

visit to FNAL:

- collaboration on beam-beam wire compensation for Tevatron with T. Sen, B. Erdelyi, V. Bocha
- machine experiment using the TEL as wire
- beam-beam meeting:

web site http://www-ap.fnal.gov/~tsen/TEV/beambeam_march04.html

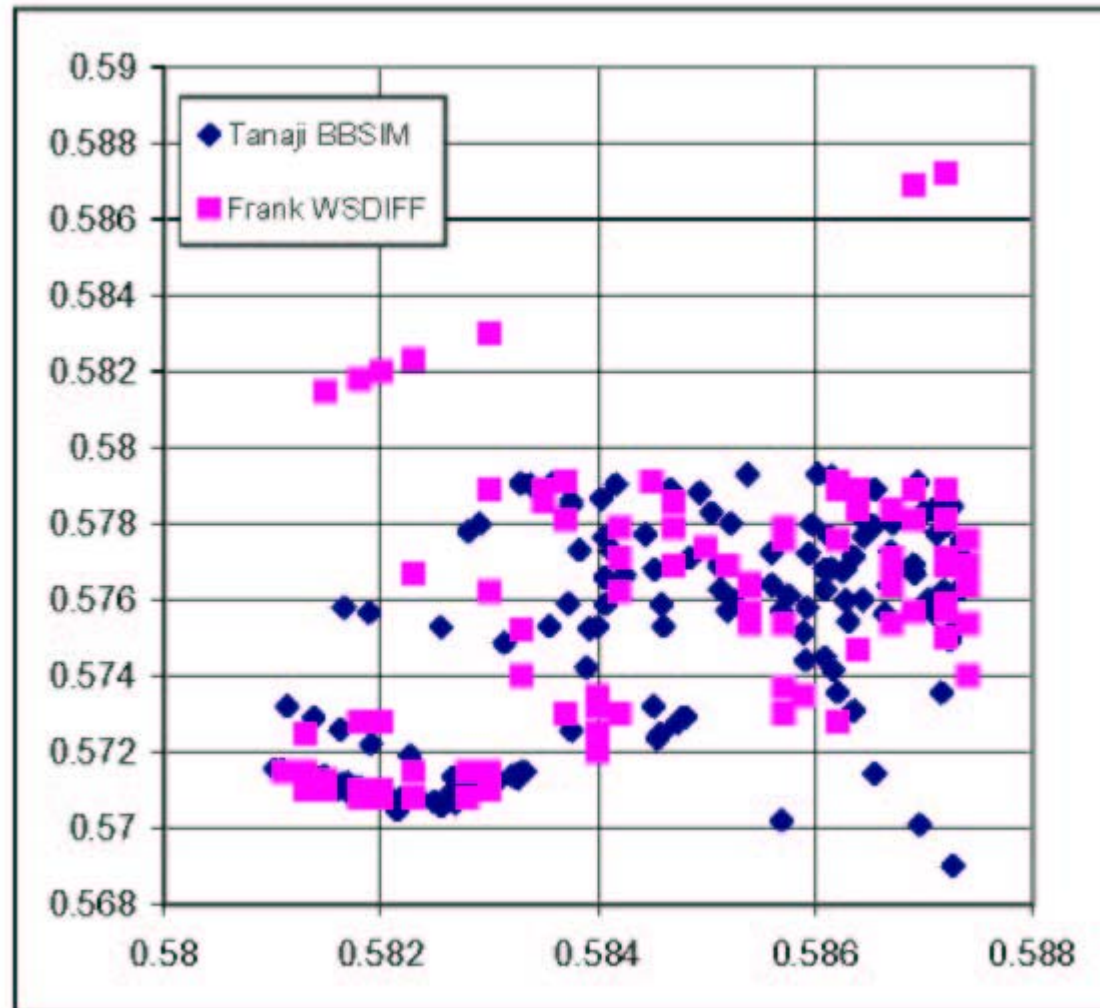
Y. Alexahin, analytical solution for 2-step diffusion model, tracking with various noise levels and extrapolation to real case

