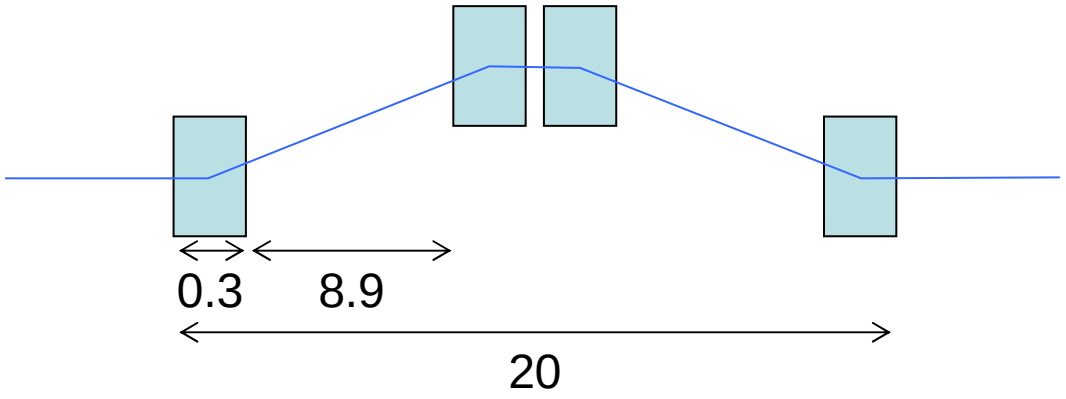
XFEL-BC2 @ 2.5GeV vs compression, chirp = 9.634 MeV/100µm



I_{peak}/kA (no CSR) = 5.5	compression = 5	R56/mm = –20.76	R_{bend}/m = 8.890
10	9.1	–23.10	8.430
15	13.6	–24.05	8.261
20	18.2	–24.52	8.181
30	27.3	–25.00	8.103
40	36.4	–25.24	8.065
∞	full	–25.95	7.953
40	–36.4	–26.67	7.846
20	–18.2	–27.38	7.744

initial distribution: ideal gaussian, q = 1nC, σ = 100 µm, dE=5keV@50A

$\varepsilon_{nx} = 10^{-6}$, $\beta_x = 47.5$ m, $\alpha_x = 2.3$

$\sigma_y = 100\ \mu m \cdot (1000/\gamma)^{1/2}$

XFEL-BC2 @ 2.5GeV vs compression, chirp = 9.634 MeV/100µm

(no CSR)		(slice)	(proj)	(slice)
I_{peak}/kA = 5.5	Ipeak/kA ≈ 5.5	emitt. ≈ 1.01	emitt. ≈ 2.0	RMS(dE)/MeV ≈ 0.45
10	9.7	1.08	3.3	0.8
15	14.8	1.25	5.4	1.2
20	19.1	2	7	2
30	31.9	3.1	12	4
40	41.3	6	16	5
∞	68.1	16	27	7.5
40	76	14	19	7
20	43	3.1	11	4

projected method numbers:
from plots by eye

I_{peak}/kA (no CSR) = 5.5

slice with I_peak:
Green's projected

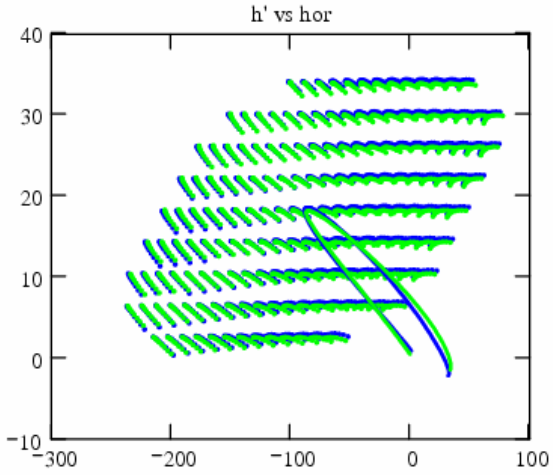
emittance(x1) = 1.001×10^{-6}
emittance(x2) = 10×10^{-7}

