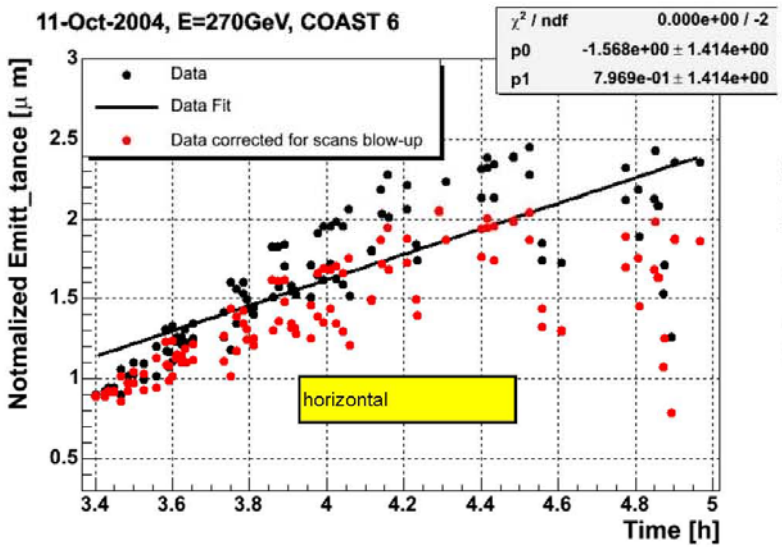
new results of data analysis for SPS collimator

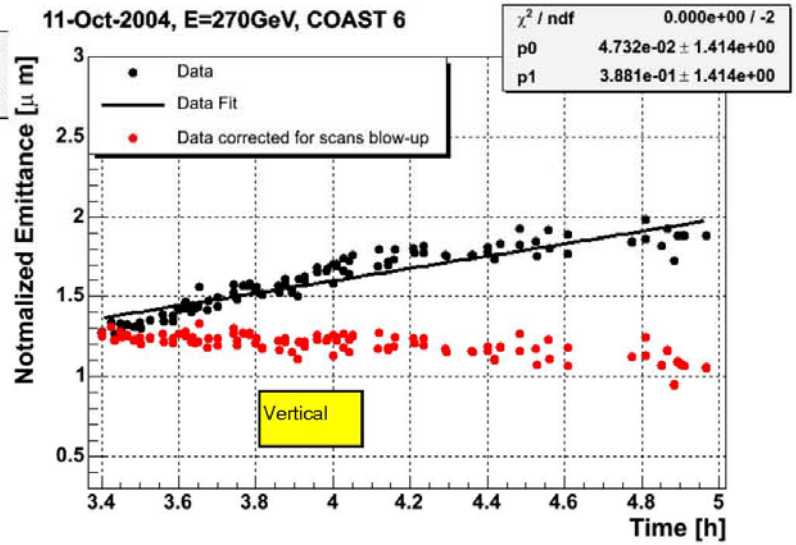
Re-analysis of SPS collimator MD

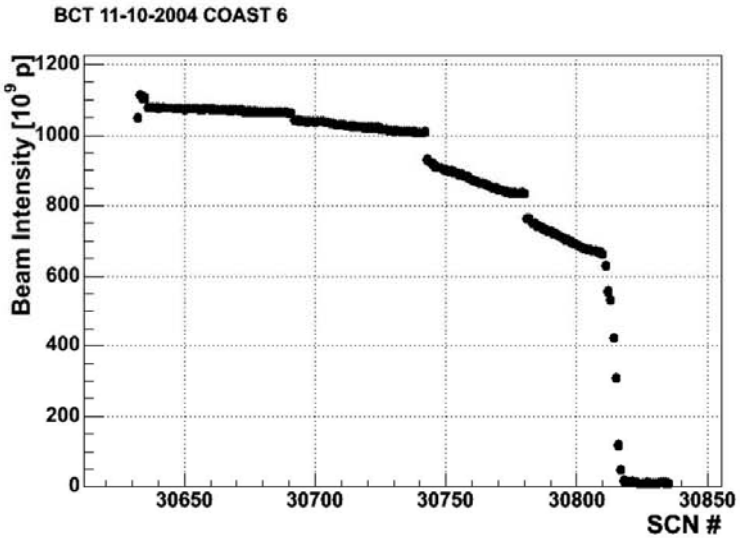
Thanks to G. Arduini, E. Metral, F. Roncarolo