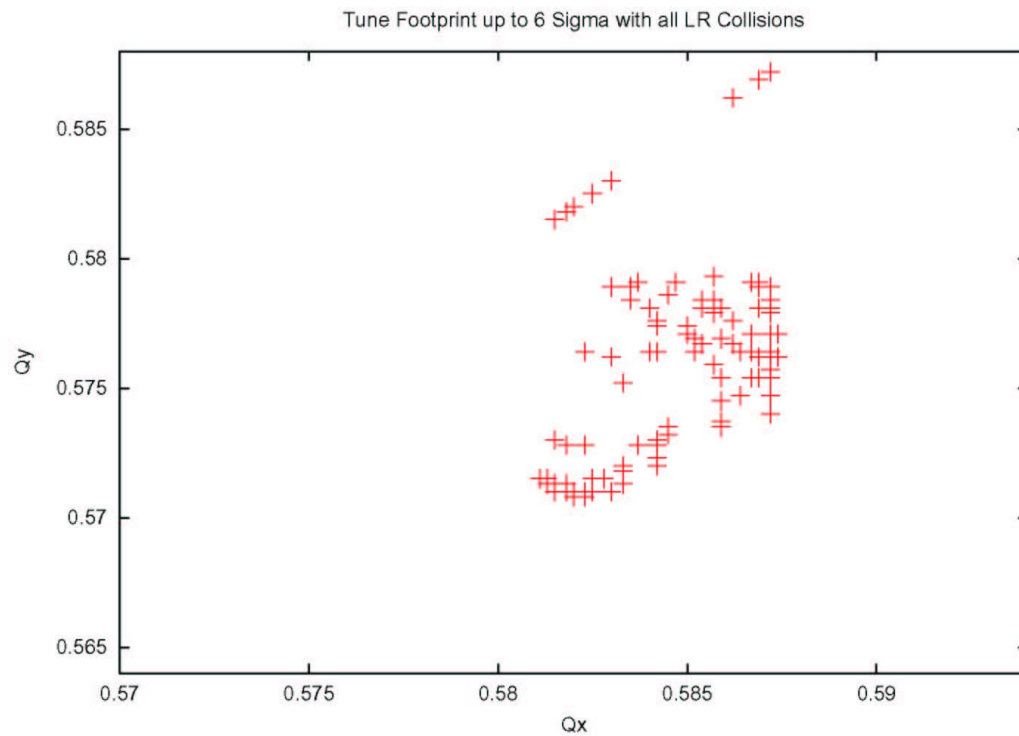
B. Erdelyi, effect of unequal beta function on wire compensation

- other: talk by Talman ('PIC is for the birds!')
- impressions from Tevatron improvement & operation