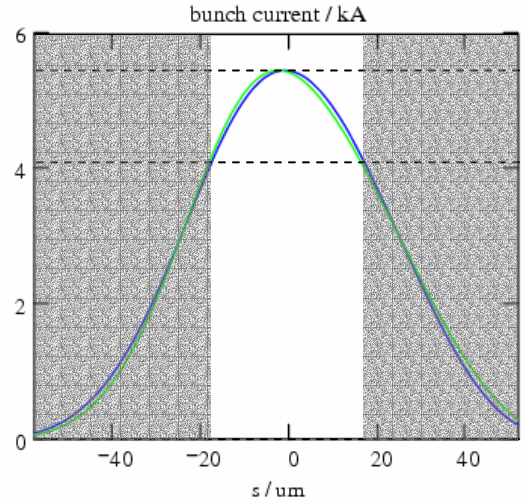
slice

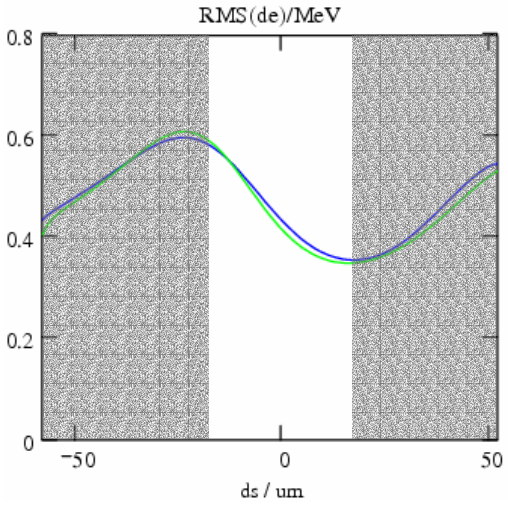
E0 = 2.5×10^{9}

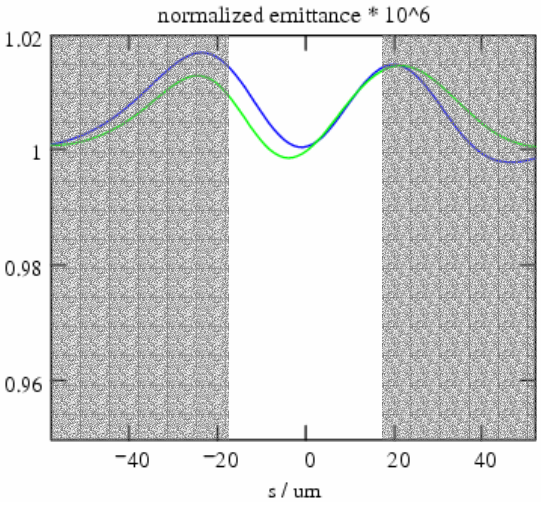
emittance(X1) = 2.01×10^{-6}
emittance(X2) = 1.951×10^{-6}

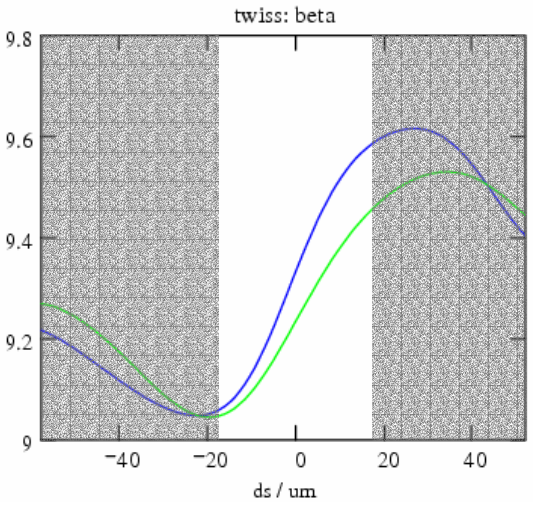
full











I_{peak}/kA (no CSR) = 10

slice with I_peak:
cf=9.1
Green's projected

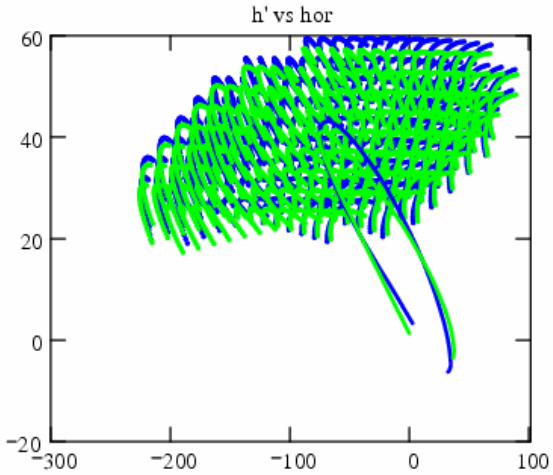
emittance(x1) = 1.017×10^{-6}
emittance(x2) = 1.006×10^{-6}

