Michael Ehrlichman
March 26, 2006

Status of CesrTF lattice optimization jobs

Original 2.0 GeV lattice w/ rigorous wiggler tracking: emittance = 1.87 nm
1.5 GeV with wiggler polarity scaled to 75%: emittance = 1.09 nm
1.5 GeV with wiggler polarity scaled to 67.5%: emittance = 1.06 nm (preliminary)
2.0 GeV lattice wiggler polarity scaled to 90%: emittance = 1.81 nm (see note)
2.0 GeV lattice wiggler polarity scaled to 80%: emittance = 1.88 nm (see note)

Note: the 90% and 80% lattice optimizations have had about one-third as much time on the optimizer as the 100% 2.0 GeV. Further improvements for the 80% and 90% wiggler field lattices are expected.

The pages that follow contain details about these five lattices.

Common constraints:

Parameter	Dimension	Type	Value	Weight	Where
emittance	n	max	0.0	5e21	GLOBAL
phase_frac_diff		abs min	.1	1.0E8	GLOBAL
unstable_ring	n	target	0.0	1.e16	GLOBAL
beta	x	max	60.0	1.0e4	IP_L0 to IP_L0_END
beta	y	max	60.0	1.0e4	IP_L0 to IP_L0_END
beta	x	target	1.266	1.0e1	IP_L0
beta	y	target	27.25	5.0e1	IP_L0
eta	x	abs max	3.0	2.0e1	IP_L0 to IP_L0_END
chrom	x	target	1.0	1.0	GLOBAL
chrom	y	target	1.0	1.0	GLOBAL

Table 1: Constraints common to all five optimizations.

Original 2.0 GeV lattice w/ rigorous wiggler tracking
Details

Name	Dimension	Model Data	Where
emittance	a	1.8739E-09	
beta	x	5.9164E+01	Max for any element
beta	y	5.8590E+01	Max for any element
beta	x	1.0888E+00	Value at IP_L0
beta	y	2.8276E+01	Value at IP_L0
eta	x	2.5095E+00	Max for any element
phase	x	14.63	
phase	y	9.74	
phase_frac_diff		.11	
chrom	a	-3.9953E-01	
chrom	b	1.5080E-01	
$\sigma E/E$		8.6470E-04	

Table 2: Details of 2.0 GeV optimization at 100% wiggler field.

1.5 GeV lattice with wiggler polarity scaled to 75% Details

Name	Dimension	Model Data	Where
emittance	a	1.0888E-09	
beta	x	5.9364E+01	Max for any element
beta	y	5.8508E+01	Max for any element
beta	x	1.0633E+00	Value at IP_L0
beta	y	2.7129E+01	Value at IP_L0
eta	x	2.5122E+00	Max for any element
phase	x	14.51	
phase	y	9.76	
phase_frac_diff		.14	
chrom	a	-4.4824E-02	
chrom	b	-7.1800E-01	
$\sigma E/E$		6.2249E-04	

Table 3: Details of 1.5 GeV optimization at 75% wiggler field.

1.5 GeV lattice with wiggler polarity scaled to 67.5% Details

Name	Dimension	Model Data	Where
emittance	a	1.0638E-09	
beta	x	6.0013E+01	Max for any element
beta	y	5.7432E+01	Max for any element
beta	x	1.0862E+00	Value at IP_L0
beta	y	2.7353E+01	Value at IP_L0
eta	x	2.4573E+00	Max for any element
phase	x	14.58	
phase	y	9.72	
phase_frac_diff		.13	
chrom	a	5.4692E-01	
chrom	b	-4.0100E-01	
$\sigma E/E$		6.0901E-04	

Table 4: Details of 1.5 GeV optimization at 67.5% wiggler field.

2.0 GeV lattice with wiggler polarity scaled to 90% Details

Name	Dimension	Model Data	Where
emittance	a	1.8144E-09	
beta	x	5.9934E+01	Max for any element
beta	y	5.7461E+01	Max for any element
beta	x	1.0506E+00	Value at IP_L0
beta	y	2.7688E+01	Value at IP_L0
eta	x	2.5008E+00	Max for any element
phase	x	14.71	
phase	y	9.57	
phase_frac_diff		.15	
chrom	a	-4.6511E-01	
chrom	b	1.4774E-01	
$\sigma E/E$		8.1202E-04	

Table 5: Details of 2.0 GeV optimization at 90% wiggler field.

2.0 GeV lattice with wiggler polarity scaled to 80% Details

Name	Dimension	Model Data	Where
emittance	a	1.8758E-09	
beta	x	5.9935E+01	Max for any element
beta	y	5.8642E+01	Max for any element
beta	x	1.0921E+00	Value at IP_L0
beta	y	2.7037E+01	Value at IP_L0
eta	x	2.4849E+00	Max for any element
phase	x	14.71	
phase	y	9.45	
phase_frac_diff		.26	
chrom	a	-1.1390E+00	
chrom	b	-4.3019E-02	
$\sigma E/E$		7.8821E-04	

Table 6: Details of 2.0 GeV optimization at 80% wiggler field.