time (readme)	time (Marek)	sc number	gap [mm] readme	gap [mm] Marek	err [mm]	dq [Hz]	err [Hz]	dQ [10^{-3}]	dQ_err [10^{-3}]
03:30	03:35:42	30650-30671	4.8 mm	4.86	0.05	2.07	0.47	0.0477	0.0108
03:41	03:45:28	30672-30690	3.8 mm	3.86	0.05	3.28	0.49	0.0756	0.0113
03:50-03:52	04:01:57	30690-30694	2.8 mm	2.86	0.05	5.96	0.64	0.1373	0.0147
04:14	04:21:49	30738-30778	2.1 mm (10% losses)	2.26	0.05	9.28	0.57	0.2138	0.0131
04:34-04:42	04:39:44	30779-30794	1.9 mm (15% losses)	1.96	0.05	10.49	0.50	0.2417	0.0115
05:25	05:29:56	30879-30897	3.8 mm	3.86	0.05	2.73	0.77	0.0629	0.0177
05:34	05:37:34	30898-30913	2.8 mm	2.86	0.05	6.38	0.549	0.1470	0.0126
05:42	05:45:51	30914-30929	2.4 mm (2% losses)	2.46	0.05	8.48	0.37	0.1954	0.0085
05:50	05:53:19	30930-30943	2.0 mm (6% losses)	2.06	0.05	11.82	0.53	0.2723	0.0122
05:57-06:12	06:04:37	30944-30973	1.8 mm (9% losses)	1.86	0.05	11.46	0.54	0.2640	0.0124

Coast 6 emittances and intensities







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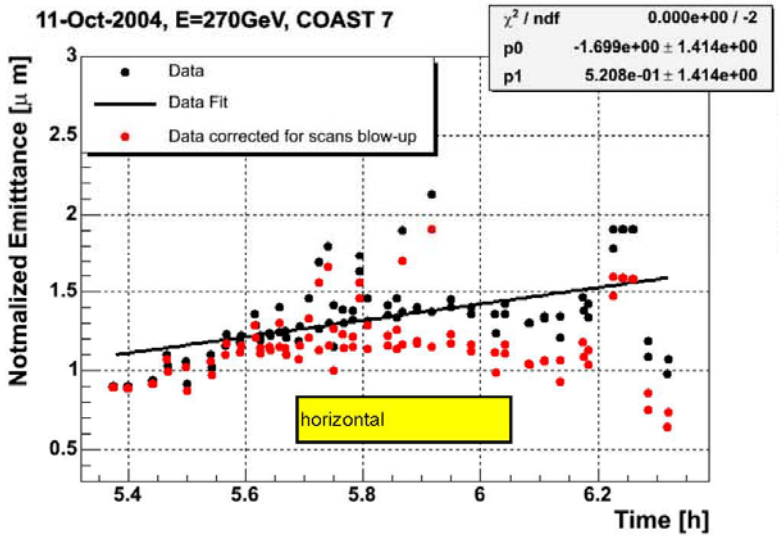
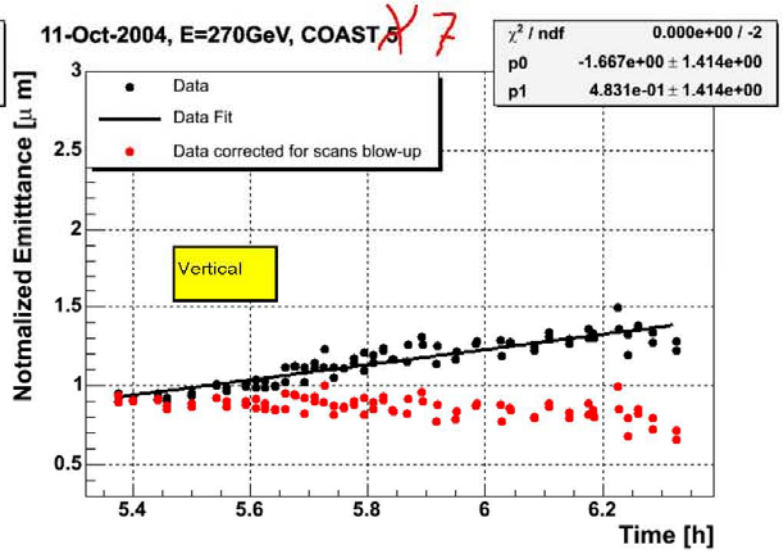
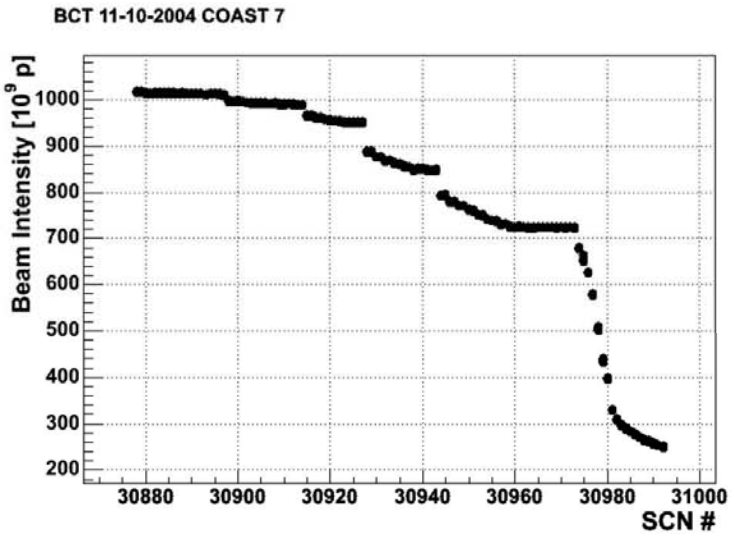
Federico Roncarolo