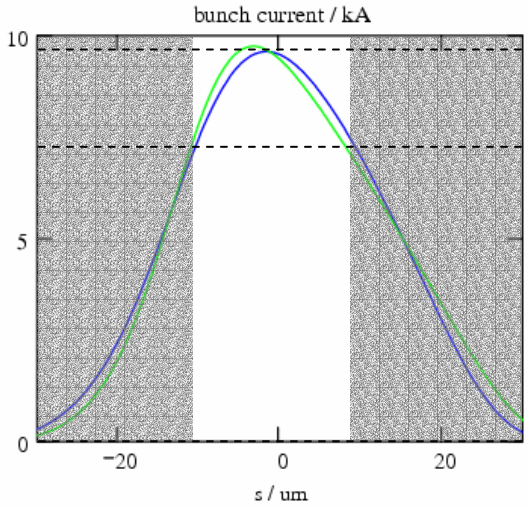
slice

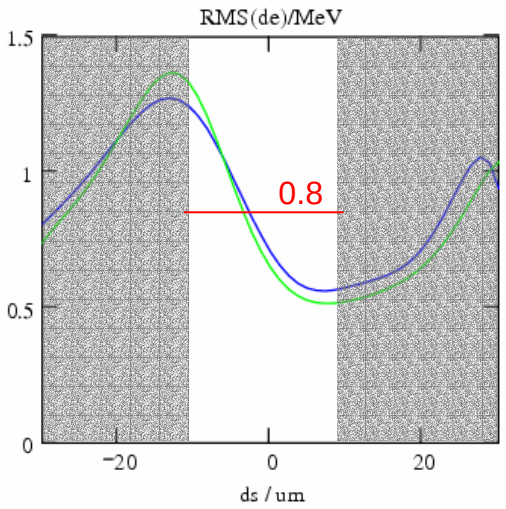
E0 = 2.5×10^{9}

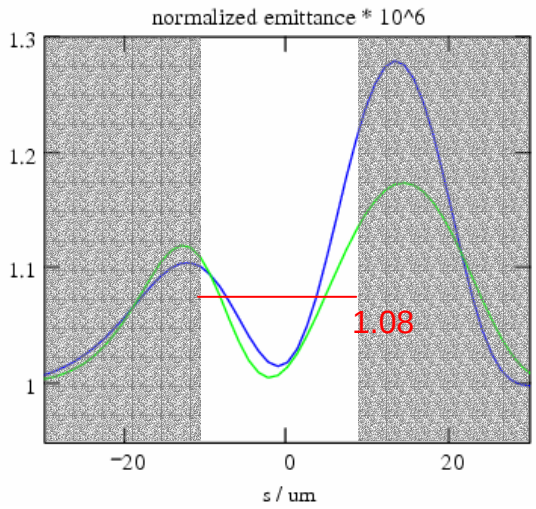
emittance(X1) = 3.551×10^{-6}
emittance(X2) = 3.297×10^{-6}

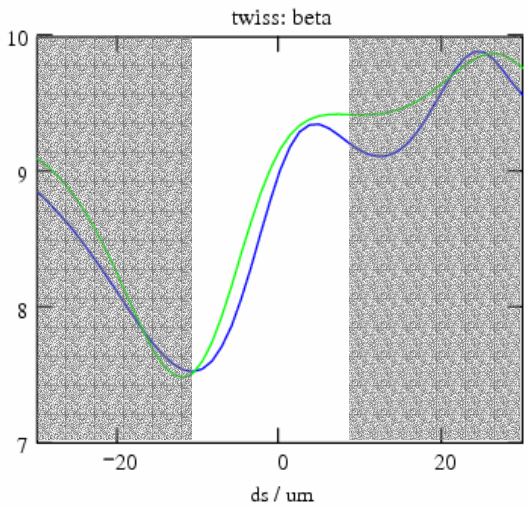
full











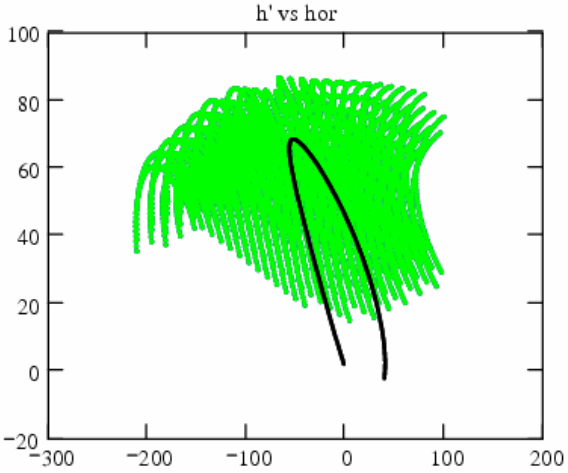
I_{peak}/kA (no CSR) = 15

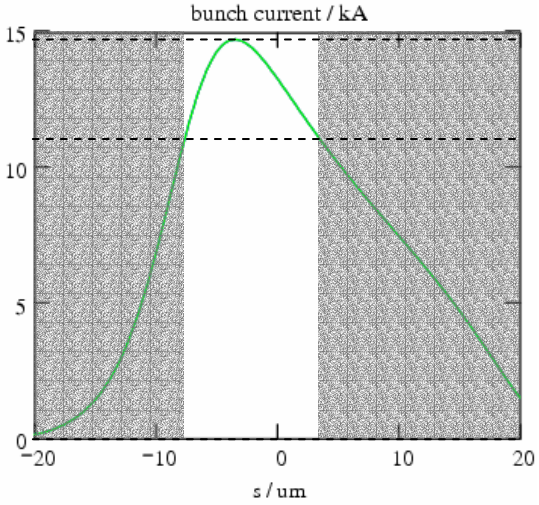
slice with I_peak:
cf=13.6
Green's projected

