Cornell University
Laboratory for Elementary-Particle Physics

Synchrotron Radiation Profile Analysis for CERL 8.1

J.A. Crittenden, C.E. Mayes, Y. Li, D.C. Sagan

Detailed analysis of synchrotron radiation profiles has been required by the sophisticated CesrTA measurements of electron cloud buildup.

These tools have now been applied to the ERL lattice

Cornell Laboratory for Accelerator-Based Sciences and Education

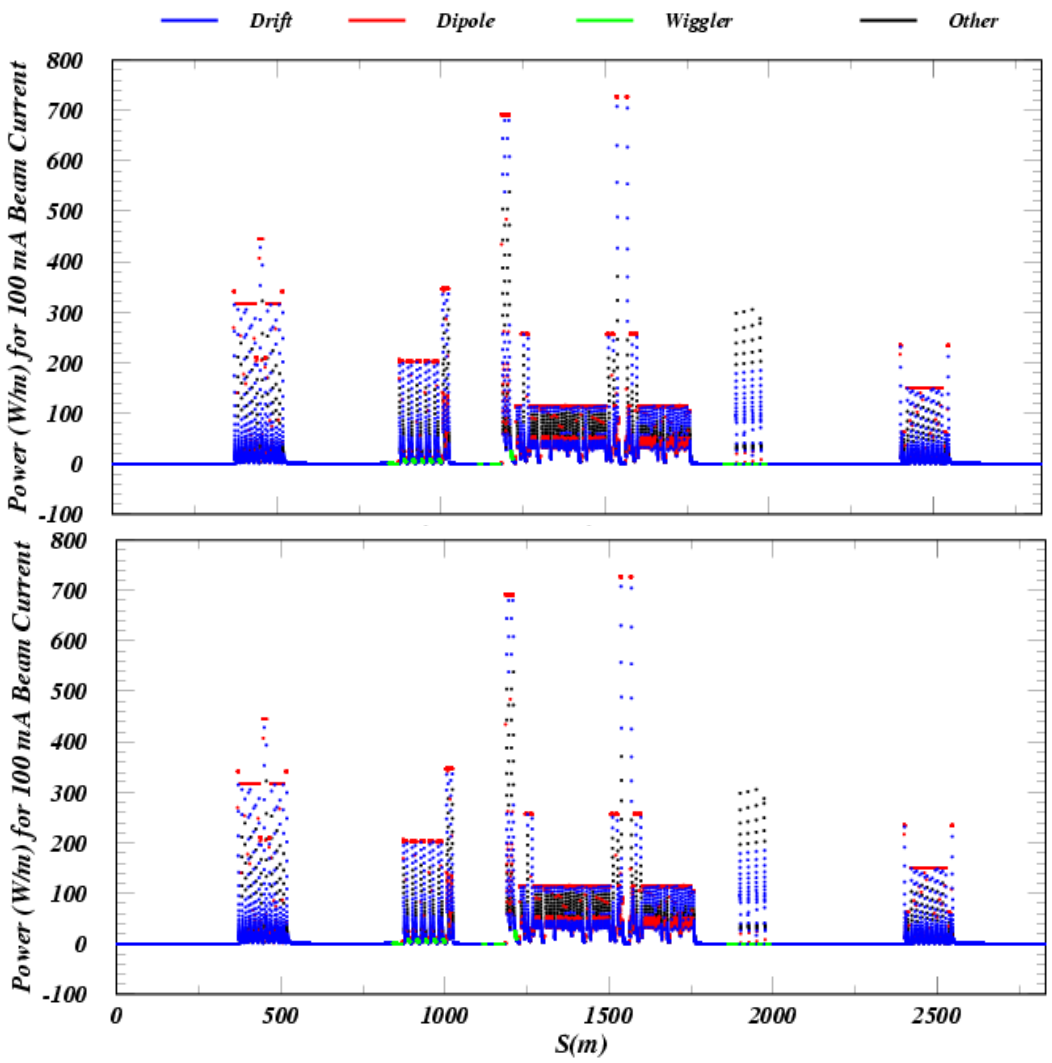
Electron Cloud Meeting

4 March 2010

Linear Power Density

Outer Vacuum Chamber Wall

Inner Vacuum Chamber Wall



Less than 800 W/m.

Element-averages of Twiss functions, beam sizes and photon rates

Outer Vacuum Chamber Wall

Element	Nr Seg	<Length>	Tot Length	Fraction	<Beta X>	<Beta Y>	<Sig X>	<Sig Y>	<Phot/m/e>
Dipole	6589	0.100	658.9	23.3%	14.8	53.7	0.168	0.036	1.117
Drift	17755	0.100	1775.2	62.7%	35.5	38.9	0.056	0.031	0.075
Wiggler	1310	0.100	131.0	4.6%	11.0	11.0	0.017	0.017	0.012
Quadrupole	2349	0.100	234.9	8.3%	30.7	45.5	0.097	0.032	0.237
Sextupole	293	0.100	29.3	1.0%	26.1	59.0	0.218	0.036	0.317
Solenoid	4	0.100	0.4	0.0%	11.4	11.4	0.018	0.018	0.000
Octupole	0	0.000	0.0	0.0%	0.0	0.0	0.000	0.000	0.000
Non-dipole	21711	0.100	2170.9	76.7%	33.4	38.2	0.060	0.030	0.092
Non-drift	10545	0.100	1054.4	37.3%	18.2	46.7	0.135	0.032	0.761
Total	28300	0.100	2830.4	100.0%	29.1	41.8	0.085	0.031	0.330

Inner Vacuum Chamber Wall

Element	Nr Seg	<Length>	Tot Length	Fraction	<Beta X>	<Beta Y>	<Sig X>	<Sig Y>	<Phot/m/e>
Dipole	6589	0.100	658.9	23.3%	14.8	53.7	0.168	0.036	0.304
Drift	17755	0.100	1775.2	62.7%	35.5	38.9	0.056	0.031	0.024
Wiggler	1310	0.100	131.0	4.6%	11.0	11.0	0.017	0.017	0.020
Quadrupole	2349	0.100	234.9	8.3%	30.7	45.5	0.097	0.032	0.123
Sextupole	293	0.100	29.3	1.0%	26.1	59.0	0.218	0.036	0.072
Solenoid	4	0.100	0.4	0.0%	11.4	11.4	0.018	0.018	0.000
Octupole	0	0.000	0.0	0.0%	0.0	0.0	0.000	0.000	0.000
Non-dipole	21711	0.100	2170.9	76.7%	33.4	38.2	0.060	0.030	0.035
Non-drift	10545	0.100	1054.4	37.3%	18.2	46.7	0.135	0.032	0.222
Total	28300	0.100	2830.4	100.0%	29.1	41.8	0.085	0.031	0.098

Coarse step size of 10 cm used for this example.