

Apr-07 Apr-07 Jun-08

Simulation parameters for coherent tune shift experiments

Files

Data reference

<http://cesrelog.lns.cornell.edu> 3232-3420

Beam parameters

	Drift	Dipole	Drift
Number of bunches	10	10	10
Bunch spacing interval	14	14	14
Bunch intensity	0.75	0.75	0.75
Particles per bunch	1.2	1.2	1.2
Total beam intensity	7.5	7.5	7.5
Horiz. Emittance (rms, geom)	132	132	133
Vertical Emittance (rms, geom)	1.32	1.32	1.33
Horiz beta	19.64	15.36	18.31
Vertical beta	18.82	18.75	16.49
Horizontal beam size (rms)	1.61	1.42	1.56
Vertical beam size (rms)	0.16	0.16	0.15
Bunch length (rms)	12.6	12.6	17.24
Bunch duration (rms)	42	42	57
Particle species	positrons	positrons	positrons
Circumference	768.43	768.43	768.43
Beam energy	1.89	1.89	5.29

Chamber parameters

Geometry	elliptical	elliptical	elliptical
Radius	4.5H X 2.5V	4.5H X 2.5V	4.5H X 2.5V
Material	Aluminum	Aluminum	Aluminum

Magnetic field parameters

Type	field free	Dipole	field free
Length		1	1
Field strength		0	715

Radiation parameters

Photon intensity	0.23	0.53	0.58
Weight factor	0.25	0.59	0.23

Photoeffect parameters

Quantum efficiency	0.1	0.1	0.1
Reflectivity	15	15	10
Photoelectron peak energy	5	5	5
Photoelectron rms energy spread (gaussian)	5	5	5
Rms width of vertical size of radiation stripe (gaussian)	1	1	1
Power in angular distribution ($dN/d\omega = \cos\theta^{\text{pangphel}}$)	1	1	1

SEY parameters

Material	Aluminum	Aluminum	Aluminum
Total SEY yield maximum	1.8	1.8	1.8
SEY yield peak energy	310	310	310

Elastic electron parameters

R(inf) (Elastic yield at high energies)	0.02	0.02	0.02
R(E0) (Elastic yield at peak)	0.45	0.45	0.45
Location of maximum value of R	0	0	0
Typical energy width of elastic SEY yield	15	15	15
rms energy spread of "elastic" secondaries	2	2	2
Power used in exponential	1	1	1
Yield angular dependence parameter	0.26	0.26	0.26
Power used in angular dependence	2	2	2

Rediffused electron parameters

Rediffused yield at high energies	0.16	0.17	0.16
Energy scale for incident energy dependence	0.04	0.04	0.04
Power used in exponential	0.1	0.1	0.1
Power used in energy scaling for rediffused secondaries	0.5	0.5	0.5
Yield angular dependence parameter	0.26	0.26	0.26
Power used in angular dependence	2	2	2

True secondary parameters

Peak energy	310	310	310
Yield at peak energy	1.62	1.62	1.62
Power used in scaling function	1.54	1.54	1.54
Yield angular dependence parameter	0.66	0.66	0.66
Power used in angular dependence	0.8	0.8	0.8
peak energy angular dependence parameter	0.7	0.7	0.7
Power used in angular dependence	1	1	1
Scaling function power angular dependence parameter	0	0	0

Power used in angular dependence	0	0	0
Secondary energy power scaling parameter for n=1	2.5	2.5	2.5
Secondary energy power scaling parameter for n=2	3.3	3.3	3.3
Secondary energy power scaling parameter for n=3	2.5	2.5	2.5
Secondary energy power scaling parameter for n=4	2.5	2.5	2.5
Secondary energy power scaling parameter for n=5	2.8	2.8	2.8
Secondary energy power scaling parameter for n=6	1.3	1.3	1.3
Secondary energy power scaling parameter for n=7	1.5	1.5	1.5
Secondary energy power scaling parameter for n=8	1.5	1.5	1.5
Secondary energy power scaling parameter for n=9	1.5	1.5	1.5
Secondary energy power scaling parameter for n=10	1.5	1.5	1.5
Secondary energy exponential scaling parameter for n=1	1.5	1.5	1.5
Secondary energy exponential scaling parameter for n=2	1.75	1.75	1.75
Secondary energy exponential scaling parameter for n=3	1	1	1
Secondary energy exponential scaling parameter for n=4	3.75	3.75	3.75
Secondary energy exponential scaling parameter for n=5	8.5	8.5	8.5
Secondary energy exponential scaling parameter for n=6	11.5	11.5	11.5
Secondary energy exponential scaling parameter for n=7	2.5	2.5	2.5
Secondary energy exponential scaling parameter for n=8	3	3	3
Secondary energy exponential scaling parameter for n=9	2.5	2.5	2.5
Secondary energy exponential scaling parameter for n=10	3	3	3

Numerical Parameters

Time step during bunch	3.36	3.36	4.60
Time step between bunches	91.60	91.60	88.50
Number of macroelectrons generated per bunch	12000	30000	12000
Central density-x dimension	4.50	4.50	4.50
Central density-y dimension	0.05	0.05	0.05

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Dipole Drift Dipole Units POSINST parameter name