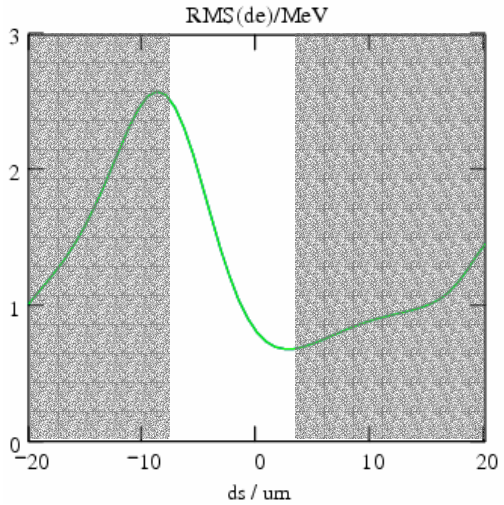
emittance(x2) = 1.178×10^{-6} slice

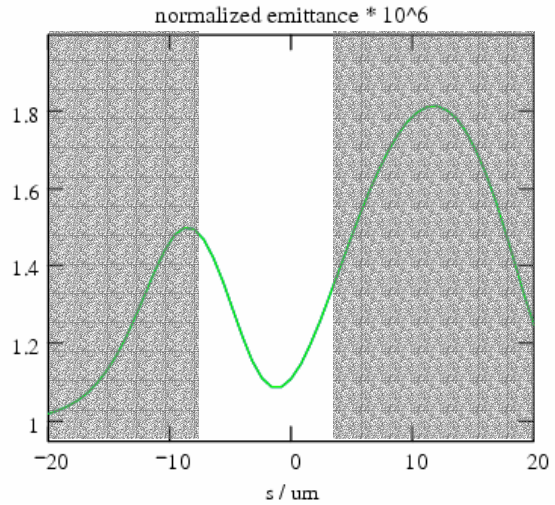
E0 = 2.5×10^{9}

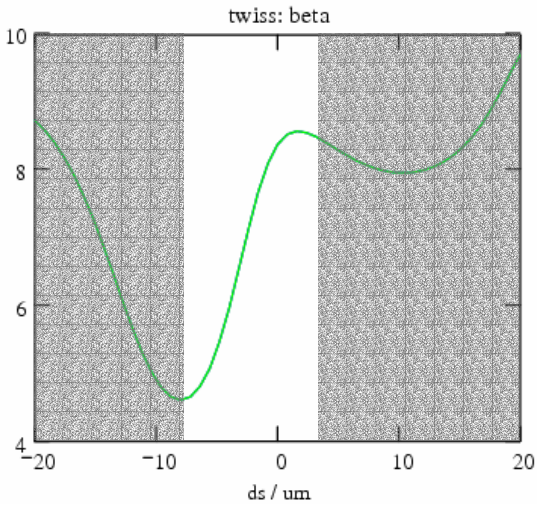
emittance(X2) = 5.366×10^{-6} full











I_{peak}/kA (no CSR) = 20

slice with I_peak:
cf=18.2
Green's projected

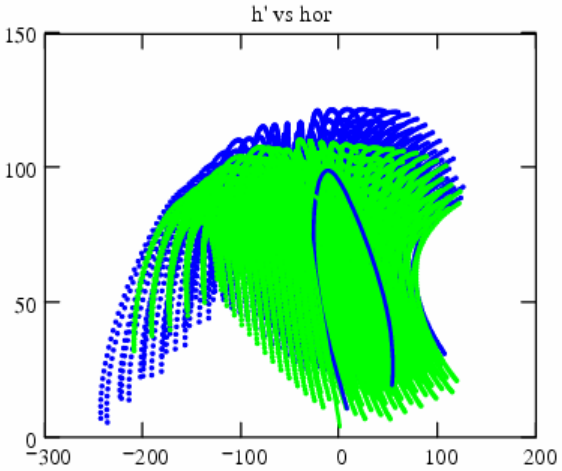
emittance(x1) = 1.833×10^{-6}
emittance(x2) = 1.554×10^{-6}