code benchmarking: tune footprint

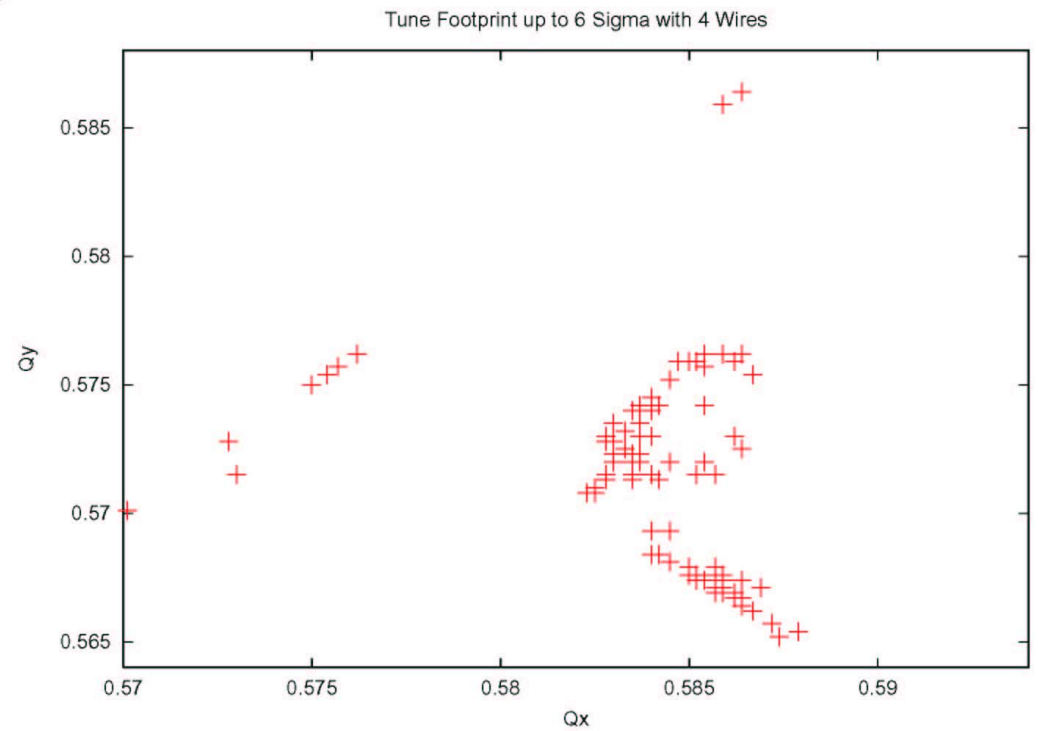
injection



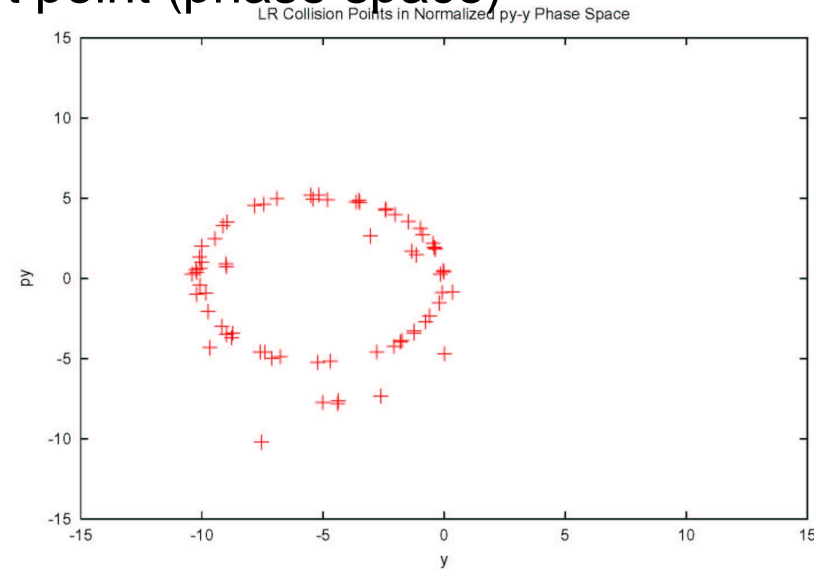
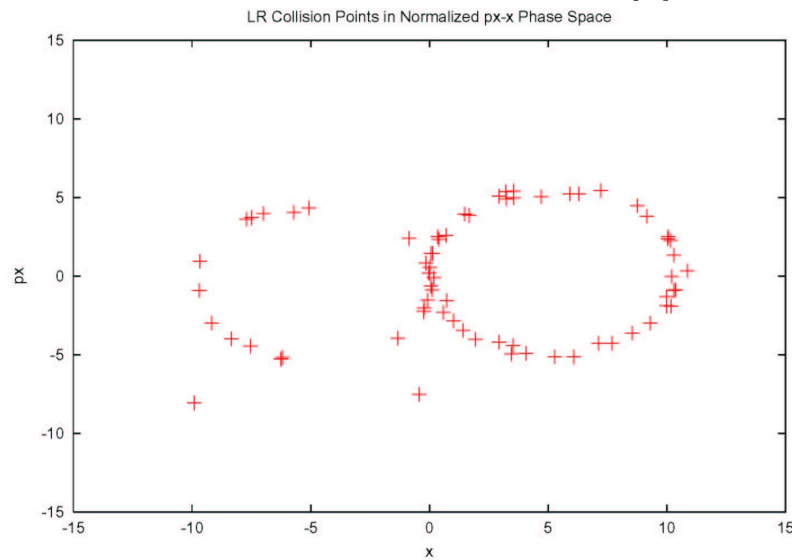


effect of wire solution by Bela
on tune footprint

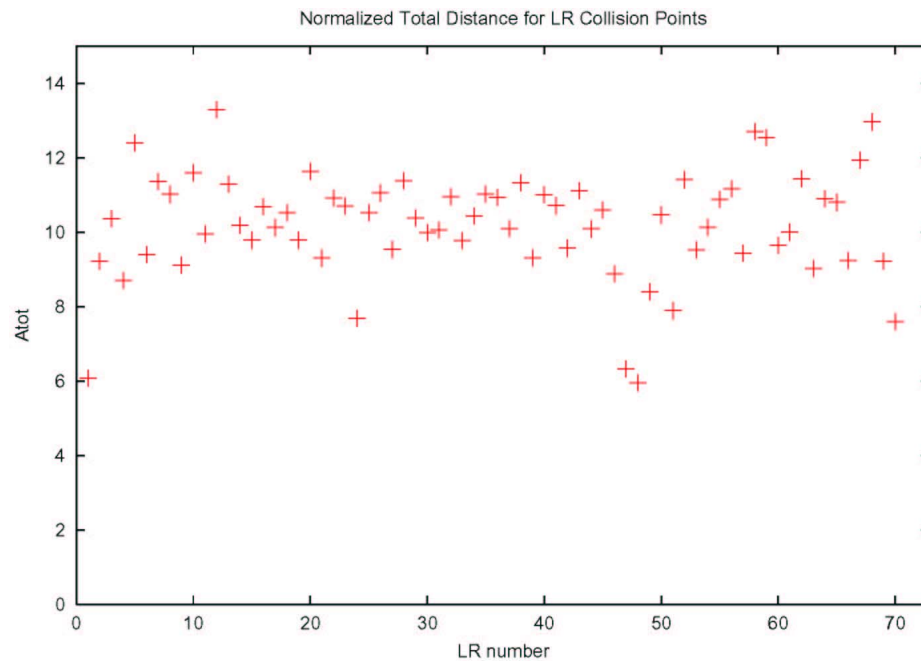
injection



helix in collision mapped to start point (phase space)