Coast 7 emittances and intensities







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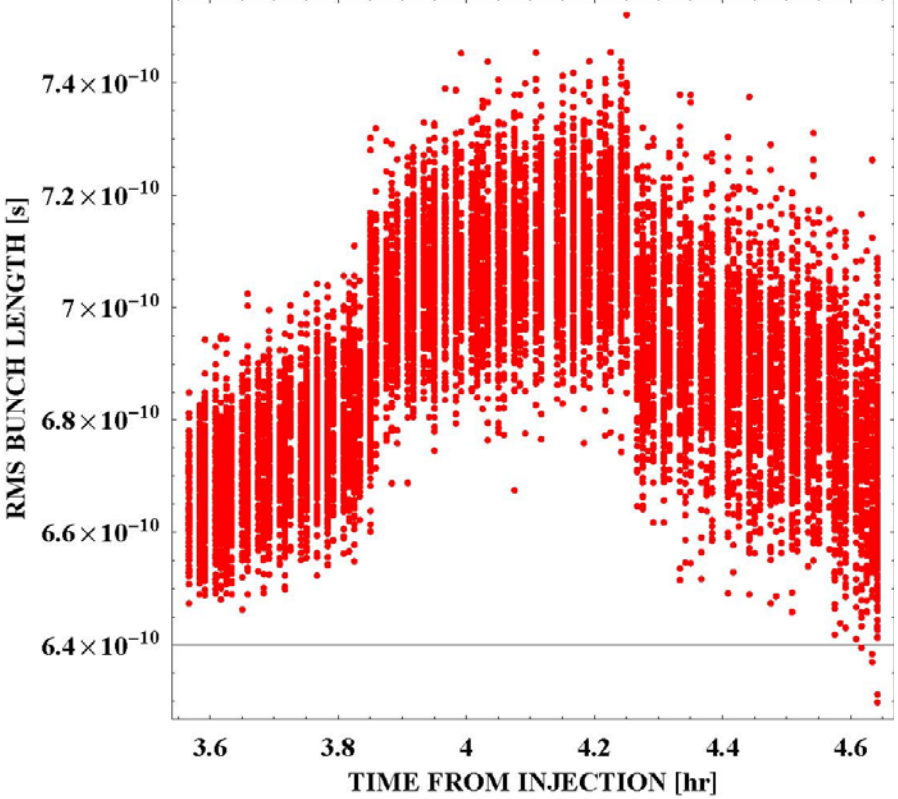
Federico Roncarolo

emittances from F. Roncarolo

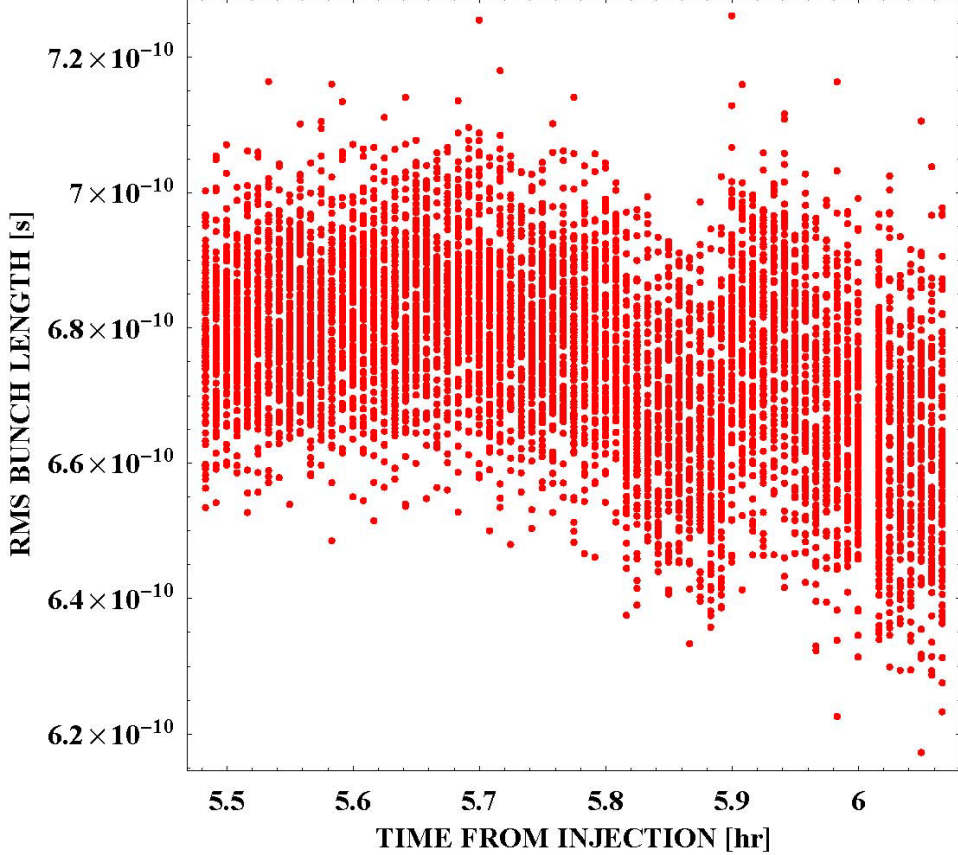
time (readme)	time (Marek)	sc number	EmitXN [micron]	EmitX_err [micron]	EmitYn [micron]	EmitY_err [micron]
03:30	03:35:42	30650-30671	1.0	0.1	1.3	0.1
03:41	03:45:28	30672-30690	1.25	0.1	1.4	0.1
03:50-03:52	04:01:57	30690-30694	1.5	0.1	1.5	0.1
04:14	04:21:49	30738-30778	2.0	0.3	1.7	0.1
04:34-04:42	04:39:44	30779-30794	2.3	0.2	1.8	0.1
05:25	05:29:56	30879-30897	1.0	0.1	0.9	0.1
05:34	05:37:34	30898-30913	1.1	0.1	1.0	0.1
05:42	05:45:51	30914-30929	1.2	0.1	1.1	0.1
05:50	05:53:19	30930-30943	1.3	0.3	1.2	0.1
05:57-06:12	06:04:37	30944-30973	1.3	0.2	1.25	0.1

