Evaluation of aperture for crab cavity*

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name	thickness		material	aperture					σ beam size	
				code	hor.	ver.	hor.	ver.	hor.	ver.
	mm	rad.len.			mm	mm	σ_x	σ_y	mm	mm
collim.at $8\sigma_x$ *X* $57\sigma_y$										
AB2	429.0	30	Copper	17	1.7	1.3	15	169	0.1119	0.0077
SP2	8.6	0.6	Copper	18	0.9	0.5	8	65	0.1119	0.0077
PC1	214.5	15	Copper	20	1.3	0.7	20	438	0.0655	0.0016
AB3	429.0	30	Copper	28	0.7	0.7	35	583	0.0202	0.0012
PC2	214.5	15	Copper	10	1.1	0.7	18	467	0.0617	0.0015
PC3	214.5	15	Copper	22	2.8	1.5	20	273	0.1419	0.0055
AB4	429.0	30	Copper	24	1.9	1.3	17	169	0.1123	0.0077
SP4	8.6	0.6	Copper	25	0.9	0.5	8	65	0.1123	0.0077
PC4	214.5	15	Copper	23	2.8	1.5	20	246	0.1373	0.0061
PC5	214.5	15	Copper	11	1.8	0.7	20	233	0.0923	0.0030
AB5	429.0	30	Copper	12	1.0	0.7	23	778	0.0426	0.0009
PC6	214.5	15	Copper	27	1.8	0.7	20	304	0.0893	0.0023
PDUMP	214.5	15	Copper	56	1.8	1.5	27	246	0.0677	0.0061
PC7	214.5	15	Copper	55	5.0	3.5	143	202	0.0349	0.0173
SPEX	35.6	1	Titanium	33	0.5	0.8	10	62	0.0516	0.0130
PC8	214.5	15	Copper	19	0.7	1.7	19	100	0.0367	0.0170
PC9	214.5	15	Copper	26	0.7	1.2	19	98	0.0378	0.0123
PC10	214.5	15	Copper	13	1.2	1.0	20	137	0.0606	0.0073
ABE	105.0	30	Tungsten	37	1.8	0.5	20	208	0.0902	0.0024
PC11	214.5	15	Copper	14	0.8	0.7	20	636	0.0400	0.0011
AB10	105.0	30	Tungsten	39	7.0	7.0	18	139	0.3801	0.0502
AB9	105.0	30	Tungsten	40	10	4.5	16	147	0.6449	0.0307
AB7	105.0	30	Tungsten	41	4.4	1.6	171	1230	0.0257	0.0013
MSK1	105.0	30	Tungsten	42	7.8	4.0	16	178	0.4875	0.0225
MSK2	105.0	30	Tungsten	43	7.4	4.5	12	151	0.6076	0.0298

Table 1: ILC collimator aperture, length and material. CP - spoiler, AB - absorber, MSK - photon mask, PC - electron mask. Version ILCFF9.

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name	thickness		material	aperture					σ beam size	
				code	hor.	ver.	hor.	ver.	hor.	ver.
	mm	rad.len.			mm	mm	σ_x	σ_y	mm	mm
collim.at $8\sigma_x$ *X* $57\sigma_y$										
AB2	429.0	30	Copper	17	2.0	2.0	18	260	0.1119	0.0077
SP2	8.6	0.6	Copper	18	0.9	0.5	8	65	0.1119	0.0077
PC1	214.5	15	Copper	20	2.0	2.0	30	1250	0.0655	0.0016
AB3	429.0	30	Copper	28	2.0	2.0	99	1670	0.0202	0.0012
PC2	214.5	15	Copper	10	2.0	2.0	32	1330	0.0617	0.0015
PC3	214.5	15	Copper	22	2.8	2.0	20	364	0.1419	0.0055
AB4	429.0	30	Copper	24	2.0	2.0	18	260	0.1123	0.0077
SP4	8.6	0.6	Copper	25	0.9	0.5	8	65	0.1123	0.0077
PC4	214.5	15	Copper	23	2.8	2.0	20	328	0.1373	0.0061
PC5	214.5	15	Copper	11	2.0	2.0	21	667	0.0923	0.0030
AB5	429.0	30	Copper	12	2.0	2.0	47	2220	0.0426	0.0009
PC6	214.5	15	Copper	27	2.0	2.0	22	870	0.0893	0.0023
PDUMP	214.5	15	Copper	56	2.0	2.0	29	328	0.0677	0.0061
PC7	214.5	15	Copper	55	60.0	4.0	1719	231	0.0349	0.0173
SPEX	35.6	1	Titanium	33	2.3	0.8	44	62	0.0516	0.0130
PC8	214.5	15	Copper	19	2.0	2.0	54	117	0.0367	0.0170
PC9	214.5	15	Copper	26	2.0	2.0	53	162	0.0378	0.0123
PC10	214.5	15	Copper	13	2.0	2.0	33	274	0.0606	0.0073
ABE	105.0	30	Tungsten	37	2.0	2.0	22	830	0.0902	0.0024
PC11	214.5	15	Copper	14	2.0	2.0	50	1820	0.0400	0.0011
AB10	105.0	30	Tungsten	39	7.0	9.1	18	180	0.3801	0.0502
AB9	105.0	30	Tungsten	40	11.3	5.5	18	180	0.6449	0.0307
AB7	105.0	30	Tungsten	41	4.4	2.0	171	1540	0.0257	0.0013
MSK1	105.0	30	Tungsten	42	8.8	4.0	18	180	0.4875	0.0225
MSK2	105.0	30	Tungsten	43	11.1	5.4	18	180	0.6076	0.0298

