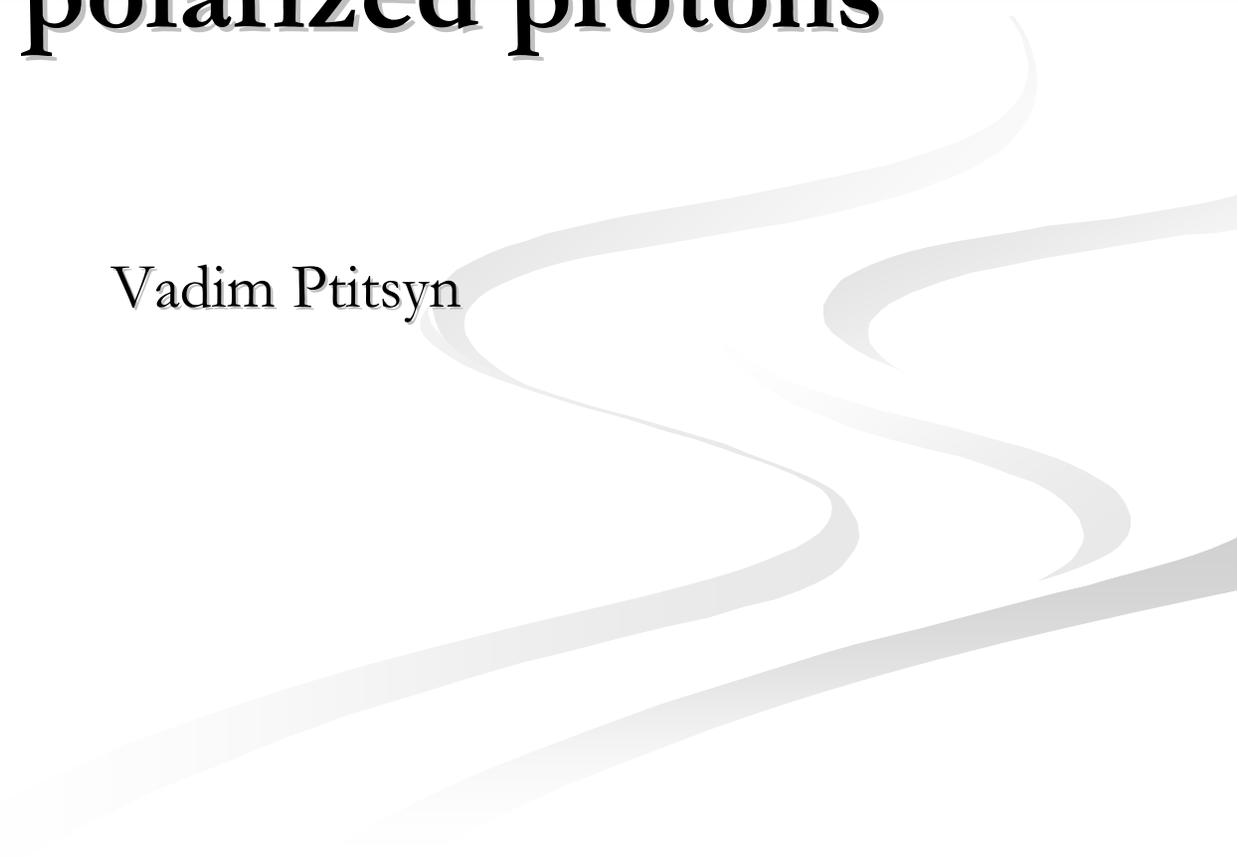


Run-6 polarized protons

Vadim Ptitsyn

The background of the slide features several thick, light gray, wavy lines that flow from the bottom right towards the center, creating a sense of movement and depth.

Lattice contours

- Operation at 100Gev with 2 experiments: PHENIX and STAR.
Collisions only at IR6 and IR8.
- Beta* configuration:

	IP6	IP8	IP10	IP12	IP2	IP4
Injection	10	10	10	10	10	10
Store	1	1	10	5-10	10	10

Defined by CNI polarimeter



- First energy ramp ($Q_x=0.72$, $Q_y=0.73$),
then beta-squeeze ($Q_x=0.68$, $Q_y=0.69$).

Luminosity Goals

Table 5: Projected RHIC p-p luminosities and polarization.