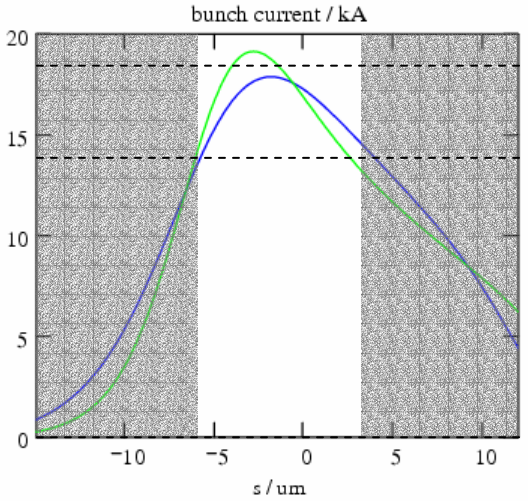
slice

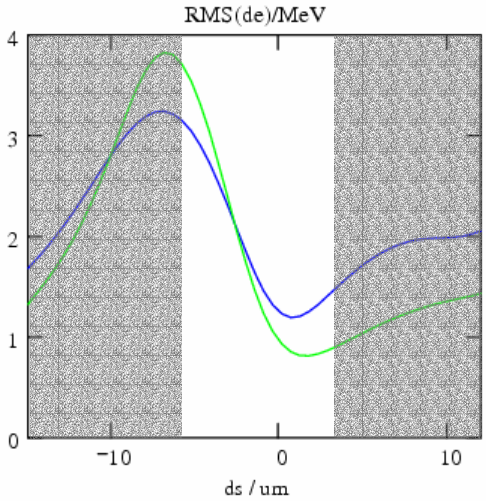
E0 = 2.5×10^{9}

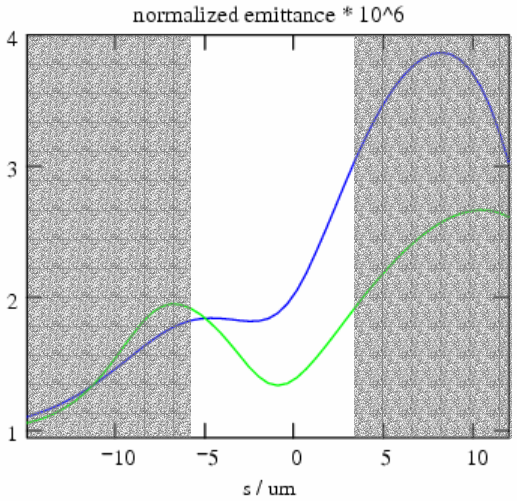
emittance(X1) = 8.354×10^{-6}
emittance(X2) = 6.911×10^{-6}

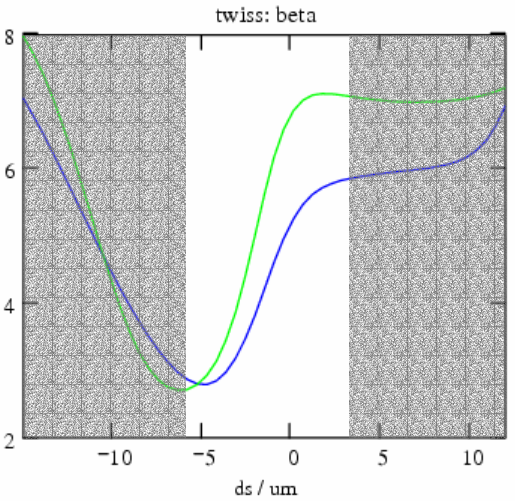
full











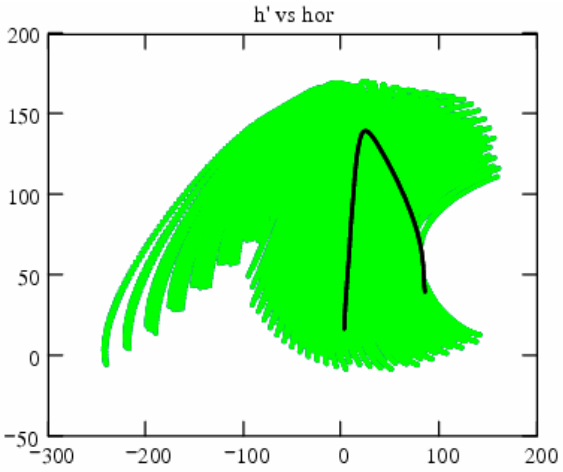
I_{peak}/kA (no CSR) = 30

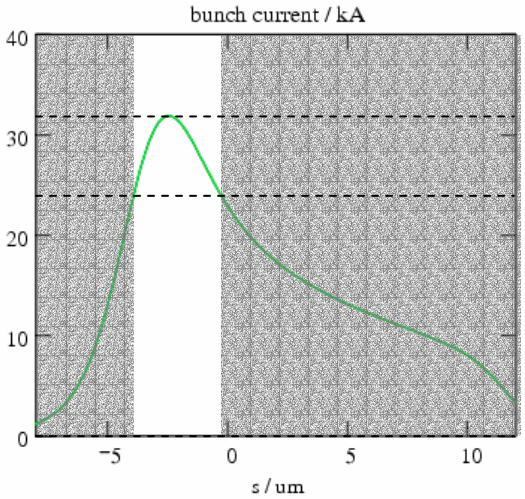
slice with I_peak:
cf=27.3
Green's projected