intensity data obtained with the help of G. Arduini and E. Metral

time (readme)	time (Marek)	sc number	intensity [1e9]	intensity error-std [1e9]	intensity error-sys [1e9]
03:30	03:35:42	30650-30671	95.72	0.20	9.6
03:41	03:45:28	30672-30690	94.91	0.25	9.5
03:50-03:52	04:01:57	30690-30694	93.58	0.95	9.4
04:14	04:21:49	30738-30778	77.15	4.77	7.7
04:34-04:42	04:39:44	30779-30794	64.37	3.08	6.4
05:25	05:29:56	30879-30897	91.47	0.17	9.1
05:34	05:37:34	30898-30913	89.63	0.55	9.0
05:42	05:45:51	30914-30929	85.54	2.47	8.6
05:50	05:53:19	30930-30943	77.10	1.32	7.7
05:57-06:12	06:04:37	30944-30973	66.16	2.94	6.62



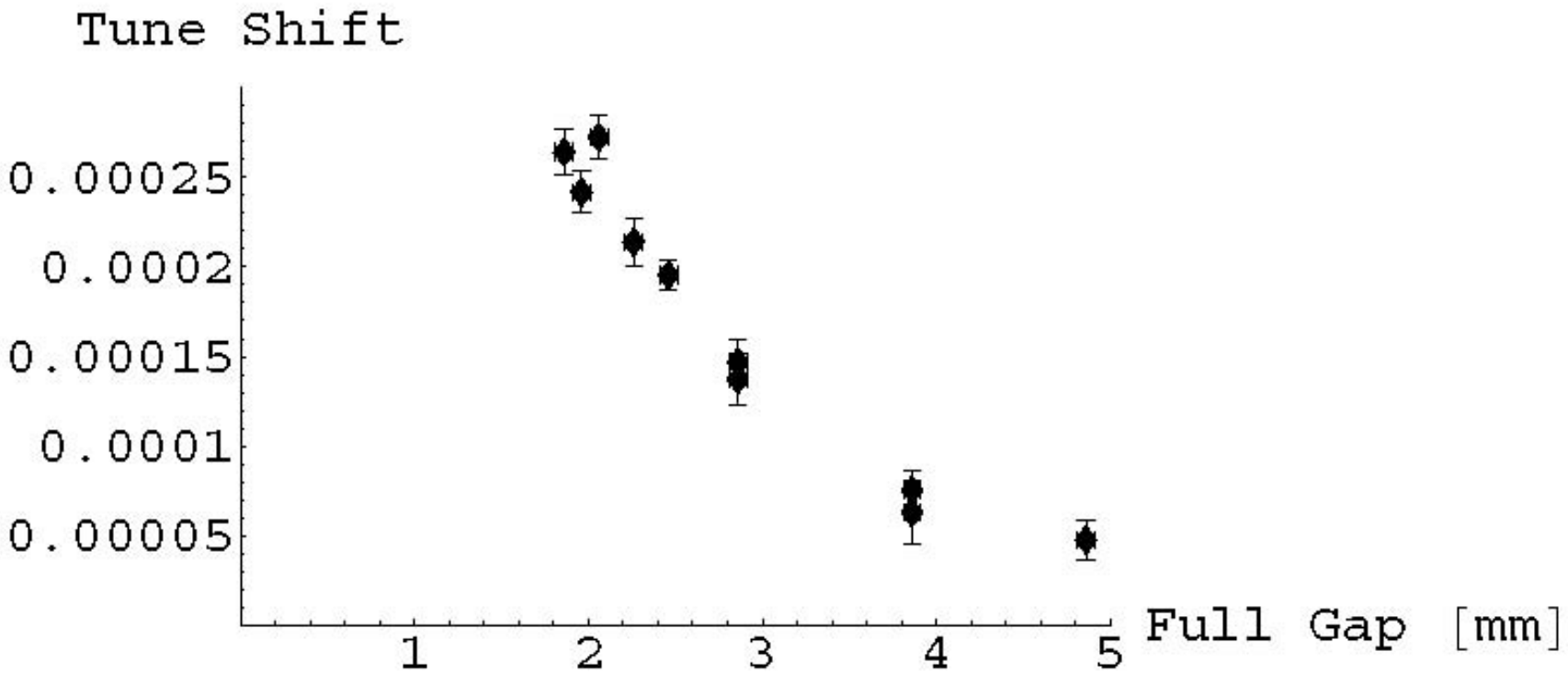
Fitted rms bunch length during Coast 6.
Average bunch length is 0.691 ns +/- 0.019 ns.
From 3.5 h to 3.683 h, the gap was 4.86 mm, from 3.683 h to 3.833 h it was 3.86 mm, from 3.833 h to 0.387 h it was 2.86 mm, from 4.233 h to 4.567 it was 2.26 mm, and from 4.567 h to 4.7 h 1.96 mm.
The rf tripped at 3.867 h.