normalized distance vs. LR collision number



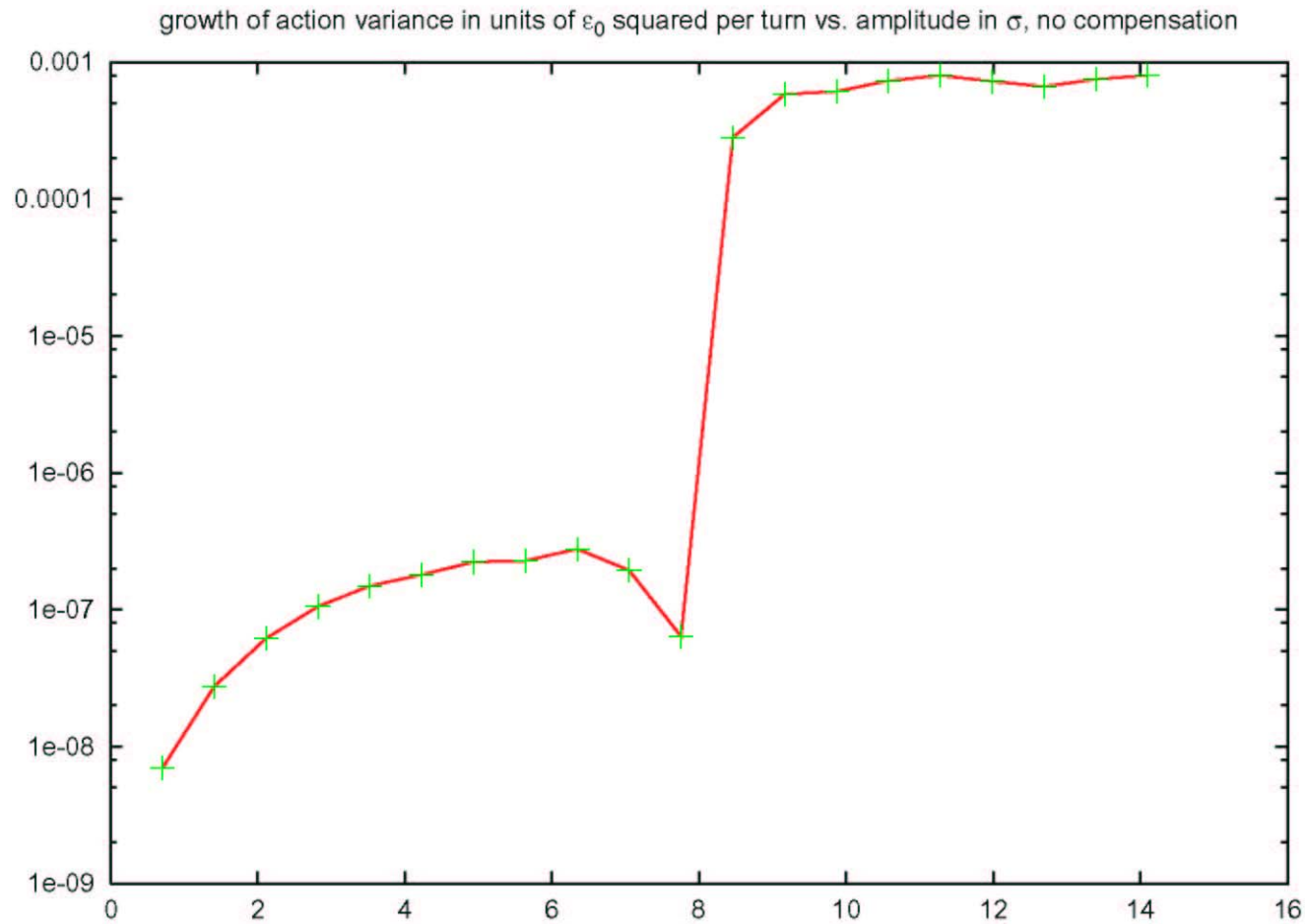
collision

collision

Pbar bunch	A12	A6	A1
X Tune shift ΔQ_x	-0.00056	0.0065	0.0073
Y Tune shift ΔQ_y	0.0068	0.0045	-0.0006
X Chromaticity Q'_x	1.54	17.52	7.50
Y Chromaticity Q'_y	-6.69	0.042	-2.01
Coupling real part $\text{Re}[\kappa]$	0.00068	0.00075	-0.00010
Coupling imaginary part $\text{Im}[\kappa]$	0.00019	-0.00017	0.00043
Chromatic coupling $\text{Re}[d\kappa/d\delta]$	-2.64	0.32	-0.84
Chromatic coupling $\text{Im}[d\kappa/d\delta]$	4.11	-0.33	0.21