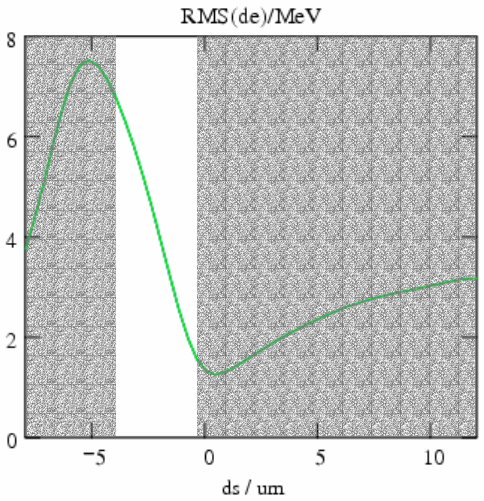
emittance(x2) = 3.266×10^{-6} slice

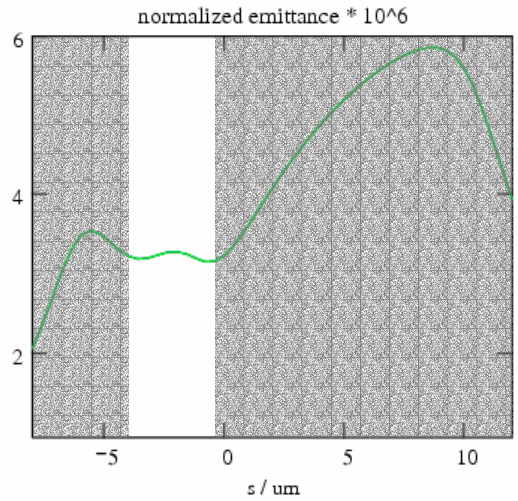
E0 = 2.5×10^{9}

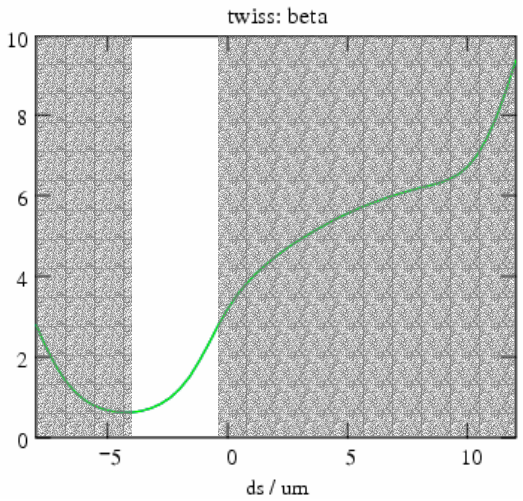
emittance(X2) = 1.211×10^{-5} full











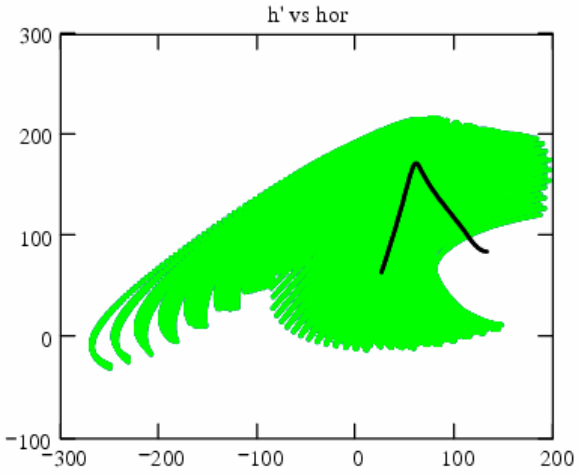
I_{peak}/kA (no CSR) = 40

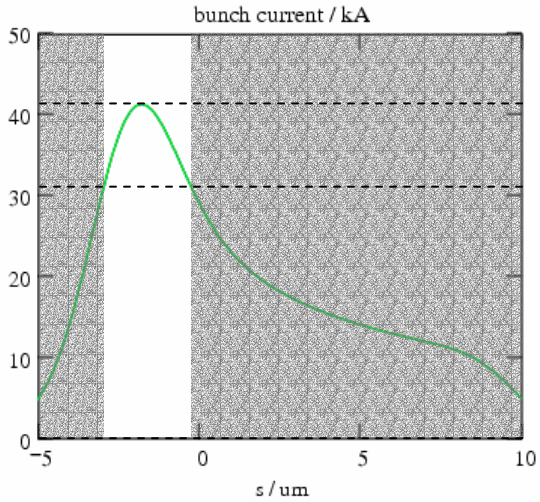
slice with I_peak:
cf=36.4
Green's projected