Fiscal year		2002A	2003A	2004A	2005A	2006E	2007E	2008E
No of bunches	...	55	55	56	106	111	111	111
Ions/bunch, initial	10^{11}	0.7	0.7	0.7	0.9	1.3	1.7	2.0
Average beam current/ring	mA	48	48	52	119	180	236	278
β^*	m	3	1	1	1	1	1	1
Peak luminosity	$10^{30} \text{ cm}^{-2} \text{ s}^{-1}$	2	6	6	10	37	64	89
Average store luminosity	$10^{30} \text{ cm}^{-2} \text{ s}^{-1}$	1.5	3	4	6	25	43	60
Time in store	%	30	41	38	56	58	59	60
Maximum luminosity/week	pb^{-1}	0.2	0.6	0.9	1.9	8.8	15.2	21.7
Minimum luminosity/week	pb^{-1}					1.9	1.9	1.9
Maximum integrated luminosity	pb^{-1}	0.5	1.6	3	13	79	126	179
Minimum integrated luminosity	pb^{-1}					17	16	16
AGS polarization at extraction	%	35	45	50	55	65	70	80
RHIC store polarization, average	%	15	35	46	47	60	65	70
Maximum LP^4/week	nb^{-1}	0	9	40	90	1130	2720	5225
Minimum LP^4/week	nb^{-1}					90	90	90

2006/2005 parameter ratios for maximum luminosity goal:

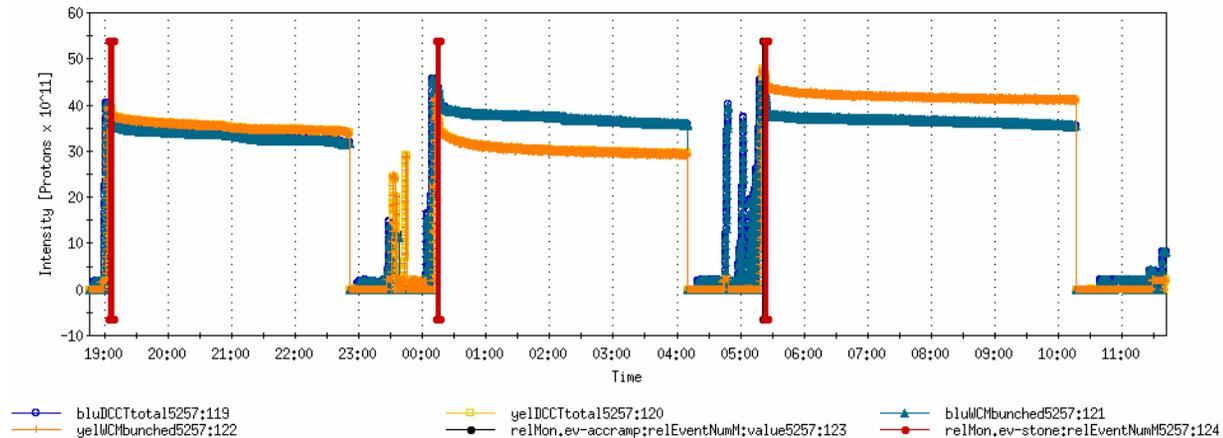
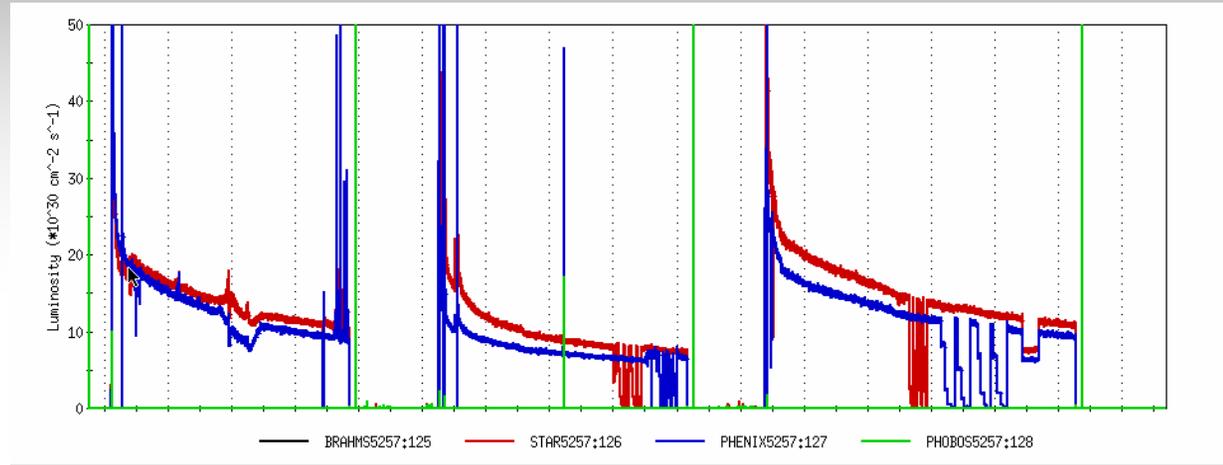
Average Luminosity	Peak luminosity	Number of bunches	Bunch intensity	Emittance
4.2	3.7	1.05	1.44	0.59