Fitted rms bunch length during Coast 7.
Average bunch length: 0.675 ns +/- 0.014 ns.
From 5.83 h to 5.95 h, the gap was 2.06 mm, from 5.95 to 6.22 h it was 1.86 mm.
At 5.9 h there was a trip of TRX2.

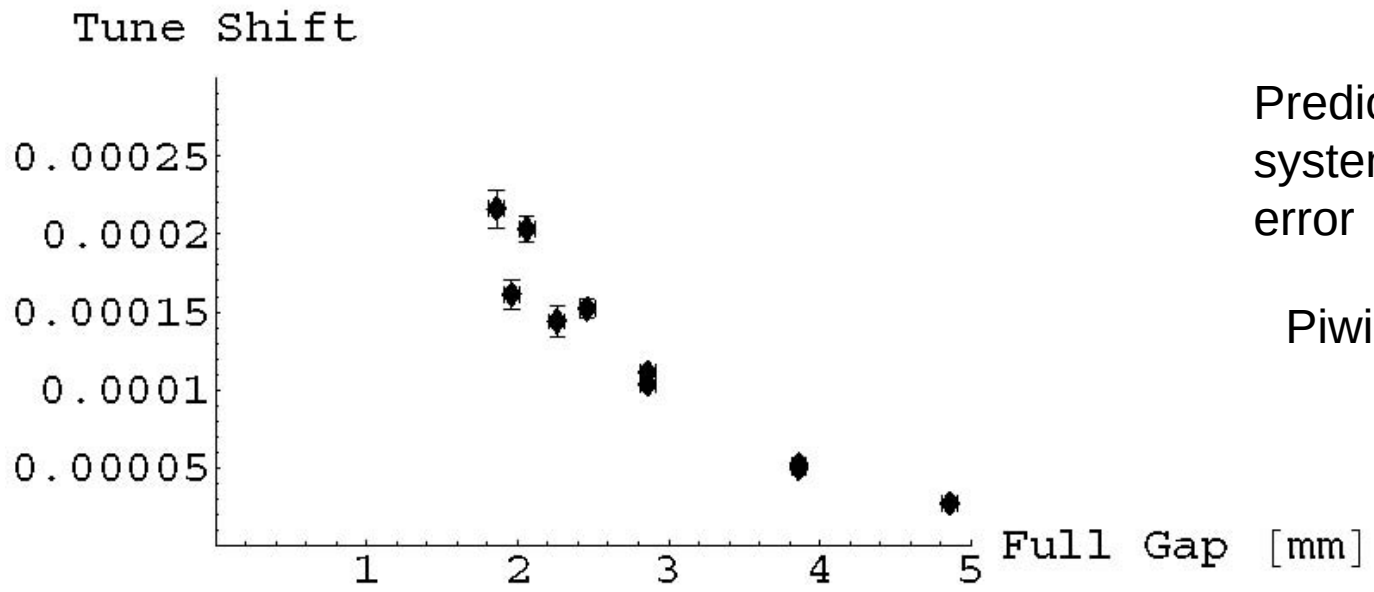
bunch-length data obtained with the help of G. Arduini