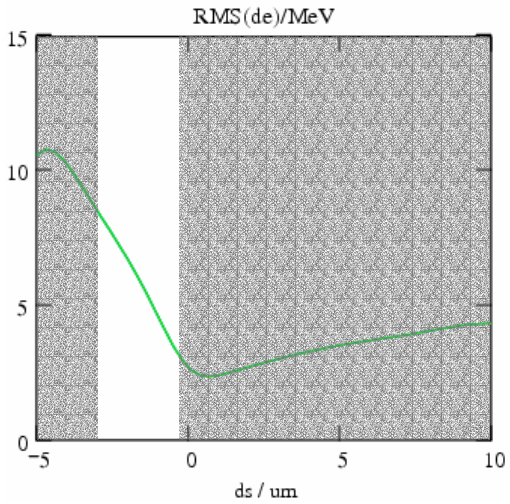
emittance(x2) = 5.883×10^{-6} slice

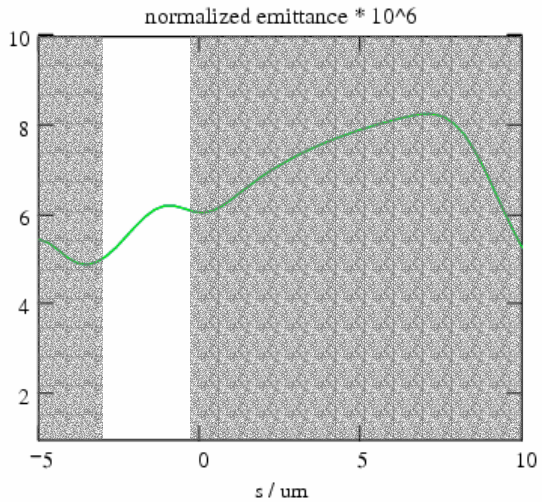
$E0 = 2.5 \times 10^{9}$

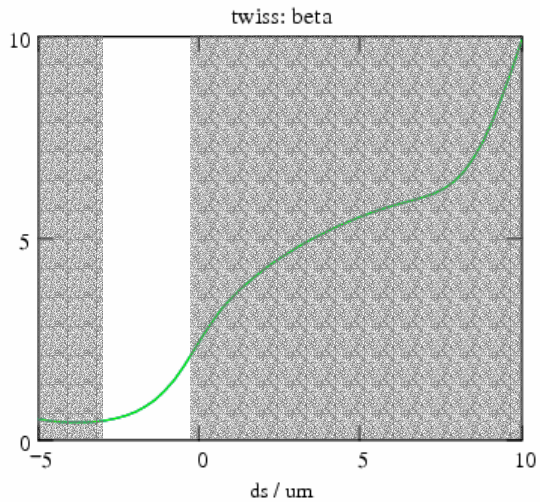
emittance(X2) = 1.597×10^{-5} full











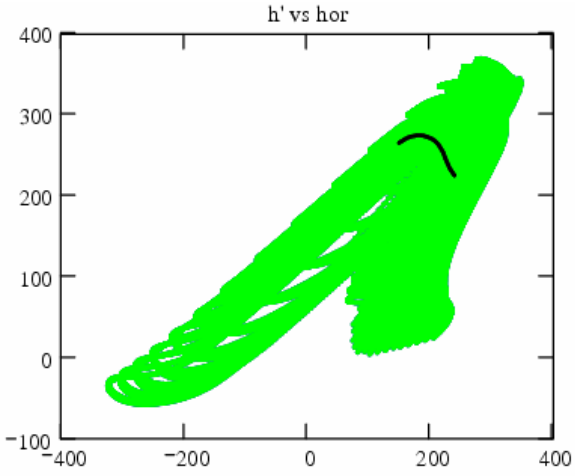
I_{peak}/kA (no CSR) = full

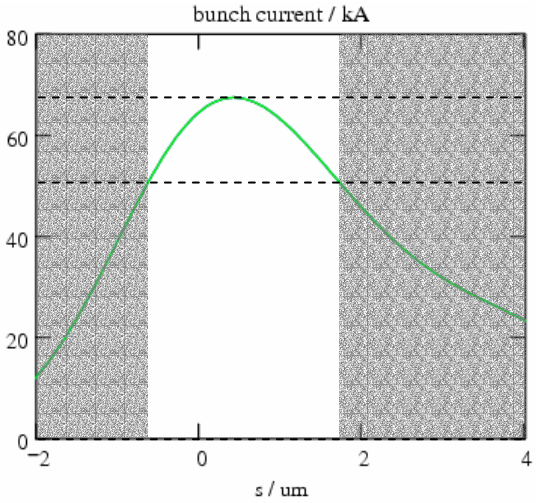
slice with I_peak:
cf=full
Green's projected