Run4 Collisions with 2 IPs

- Store bunch intensities in $1.2-1.5 \times 10^{11}$ range.
- 28x28 bunches in RHIC
- store luminosity at $1-1.5 \times 10^{31} \text{ cm}^{-2} \text{ s}^{-1}$ in STAR and PHENIX

Emittance $\sim 15-20 \pi \text{ e-06}$

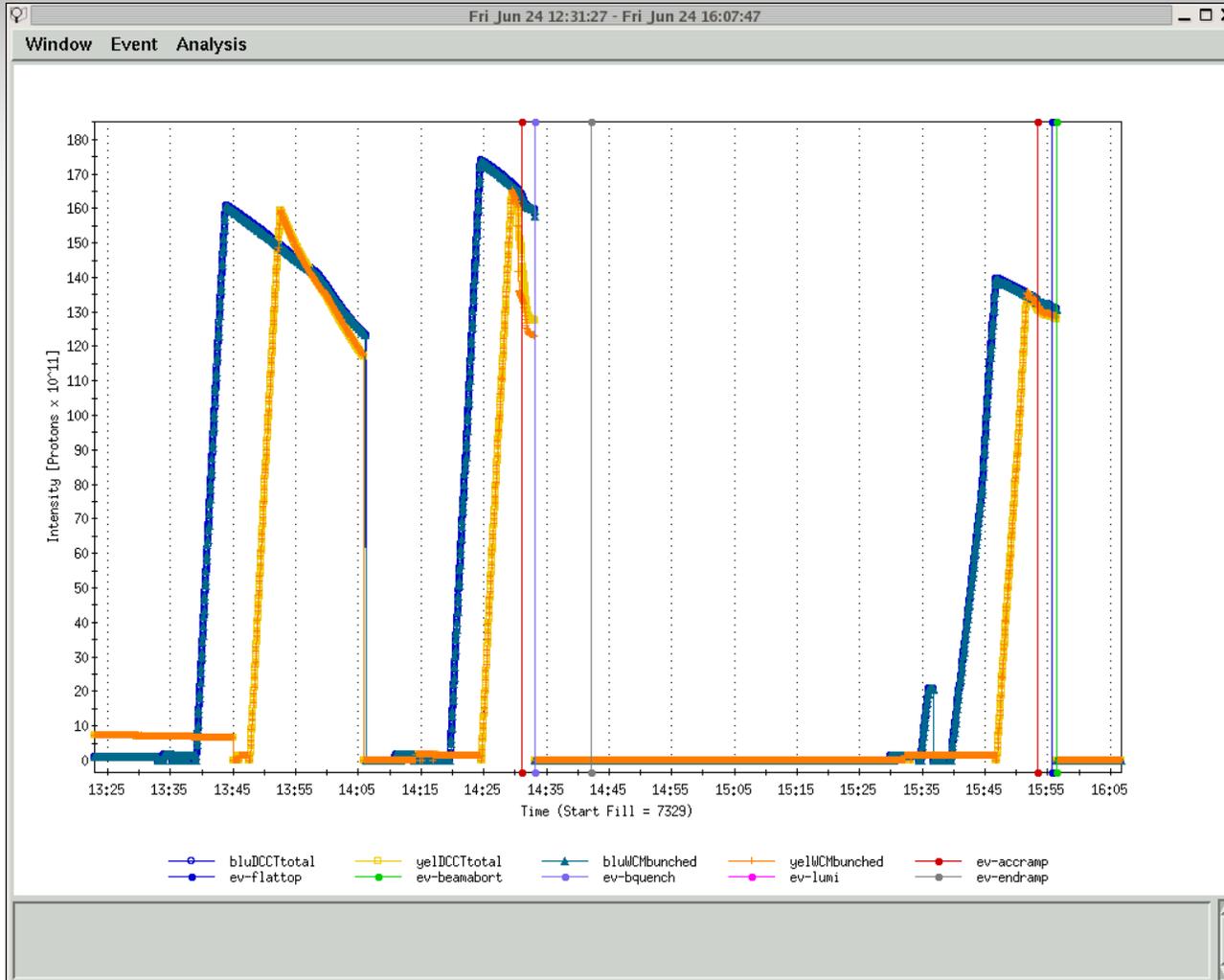
Worse average emittance ($>30\pi$) in the store in Run5: due to beam-beam or higher number of bunches? (see SY's talk today)