collision

typical plot of diffusive aperture

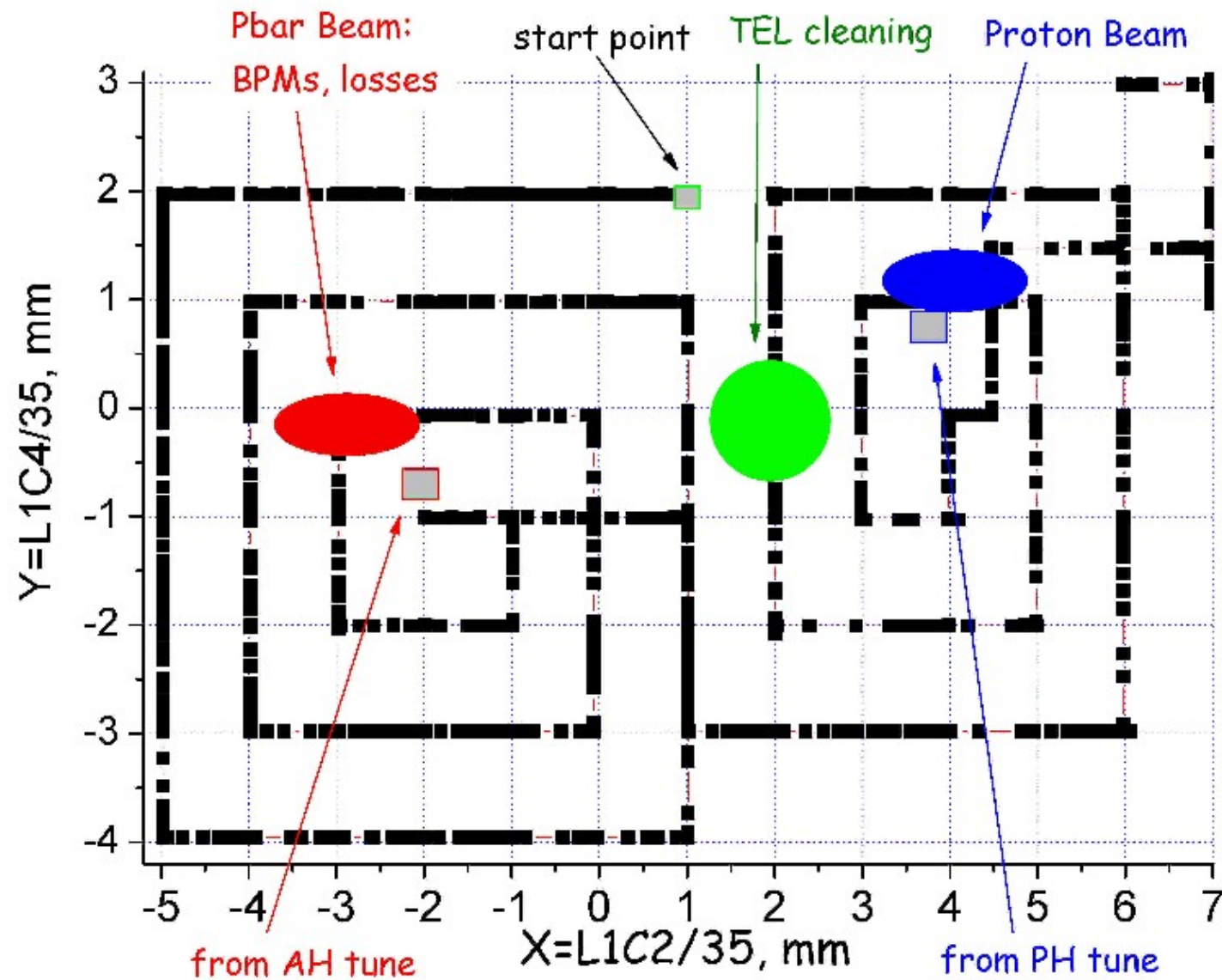


diffusive aperture for various bunches and cases

case	bunch	condition	horizontal	vertical
injection	A1	all long-range	6.0	4.5
		w/o 6 closest	6.0	5.0
		all long-range & 4 wires	6.0	6.0
collision	A6	all long-range	8.0	8.0
		w/o 3 closest	8.7	8.7
		w/o 67 others	9.4	9.4
		all long-range plus head on	7.4	7.4
		all long-range plus head on, $Q'_{x,y}=10$, $\delta=\sigma_\delta$	6.3	6.3
		all long-range plus head on, $Q'_{x,y}=10$, $\delta=-\sigma_\delta$	6.3	7.0
	A1	all long-range	6.0	6.0
		all long-range plus head-on	4.0	4.0
	A12	all long-range	5.0	5.0
		all long-range plus head-on	4.5	5.0

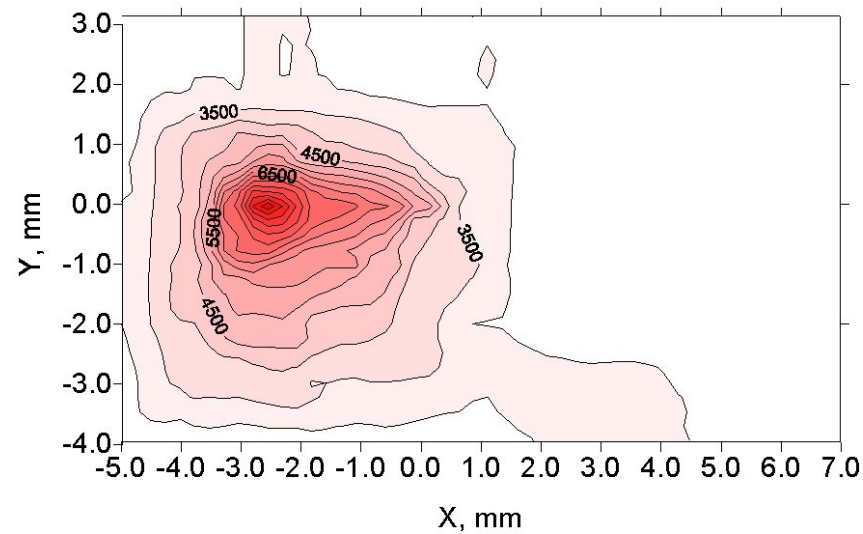
A1,A6,A12 comparison (in)consistent with scallops?!