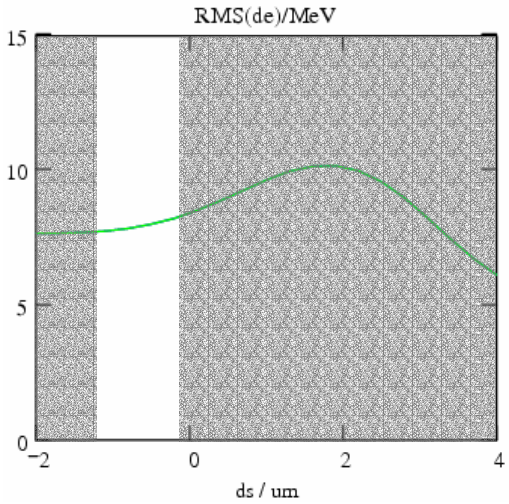
emittance(x2) = 1.8×10^{-5} slice

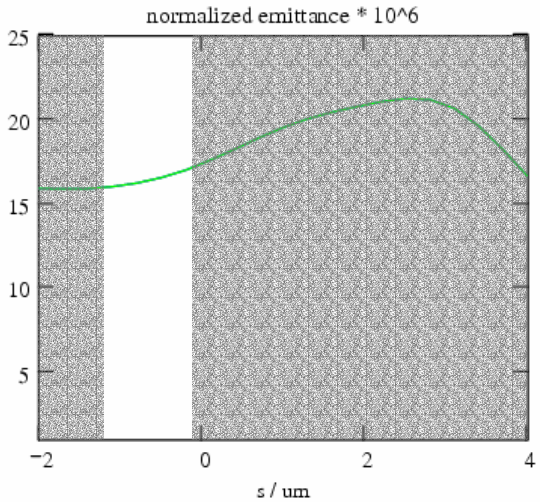
$E0 = 2.5 \times 10^{9}$

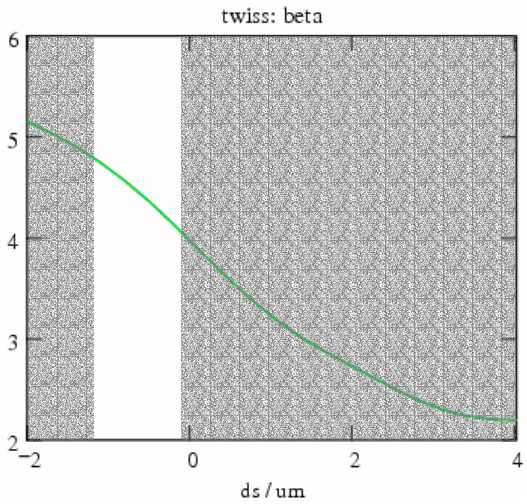
emittance(X2) = 2.66×10^{-5} full











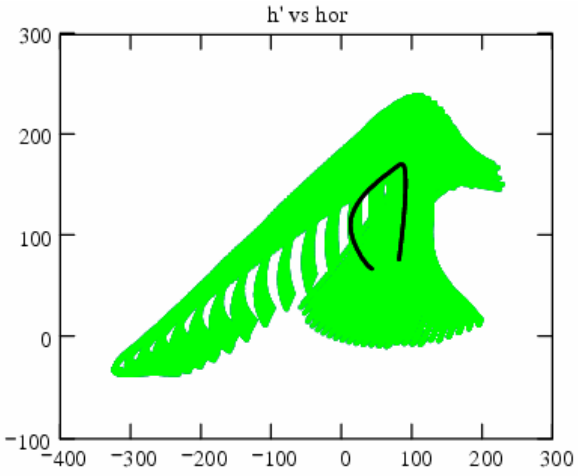
I_{peak}/kA (no CSR) = 40 (overc.)

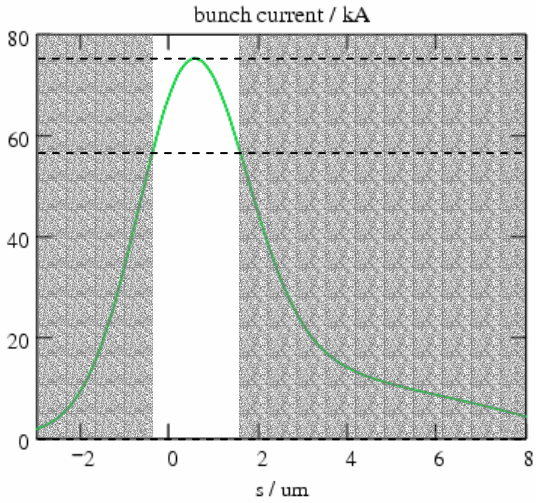
slice with I_peak:
cf=-36.4
Green's projected

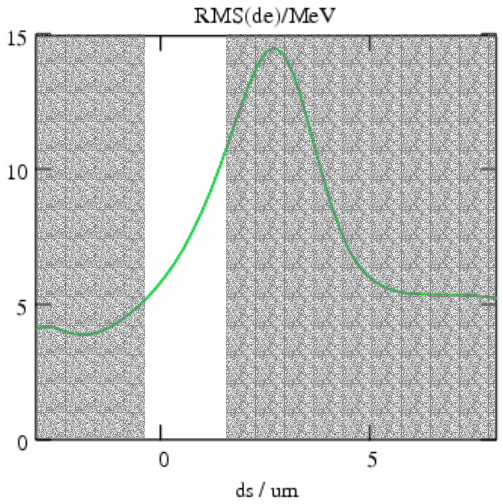
emittance(x2) = 1.441×10^{-5} slice

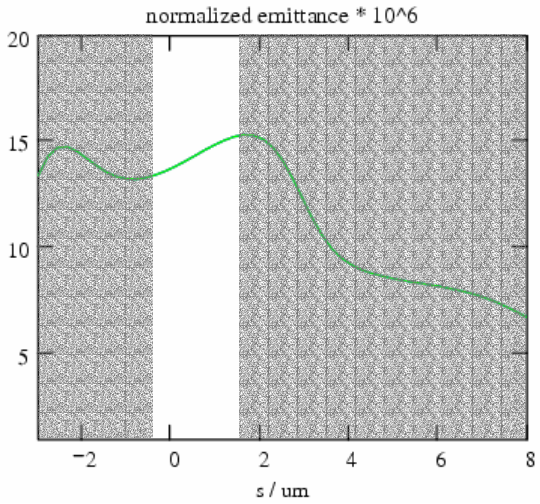
E0 = 2.5×10^{9}

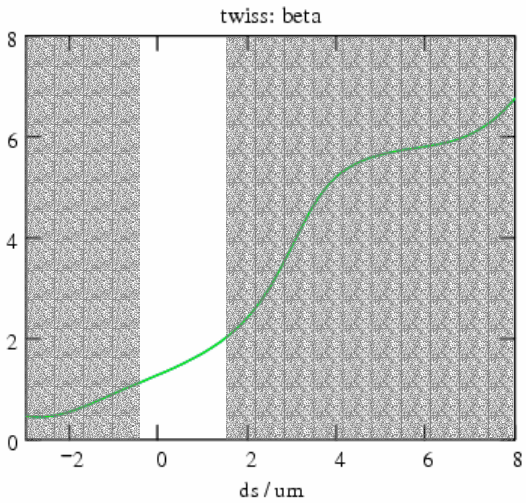
emittance(X2) = 1.873×10^{-5} full











I_{peak}/kA (no CSR) = 20 (overc.)

slice with I_peak:
cf=-18.2
Green's projected

emittance(x2) = 3.358×10^{-6} slice

E0 = 2.5×10^{9}

emittance(X2) = 1.095×10^{-5} full