Table 2: ILC collimator aperture, length and material. CP - spoiler, AB - absorber, MSK - photon mask, PC - electron mask. Version ILCFF9 with enlarged aperture of PCs and absorbers to 2 mm, and AB10, AB9, MSK1, MSK2 to $18\sigma_x$ *X* $180\sigma_y$.

name	thickness		material	aperture					σ beam size	
				code	hor.	ver.	hor.	ver.	hor.	ver.
	mm	rad.len.			mm	mm	σ_x	σ_y	mm	mm
collim.at $8\sigma_x$ *X* $57\sigma_y$										
AB2	429.0	30	Copper	17	2.0	2.0	18	260	0.1119	0.0077
SP2	8.6	0.6	Copper	18	1.5	0.8	8	65	0.1119	0.0077
PC1	214.5	15	Copper	20	2.0	2.0	30	1250	0.0655	0.0016
AB3	429.0	30	Copper	28	2.0	2.0	99	1670	0.0202	0.0012
PC2	214.5	15	Copper	10	2.0	2.0	32	1330	0.0617	0.0015
PC3	214.5	15	Copper	22	2.8	2.0	20	364	0.1419	0.0055
AB4	429.0	30	Copper	24	2.0	2.0	18	260	0.1123	0.0077
SP4	8.6	0.6	Copper	25	1.5	0.8	8	65	0.1123	0.0077
PC4	214.5	15	Copper	23	2.8	2.0	20	328	0.1373	0.0061
PC5	214.5	15	Copper	11	2.0	2.0	21	667	0.0923	0.0030
AB5	429.0	30	Copper	12	2.0	2.0	47	2220	0.0426	0.0009
PC6	214.5	15	Copper	27	2.0	2.0	22	870	0.0893	0.0023
PDUMP	214.5	15	Copper	56	2.0	2.0	29	328	0.0677	0.0061
PC7	214.5	15	Copper	55	60.0	4.0	1719	231	0.0349	0.0173
SPEX	35.6	1	Titanium	33	2.3	0.8	44	62	0.0516	0.0130
PC8	214.5	15	Copper	19	2.0	2.0	54	117	0.0367	0.0170
PC9	214.5	15	Copper	26	2.0	2.0	53	162	0.0378	0.0123
PC10	214.5	15	Copper	13	2.0	2.0	33	274	0.0606	0.0073
ABE	105.0	30	Tungsten	37	2.0	2.0	22	830	0.0902	0.0024
PC11	214.5	15	Copper	14	2.0	2.0	50	1820	0.0400	0.0011
AB10	105.0	30	Tungsten	39	7.0	9.1	18	180	0.3801	0.0502
AB9	105.0	30	Tungsten	40	11.3	5.5	18	180	0.6449	0.0307
AB7	105.0	30	Tungsten	41	4.4	2.0	171	1540	0.0257	0.0013
MSK1	105.0	30	Tungsten	42	8.8	4.0	18	180	0.4875	0.0225
MSK2	105.0	30	Tungsten	43	11.1	5.4	18	180	0.6076	0.0298

Table 3: ILC collimator aperture, length and material. CP - spoiler, AB - absorber, MSK - photon mask, PC - electron mask. Version ILCFF9 with enlarged aperture of SP2, SP4 to 1.5×0.8 mm, PCs and absorbers to 2 mm, and AB10, AB9, MSK1, MSK2 to $18\sigma_x$ *X* $180\sigma_y$.