TEL experiment 1.03.04: TEL & beam positions

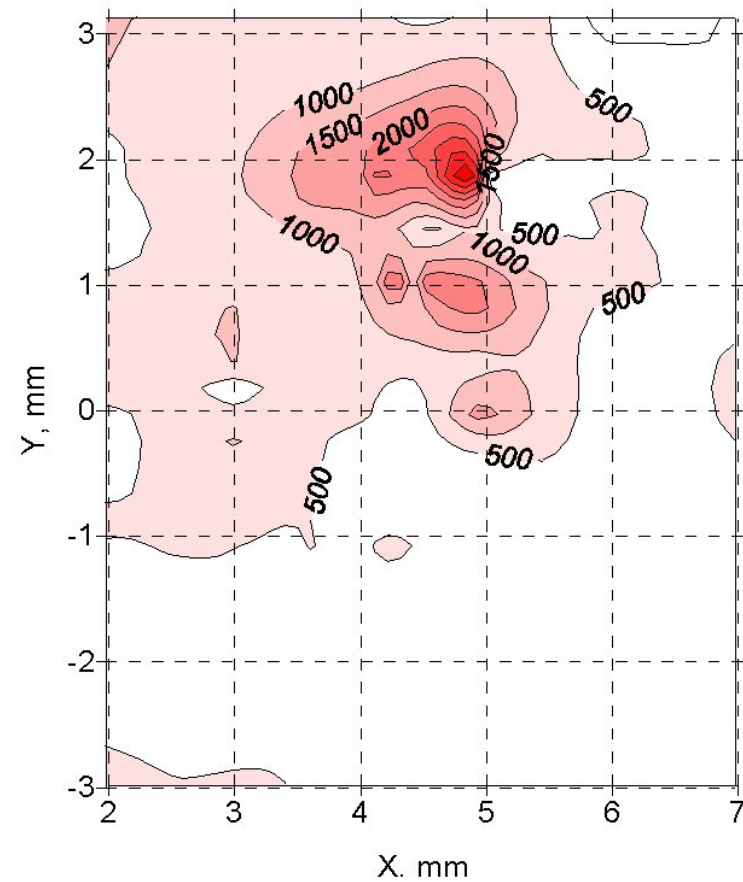


Losses vs. TEL position

Pbar losses C:D0AHTL vs e-beam position

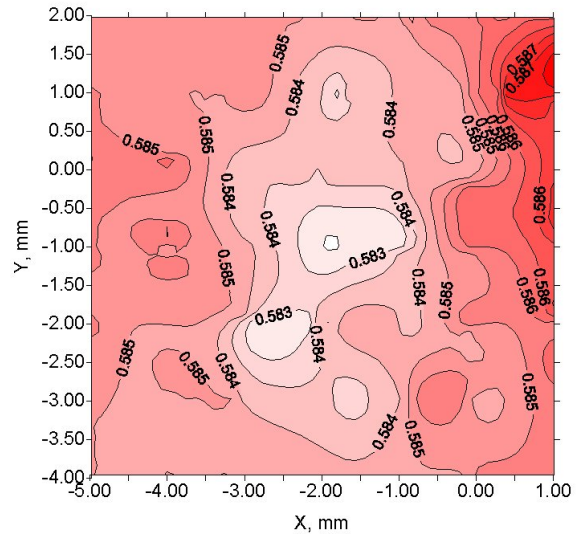


Proton losses vs e-beam position



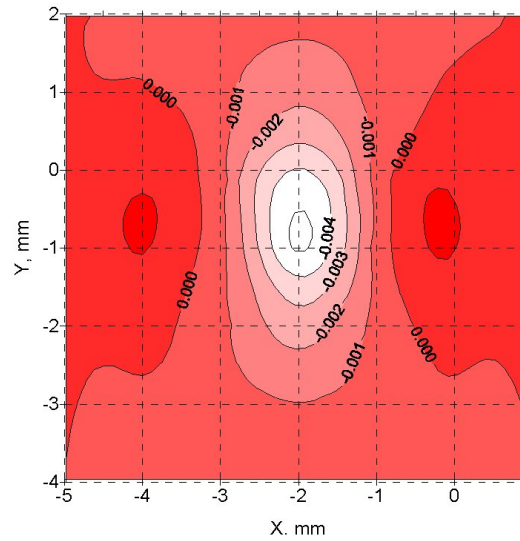
Tunes vs. TEL position

Pbar Horizontal tune vs e-beam position



measurement

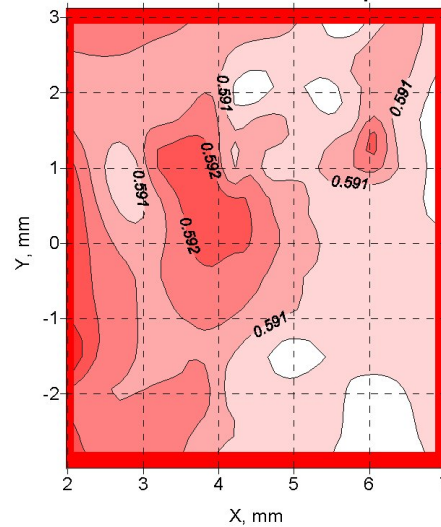
Predicted tune shift due to TEL J=0.6A, sigma_r=0.7mm