Transverse emittance

- Critical item for operation at beam-beam limit: transverse emittance control.
- Automation of emittance measurements of AGS extracted beam in ATR line at each RHIC fill.
- Upgrade of injection kicker system to provide shorter risetime. It will lead to more reliable kicker work in 111 bunch mode.
- Development of additional tools to monitor emittance.
 - Using CNI polarimeter for emittance measurements (Anatoly, Haixin)
- Careful monitoring of transverse instabilities.

Run5 last day studies. 111 bunches with 1.3-1.5e11/bunch.



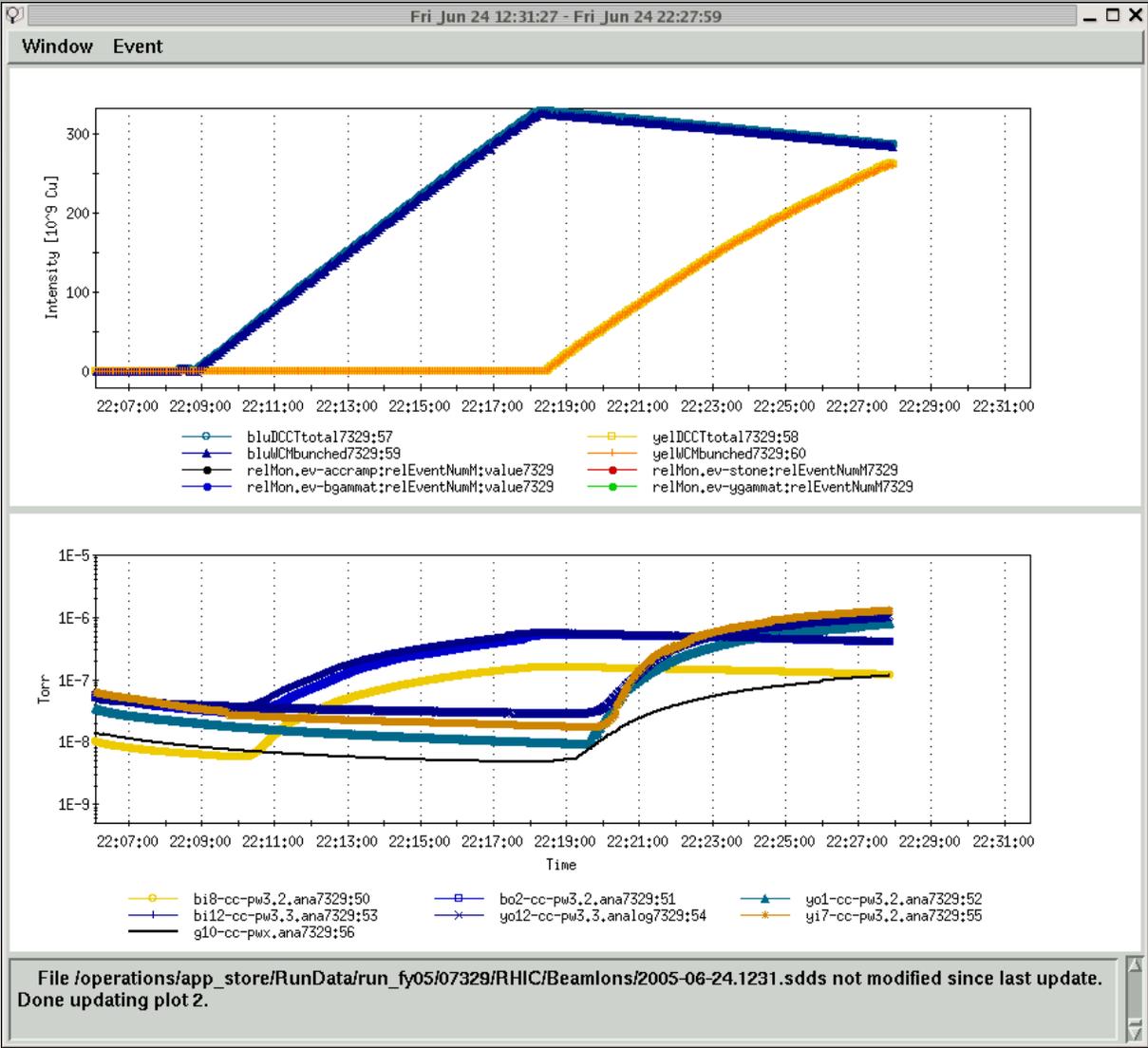
- Successful injection.
- Not good lifetime. (Vacuum or electron cloud?)
- Two unsuccessful ramps: beam aborts because of the losses.