data from Marek with x and y error bars



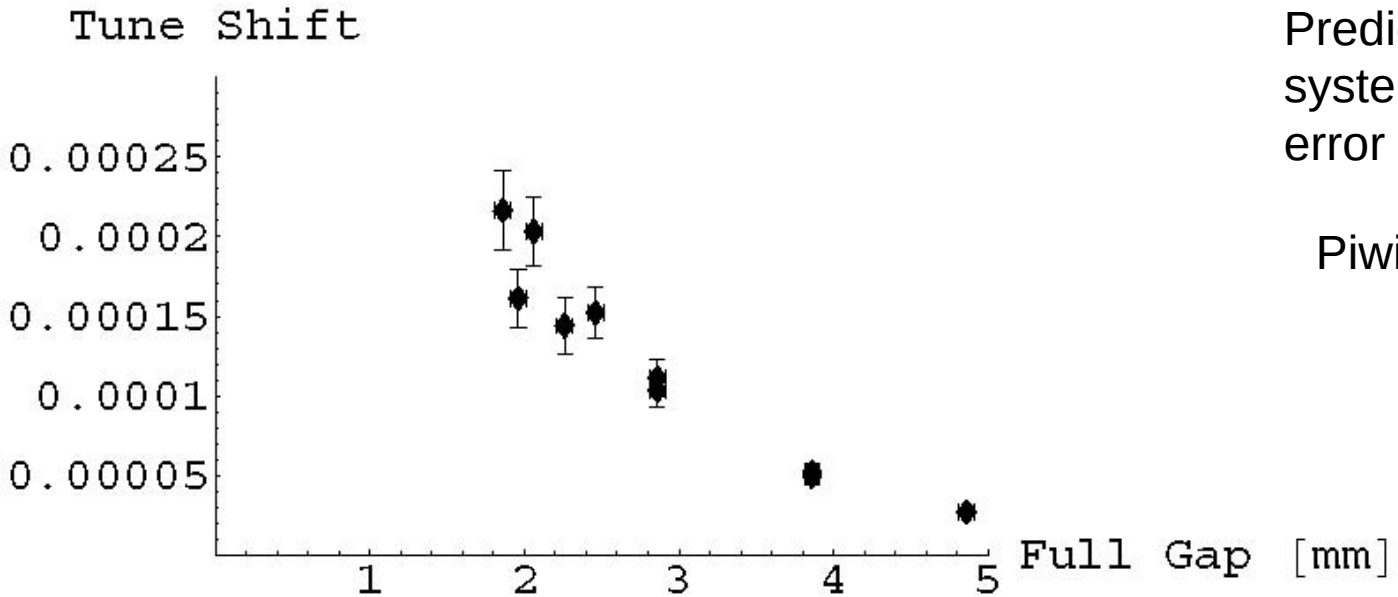
Predicted tune shifts in Piwinski theory with errors

Delta Q	EmitX	EmitY	Bunch length	Intensity (rms)	Intensity (10% syst)
-0.0000271586	3.76334×10^{-8}	2.88331×10^{-7}	3.65855×10^{-7}	5.6746×10^{-8}	2.72381×10^{-6}
-0.0000496375	9.47136×10^{-8}	7.21416×10^{-7}	6.68668×10^{-7}	1.30749×10^{-7}	4.96846×10^{-6}
-0.000103705	2.75046×10^{-7}	2.11065×10^{-6}	1.39701×10^{-6}	1.05279×10^{-6}	0.000010417
-0.000144177	9.64209×10^{-7}	3.43511×10^{-6}	1.94221×10^{-6}	8.91414×10^{-6}	0.0000143897
-0.000161277	5.01437×10^{-7}	4.07385×10^{-6}	2.17257×10^{-6}	7.71686×10^{-6}	0.000016035
-0.0000521212	1.13481×10^{-7}	8.61221×10^{-7}	5.32251×10^{-7}	9.68689×10^{-8}	5.18534×10^{-6}
-0.00011133	3.56977×10^{-7}	2.68391×10^{-6}	1.13688×10^{-6}	6.8316×10^{-7}	0.000011179
-0.000152159	5.45962×10^{-7}	4.1868×10^{-6}	1.55381×10^{-6}	4.37829×10^{-6}	0.0000152442
-0.000203226	2.09595×10^{-6}	6.31862×10^{-6}	2.0753×10^{-6}	3.47935×10^{-6}	0.0000202962
-0.000216344	1.38771×10^{-6}	7.07408×10^{-6}	2.20926×10^{-6}	9.61384×10^{-6}	0.0000216475



