9	21.92	23.12	21.27	24.16	25.65	23.43
	10	22.58	23.12	21.93	24.89	25.65	24.17
235 Xtals/Ring 45 Modules	11	20.25	23.12	19.68	22.38	25.65	21.75
	12	20.83	23.12	20.26	23.02	25.65	22.39
	13	21.41	23.12	20.84	23.66	25.65	23.03
	14	21.99	23.12	21.42	24.31	25.65	23.67
	15	22.57	23.12	22.00	24.95	25.65	24.32
265 Xtals/Ring 53 Modules	16	20.51	23.12	20.00	22.71	25.65	22.15
	17	21.02	23.12	20.52	23.28	25.65	22.72
	18	21.54	23.12	21.03	23.85	25.65	23.29
	19	22.05	23.12	21.55	24.42	25.65	23.86
	20	22.57	23.12	22.06	24.99	25.65	24.43

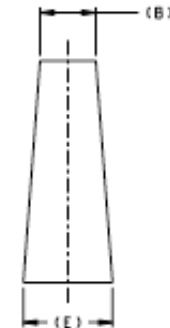
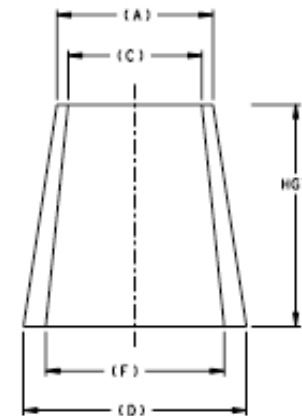
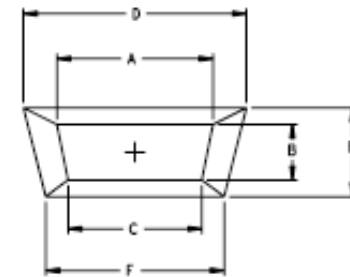
175 Xtals/Ring
35 Modules

205 Xtals/Ring
41 Modules

235 Xtals/Ring
45 Modules

265 Xtals/Ring
53 Modules

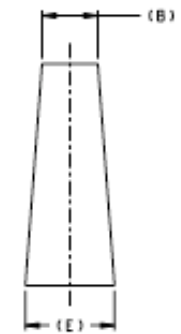
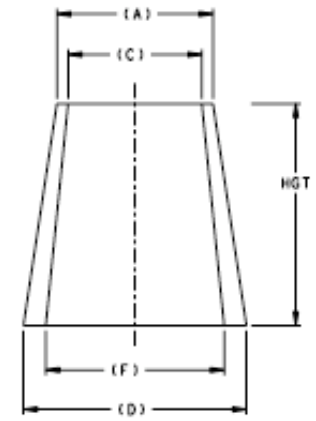
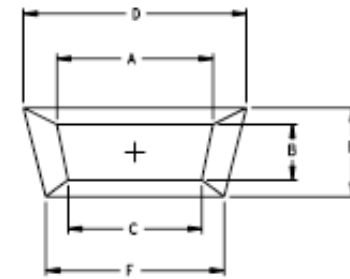
4400 Crystals



Xtals Dimensions: Back <2.5 cm

Rule: minimum allowed number of crystals multiple of 5

	Ring	A	B	C	D	E	F
165 Xtals/Ring 33 Modules	1	20.65	22.03	19.88	22.65	24.43	21.79
	2	21.44	22.03	20.66	23.52	24.43	22.66
	3	22.23	22.03	21.45	24.39	24.43	23.53
180 Xtals/Ring 36 Modules	4	21.08	22.03	20.37	23.18	24.43	22.39
	5	21.80	22.03	21.09	23.98	24.43	23.19
	6	22.52	22.03	21.81	24.77	24.43	23.99
200 Xtals/Ring 40 Modules	7	20.89	22.03	20.25	23.02	24.43	22.31
	8	21.54	22.03	20.90	23.74	24.43	23.03
	9	22.19	22.03	21.55	24.46	24.43	23.75
235 Xtals/Ring 45 Modules	10	21.23	22.03	20.64	23.44	24.43	22.78
	11	21.84	22.03	21.24	24.11	24.43	23.45
	12	22.44	22.03	21.85	24.78	24.43	24.12
265 Xtals/Ring 53 Modules	13	21.06	22.03	20.52	23.29	24.43	22.68
	14	21.62	22.03	21.07	23.90	24.43	23.30
	15	22.17	22.03	21.63	24.51	24.43	23.91
250 Xtals/Ring 50 Modules	16	21.34	22.03	20.83	23.63	24.43	23.06
	17	21.86	22.03	21.35	24.21	24.43	23.64
	18	22.38	22.03	21.87	24.78	24.43	24.21
270 Xtals/Ring 54 Modules	19	21.19	22.03	20.72	23.48	24.43	22.96
	20	21.67	22.03	21.20	24.02	24.43	23.49
	21	22.15	22.03	21.68	24.55	24.43	24.02
4695 Crystals							



- New crystal dimension constraints from boule size
- Ce doping uniformity issue still to be addressed
- Need to move to new default Endcap geometry (?)
 - Choose optimistic case (Back<2.63cm , front<2.4 cm):
 - 4 module types
 - 20 rings
 - 4400 Crystals
 - Previous solution had 3000 crystals
 - Worst case solution has 4695 crystals