10	10	10	
14	14	14 ns	
0.75	1.5	1.5 mA	
1.2	2.4	2.4 x 10^10	xnptom
7.5	15	15 mA	
133	133	133 nm	
1.33	1.33	1.33 nm	
15.4	18.31	15.4 m	
18.16	16.49	18.16 m	
1.43	1.56	1.43 mm	sigx
0.16	0.15	0.16 mm	sigy
17.24	17.24	17.24 mm	sigz
57	57	57 ps	

positrons	positrons	positrons	
768.43	768.43	768.43 m	circ
5.29	5.29	5.29 GeV	beamen

elliptical	elliptical	elliptical	
4.5H X 2.5V	4.5H X 2.5V	4.5H X 2.5V	cm ach X bch
Aluminum	Aluminum	Aluminum	

Dipole	field free	Dipole	
1	1	1 m	slength
2011	0	2011 Gauss	bfield

		photons/meter/	
1.14	0.58	1.14 beam particle	photpbpm
0.61	0.23	0.61	

		photoelectrons/	
0.1	0.1	0.1 photon	qeffp
10	10	10 %	refleff
5	5	5 eV	ek0phel
5	5	5 eV	eksigphel
1	1	1 mm	sigyphel
1	1	1	pangphel

Aluminum	Aluminum	Aluminum	
1.8	1.8	1.8	deltpk
310	310	310 eV	E0pk

0.02	0.02	0.02	P1einf
0.45	0.45	0.45	P1epk
0	0	0 eV	E0epk
15	15	15 eV	E0w
2	2	2 eV	sige
1	1	1	powe
0.26	0.26	0.26	epar1
2	2	2	epar2

0.17	0.16	0.17	P1rinf
0.04	0.04	0.04 eV	Ecr
0.1	0.1	0.1	qr
0.5	0.5	0.5	pr
0.26	0.26	0.26	rpar1
2	2	2	rpar2

310	310	310 eV	E0tspk
1.62	1.62	1.62	dtspk
1.54	1.54	1.54	powts
0.66	0.66	0.66	epar1
0.8	0.8	0.8	epar2
0.7	0.7	0.7	epar1
1	1	1	epar2
0	0	0	epar1

0	0	0	epar2
2.5	2.5	2.5	pnpar (1)
3.3	3.3	3.3	pnpar (2)
2.5	2.5	2.5	pnpar (3)
2.5	2.5	2.5	pnpar (4)
2.8	2.8	2.8	pnpar (5)
1.3	1.3	1.3	pnpar (6)
1.5	1.5	1.5	pnpar (7)
1.5	1.5	1.5	pnpar (8)
1.5	1.5	1.5	pnpar (9)
1.5	1.5	1.5	pnpar (10)
1.5	1.5	1.5 eV	enpar (1)
1.75	1.75	1.75 eV	enpar (2)
1	1	1 eV	enpar (3)
3.75	3.75	3.75 eV	enpar (4)
8.5	8.5	8.5 eV	enpar (5)
11.5	11.5	11.5 eV	enpar (6)
2.5	2.5	2.5 eV	enpar (7)
3	3	3 eV	enpar (8)
2.5	2.5	2.5 eV	enpar (9)
3	3	3 eV	enpar (10)

4.60	4.60	4.60 ps
88.50	88.50	88.50 ps
30000	12000	30000
4.50	4.50	4.50 mm
0.05	0.05	0.05 mm

Density data 1.885 GeV 10 bunch train 0.75 mA/bunch 4/2/07

bunch number	density-(10¹⁰ /m³)	error
25		
1	5.07E-06	0
2	1.17	1
3	4.53	1
4	8.05	1
5	10.51	1
6	12.98	1
7	15.68	1
8	17.26	1
9	19.02	1
10	22.19	1
11	17.93	1
12	12.46	1
13	11.58	1
14	15.52	1
15	14.26	1
16	11.33	1
17	10.22	1
18	9.24	1
19	10.59	1
20	8.5	1
22	7.54	1
26	3.82	1
30	2.54	1
34	4.04	1
38	0.69	1
42	5.15	1

Density data 5.3 GeV 10 bunch train 0.75 mA/bunch 6/15/08

bunch numbedensity error

24

1	0	0
2	3.62	1.09
3	10.85	1.09
4	14.83	1.09
5	19.53	1.09
6	22.79	1.09
7	26.04	1.09
8	30.02	1.09
9	32.55	1.09
10	35.08	1.09
11	37.62	4.63
12	24.6	7.79
13	28.21	8.44
14	19.53	5.83
15	21.7	5.12
16	19.17	4.22
17	19.89	4.22
18	18.08	7.55
19	16.64	3.9
20	14.83	4.22
25	10.85	4.09
30	9.4	3.62
35	10.13	3.07
40	6.51	3.62
45	5.79	3.07

Density data 5.3 GeV 10 bunch train 1.5 r

bunch numbedensity error

24

1	0	1.06
2	8.32	1.06
3	14.83	1.06
4	24.96	1.06
5	32.91	1.06
6	38.7	1.06
7	40.15	1.06
8	38.7	1.06
9	45.94	1.06
10	53.17	1.06
11	53.53	7.79
12	35.45	16.83
13	43.4	19.48
14	43.4	18.6
15	42.68	29.51
16	49.19	25.58
17	18.08	57.98
18	41.96	25.97
19	43.4	8.09
20	7.23	58.16
24	28.94	5.12
29	15.91	6.82
34	13.02	6.47
39	13.02	6.82
44	11.57	7.79