Prediction without systematic intensity error

Piwinski

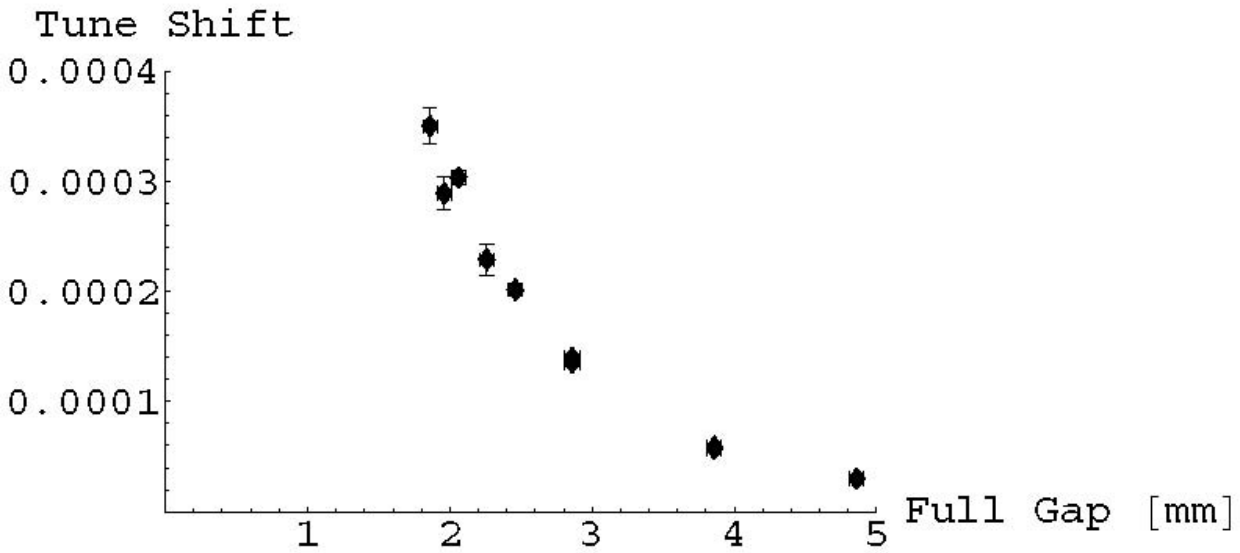


Prediction with systematic intensity error

Piwinski

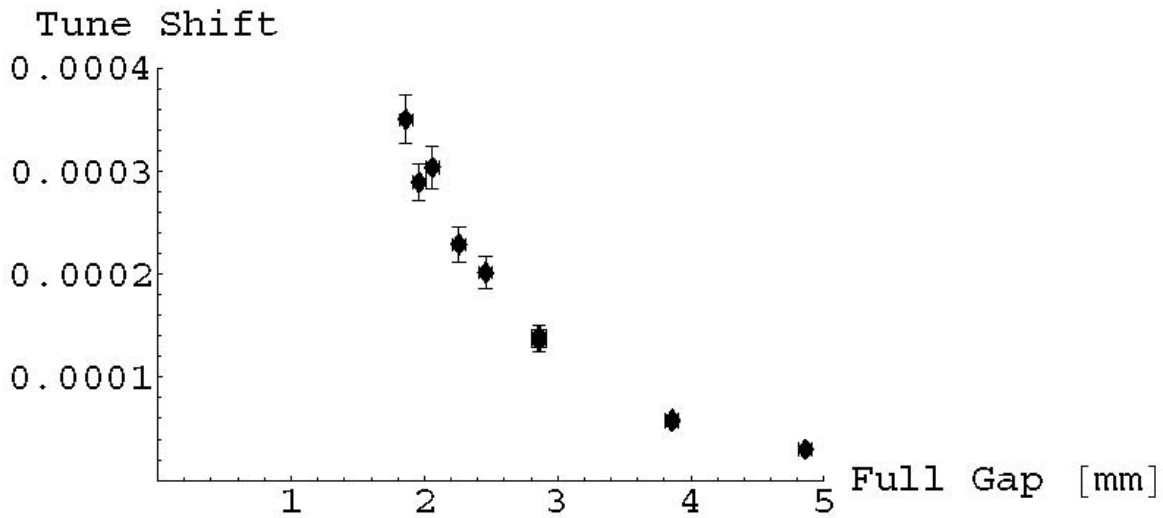
Predicted tune shifts in Burov-Lebedev theory with errors

Delta Q	Bunch length	Intensity (rms)	Intensity (10% syst)
-0.0000300148	4.21765×10^{-7}	6.27138×10^{-8}	3.01026×10^{-6}
-0.0000587435	8.33907×10^{-7}	1.54735×10^{-7}	5.87992×10^{-6}
-0.00013976	2.01732×10^{-6}	1.4188×10^{-6}	0.0000140387
-0.00022915	3.36187×10^{-6}	0.0000141678	0.0000228704
-0.000289153	4.29082×10^{-6}	0.0000138355	0.0000287491
-0.0000573173	6.16456×10^{-7}	1.06526×10^{-7}	5.70228×10^{-6}
-0.000135551	1.48212×10^{-6}	8.31784×10^{-7}	0.000013611
-0.000201677	2.22725×10^{-6}	5.80313×10^{-6}	0.0000202052
-0.000303664	3.39872×10^{-6}	5.19891×10^{-6}	0.000030327
-0.00035037	3.95519×10^{-6}	0.0000155697	0.0000350582