Control of beam losses on the ramp is critical item.

(Ramp collimation, longer beta-squeeze time)

Highest proton intensities achieved during run5 last day studies. 111 bunches, 3e11/bunch

SY.Zhang, Haixin



Pressure rise is critical item

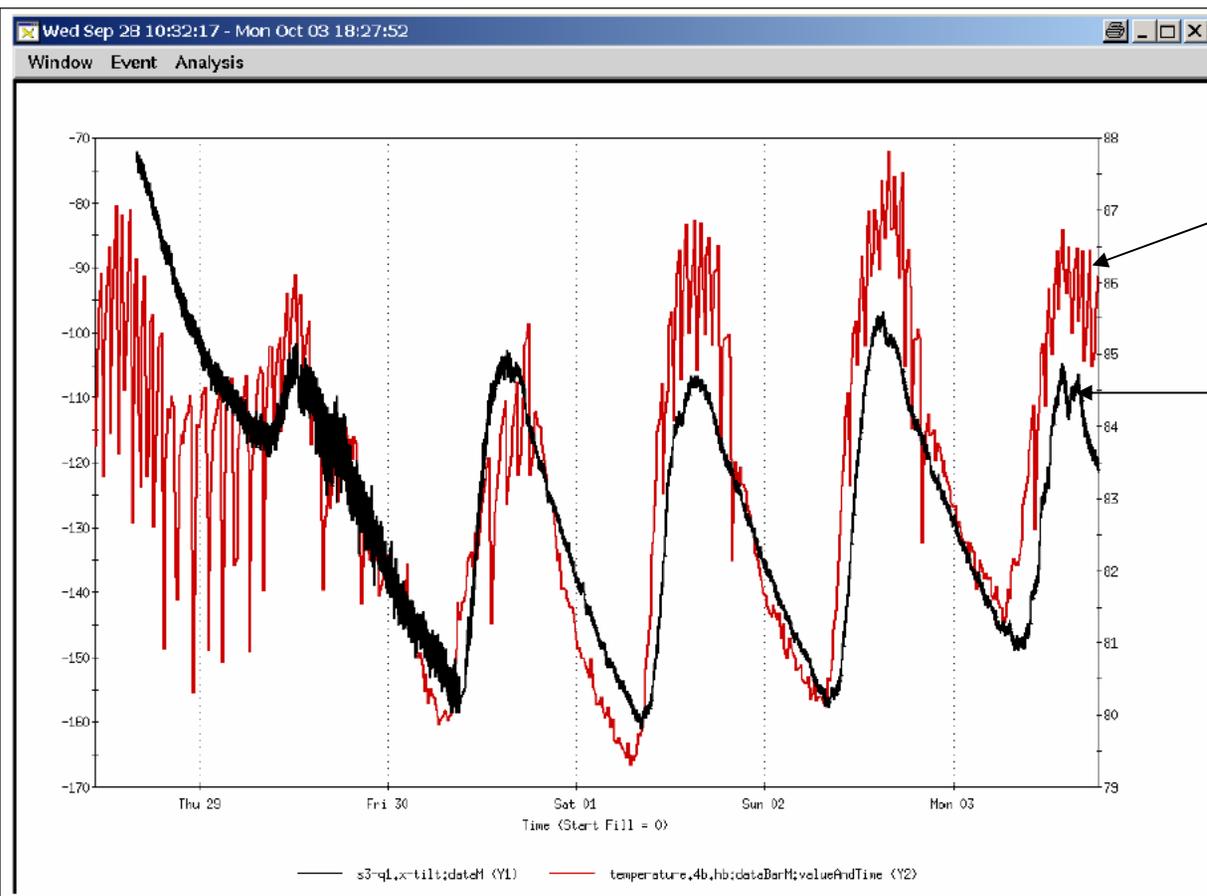
Conditioning vacuum pipe with high intensity beam to improve vacuum conditions (in more details in Haixin's talk today)