prediction for pencil beam

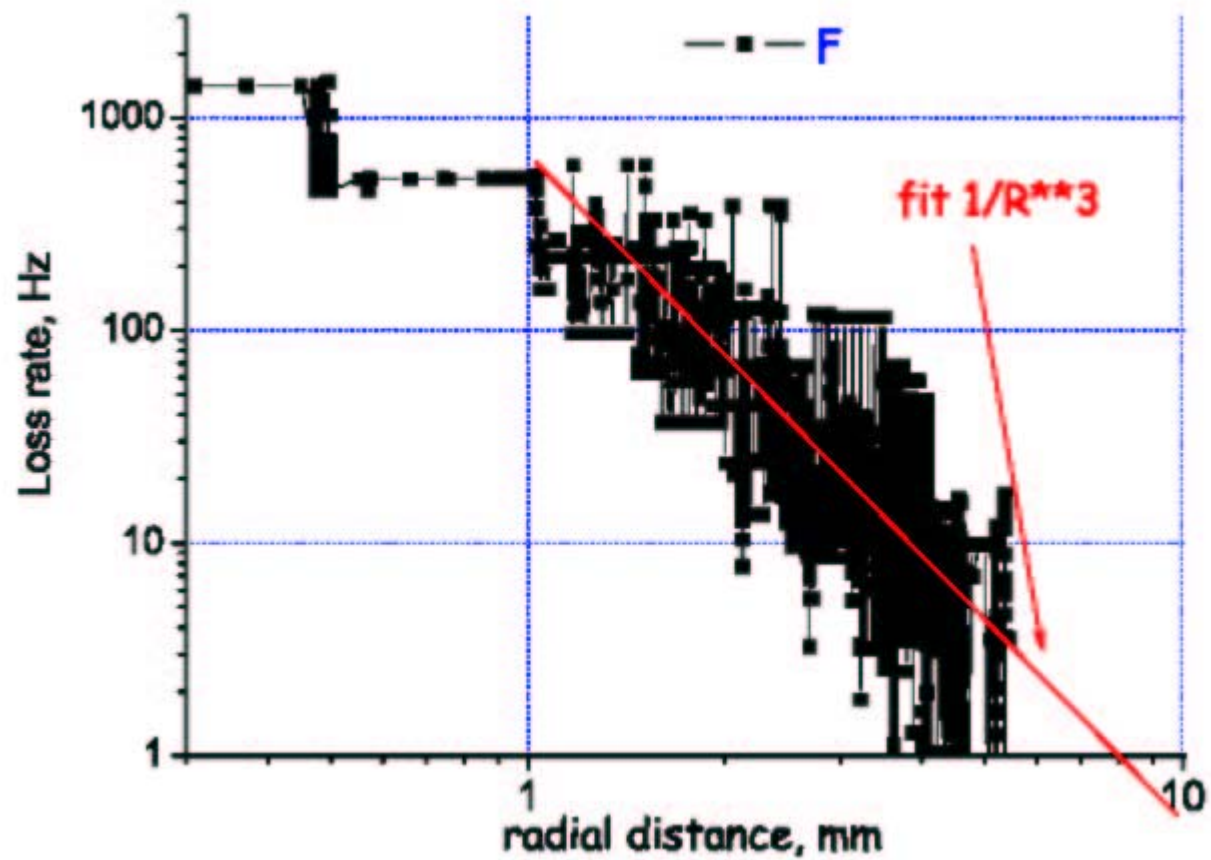
pbars

Proton tune vs e-beam position

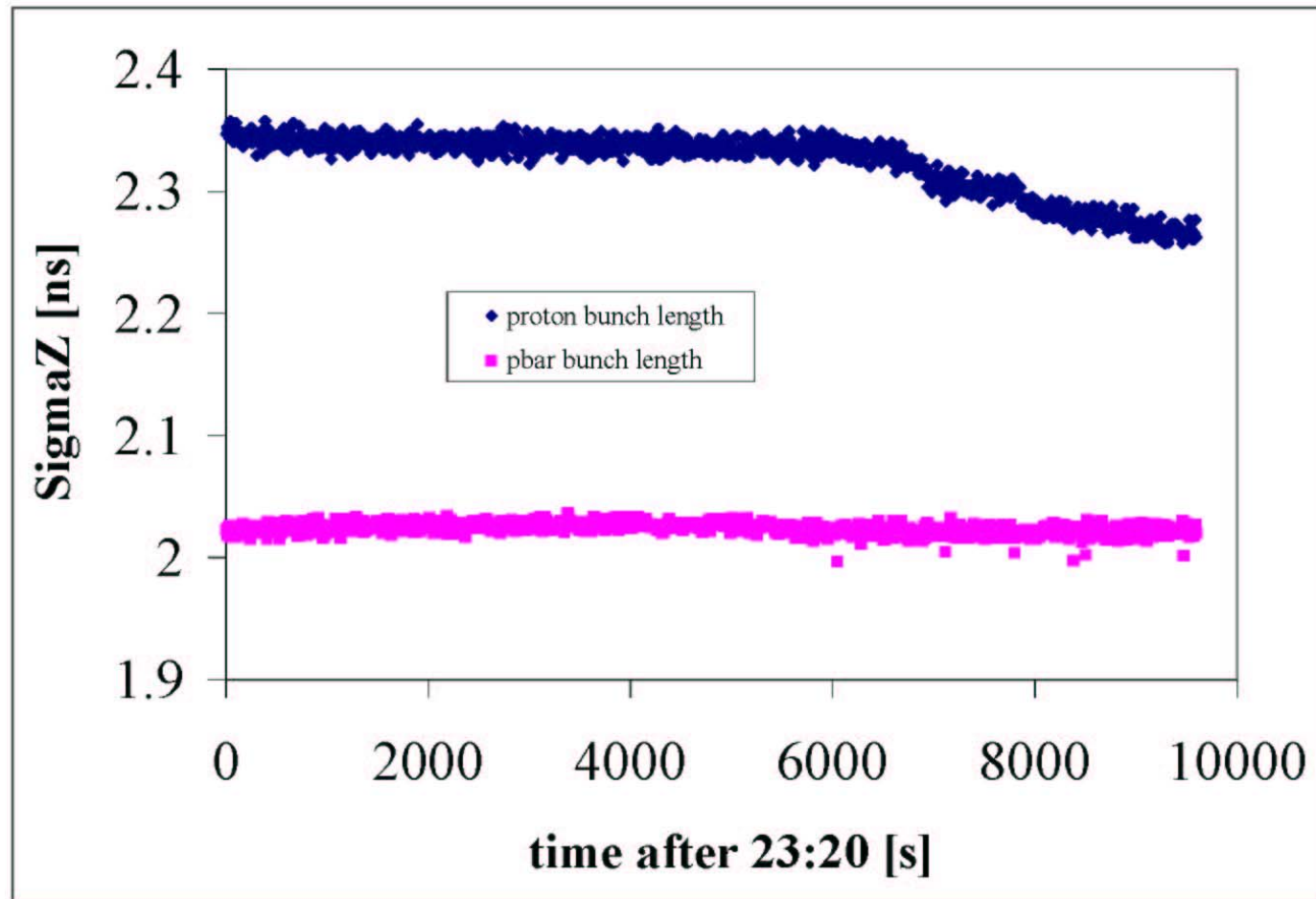


protons

pbar loss rate vs. TEL-beam distance



proton beam was shaved longitudinally



impressions from Tevatron

- enormous progress (luminosity almost doubled), long stores, no quenches
- diagnostics: head-tail monitor, 1.7-GHz Schottky monitor (both beams, \rightarrow tunes, chromaticity, emittance, momentum spread), edge radiation vs. bend SR, crystal collimator from RHIC
- 20% beta beating, 40 cm waist shift, IP betas 30% off
- recycler delivered pbars to Tevatron
- $\sim 50\%$ of the dipole anchors are broken (inner parts move during cooldown)
- magnet cycle: back porch now held constant
- p losses strongly depend on pbar emittance (beam size!)

SNS ASAC Review:

- problems now with s.c. linac, cavity quality, cryogenic line
- Los Alamos left the project
- BNL & TJNAF will be next
- impressive collimators
- e trapping in quadrupole first computed by P. Channell (1994)
- modulation of beam profile can enhance or reduce ecloud build up

ATF Meeting in Kamogawa:

- Joint Workshop: 4th China-Japan Beam Physics Seminar,