Prediction without systematic intensity error

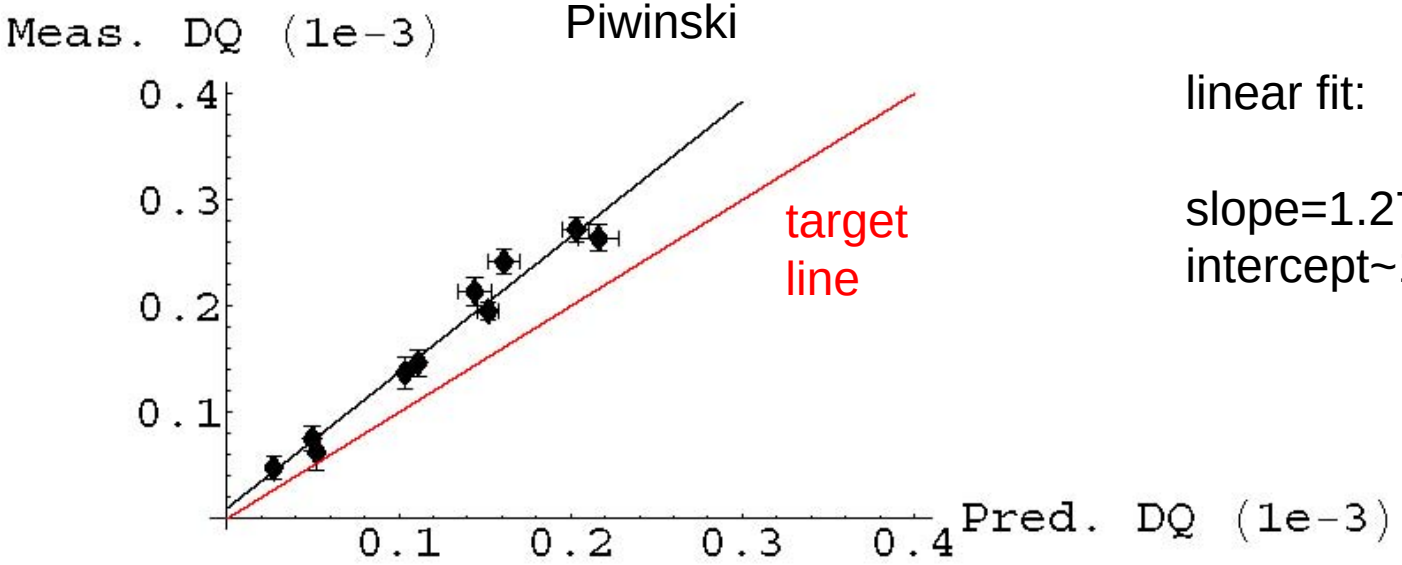
Burov-Lebedev



Prediction with systematic intensity error

Burov-Lebedev

Piwinski

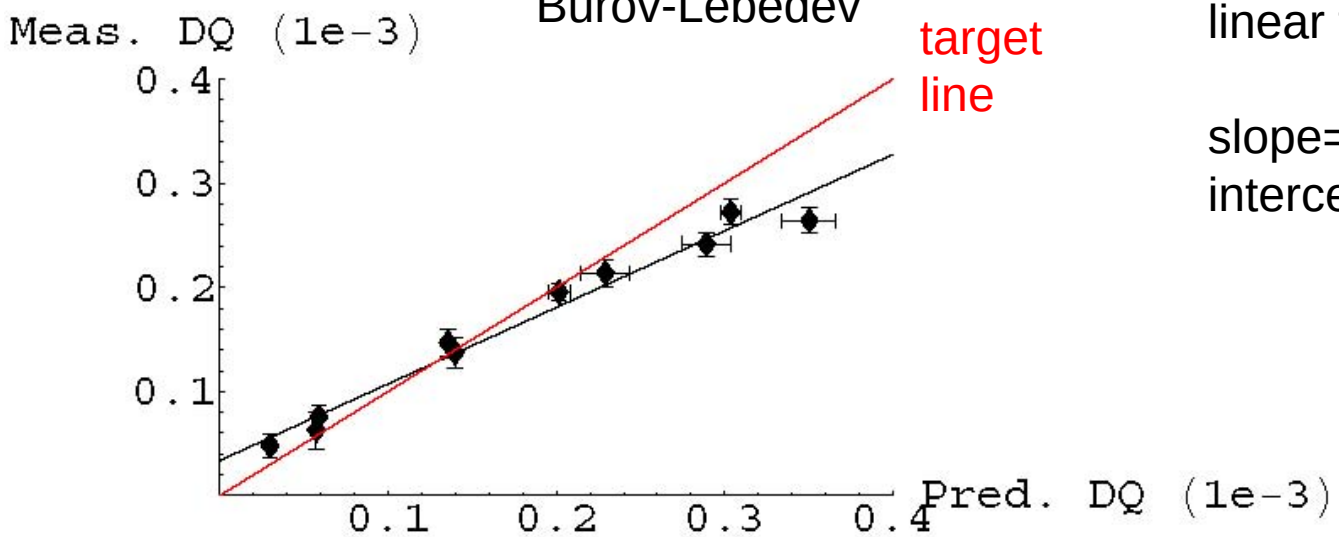


target line

linear fit:

slope=1.276
intercept~1.0x10^-5

Burov-Lebedev



target line

linear fit:

slope=0.735
intercept~3.3x10^-5