Store Reproducibility

- Major factors for store reproducibility:
 - maintaining precisely working point, chromaticity.
 - dispersion in the IRs;
 - > minimized dispersion lattice developed (S.Tepikian)
 - > dispersion correction using dipole correctors
- finding remedy against the 24h orbit variation
 - fixing the source of the problem
 - closed orbit feedforward using injection data

IR4 cryostat movement measurement

(data from D.Bruno)



Outside temperature

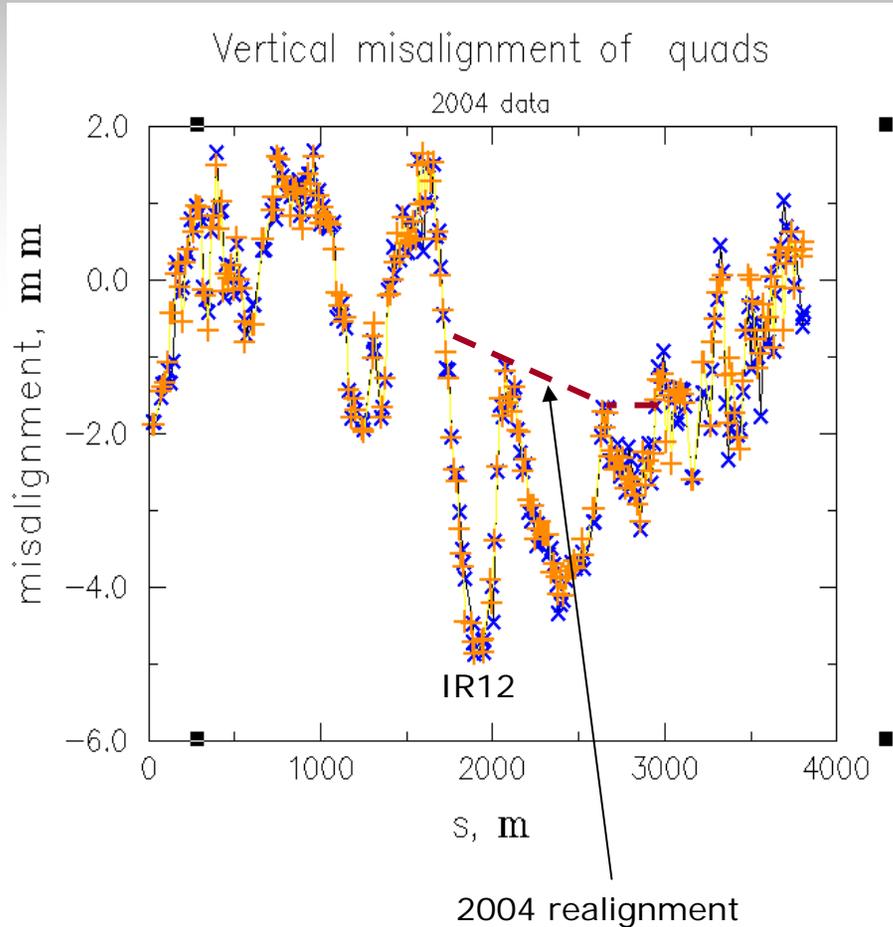
Tiltmeter measurements at
Q1 cryostat area
(top of the cryostat)

- Measurements using sensitive tiltmeters.
- Considerable daily ceiling movement observed.

Other run preparation activities

- Vacuum preparations:
 - Additional NEG piping.
 - Pre-pumping in all cold regions.
 - Vacuum related upgrades in CNI polarimeter.
- Preparations for tune and coupling feedback on the ramp. System tests on the bench (with emulated signals) are underway.
- BPM system upgrades. Boards modifications.
- Preparations for 10Hz orbit feedback of relative orbit position at IP6 and IP8. (Christoph's talk)
- STAR shielding has been added in the regions between DX and D0 magnets.
- Vertical ring realignment. (*Crucial for 250Gev acceleration test planned for this run*)

Quad-to-Quad misalignments



- Misalignment oscillations at the level of few mm.
- Misalignment dips are at the interaction regions.
- Some sections of the ring as well as several individual quadrupoles have been realigned in 2002 and 2004.
- Presently the work is underway to flatten the whole ring.

Concluding notes

- Run preparations are underway.
- Start of the run (hopefully) at the beginning of January.