9th Int'l ATF Collaboration Meeting
- 55 participants (China, India, UK, SLAC, UCLA,
Orsay, Jordan, Tomsk University, BINP, Japan)
- 1-bunch & multibunch emittances
- instabilities for multibunch & higher emittance
- emittance dependence on pressure stronger than
predicted
- wigglers will be re-commissioned in the fall
- novel diagnostics: ODR, laser wire, X-ray monitor,
nm-BPMs (BINP-SLAC-LLNL & KEK)
- own presentation on rf damping
- CLIC forum on April 30

APAC highlights:

- push to build LC in Asia/Japan; endorsed by ACFA
- T. Shintake: 6 GeV SASE FEL at SPring-8, novel gun design achieves 1 micron emittance in both planes
- BEPC-II and Shanghai Light Source approved
- BEPC e-cloud study: octupoles, solenoids, BPM bias all reduce vertical blow up
- CSR Calculations by Yokoya & Angoh
- Compact SASE FEL at PAL (3rd largest e- linac) by 2008
- V. Parkhomchuk: beam-beam, e-cloud and heating, longitudinal effects of e-cloud plasma waves?
- KEKB will install 1st crab cavity in 2005, new target Luminosity 3×10^{34} in 2006
- W. Chou: proton driver for superneutrino beam (high flux, long baseline), FNAL-Beijing – 9400 km under study
- K. Yokoya: ERL project at KEK