Crab Cavity radius mm	Mean energy			Photons number per bunch			Photon energy per bunch		
	Tab.1	Tab.2	Tab.3	Tab.1	Tab.2	Tab.3	Tab.1	Tab.2	Tab.3
	GeV						GeV/bunch		
lost at MSK1									
10.0	0.159E-03	0.178E-03	0.304E-03	0.279E+07	0.952E+07	0.205E+08	0.443E+03	0.170E+04	0.622E+04
12.5	0.159E-03	0.178E-03	0.304E-03	0.279E+07	0.952E+07	0.205E+08	0.443E+03	0.170E+04	0.622E+04
15.0	0.159E-03	0.178E-03	0.304E-03	0.279E+07	0.952E+07	0.205E+08	0.443E+03	0.170E+04	0.622E+04
17.5	0.159E-03	0.178E-03	0.304E-03	0.279E+07	0.952E+07	0.205E+08	0.443E+03	0.170E+04	0.622E+04
lost at Crab Cavity									
10.0	0.312E-04	0.317E-04	0.623E-04	0.192E+06	0.985E+06	0.286E+07	0.598E+01	0.313E+02	0.178E+03
12.5	0.298E-04	0.314E-04	0.810E-04	0.247E+05	0.386E+06	0.164E+07	0.735E+00	0.121E+02	0.133E+03
15.0	0	0.365E-04	0.175E-03	0	0.113E+05	0.501E+06	0	0.411E+00	0.874E+02
17.5	0	0.363E-02	0.106E-02	0	0.200E+02	0.414E+05	0	0.727E-01	0.439E+02
lost at MSK2									
10.0	0.312E-04	0	0	0.186E+06	0	0	0.582E+01	0	0
12.5	0.312E-04	0	0	0.186E+06	0	0	0.582E+01	0	0
15.0	0.312E-04	0	0	0.186E+06	0	0	0.582E+01	0	0
17.5	0.312E-04	0	0	0.186E+06	0	0	0.582E+01	0	0

Table 4: Photon loss at MSK1, Crab cavity and MSK2 from beam halo for different position of collimation system elements and Crab Cavity aperture.

Crab Cavity radius mm	Mean energy			Photons number per bunch			Photon energy per bunch		
	Tab.1	Tab.2	Tab.3	Tab.1	Tab.2	Tab.3	Tab.1	Tab.2	Tab.3
	GeV						GeV/bunch		
lost at MSK1									
10.0	0.692E-04	0.710E-04	0.733E-04	0.230E+11	0.220E+11	0.209E+11	0.159E+07	0.156E+07	0.153E+07
12.5	0.692E-04	0.710E-04	0.733E-04	0.230E+11	0.220E+11	0.209E+11	0.159E+07	0.156E+07	0.153E+07
15.0	0.692E-04	0.710E-04	0.733E-04	0.230E+11	0.220E+11	0.209E+11	0.159E+07	0.156E+07	0.153E+07
17.5	0.692E-04	0.710E-04	0.733E-04	0.230E+11	0.220E+11	0.209E+11	0.159E+07	0.156E+07	0.153E+07
lost at Crab Cavity									
10.0	0.340E-04	0.321E-04	0.312E-04	0.166E+10	0.266E+10	0.382E+10	0.565E+05	0.855E+05	0.119E+06
12.5	0.463E-05	0.286E-04	0.288E-04	0.400E+07	0.898E+09	0.205E+10	0.185E+02	0.257E+05	0.591E+05
15.0	0	0	0.276E-04	0	0	0.305E+09	0	0	0.843E+04
17.5	0	0	0	0	0	0	0	0	0
lost at MSK2									
10.0	0.305E-04	0	0	0.206E+10	0	0	0.628E+05	0	0
12.5	0.305E-04	0	0	0.206E+10	0	0	0.628E+05	0	0
15.0	0.305E-04	0	0	0.206E+10	0	0	0.628E+05	0	0
17.5	0.305E-04	0	0	0.206E+10	0	0	0.628E+05	0	0

Table 5: Photon loss at MSK1, Crab cavity and MSK2 from beam core for different position of collimation system elements and Crab Cavity aperture.