APEX
overview Run-5, outlook Run-6

Fulvia Pilat, Haixin Huang

Outline

Run-5

- APEX statistics
- APEX program and results

Run-6

- APEX Organization
- APEX Program, this workshop

APEX Run-5 statistics

Run-5 Cu: 9 (7 HE + 2 LE) physics weeks

Run-5 PP: 10 physics weeks

Run	Time agreed	Time scheduled	Beam time (failures <6 min ignored)
Cu-Cu	108	92	70
P-P	120	99	88

	Run-3 d-Au	Run-4 Au-Au	Run-5 Cu-Cu + PP
scheduled/ planned	80 %	90 %	84 %
beam/ scheduled	65 %	84%	83 %

APEX Run-5 program

Decoupling on the ramp	Y. Luo
AC dipole (coupling)	M. Bai
Pressure rise, e-cloud (NEG, new limits)	S.Y.Zhang
Stochastic cooling	M. Blaskiewicz
Nonlinear (tune spread, IRs)	V. Ptitsyn
Beta* squeeze and measurement	F. Pilat
Higher order IR corrections	F. Pilat/Y. Luo/N. Malitsky
Beam-beam	Fischer/Malitsky/ *Tomas*
Polarization	H. Huang/M. Bai
PLL experiments	P.Cameron
Schottky	K. Vetter
IBS	J. Wei/ A.Fedotov
Cryo Jitter	C. Montag
IBS lattice, RHIC II	V. Litvinenko
eRHIC	V. Ptitsyn

New AP Experiments in 2005

- Many experiments carried over from Run-4
- Experiments for RHIC upgrades started
- Once again, no "Class-2" experiment in Run-5
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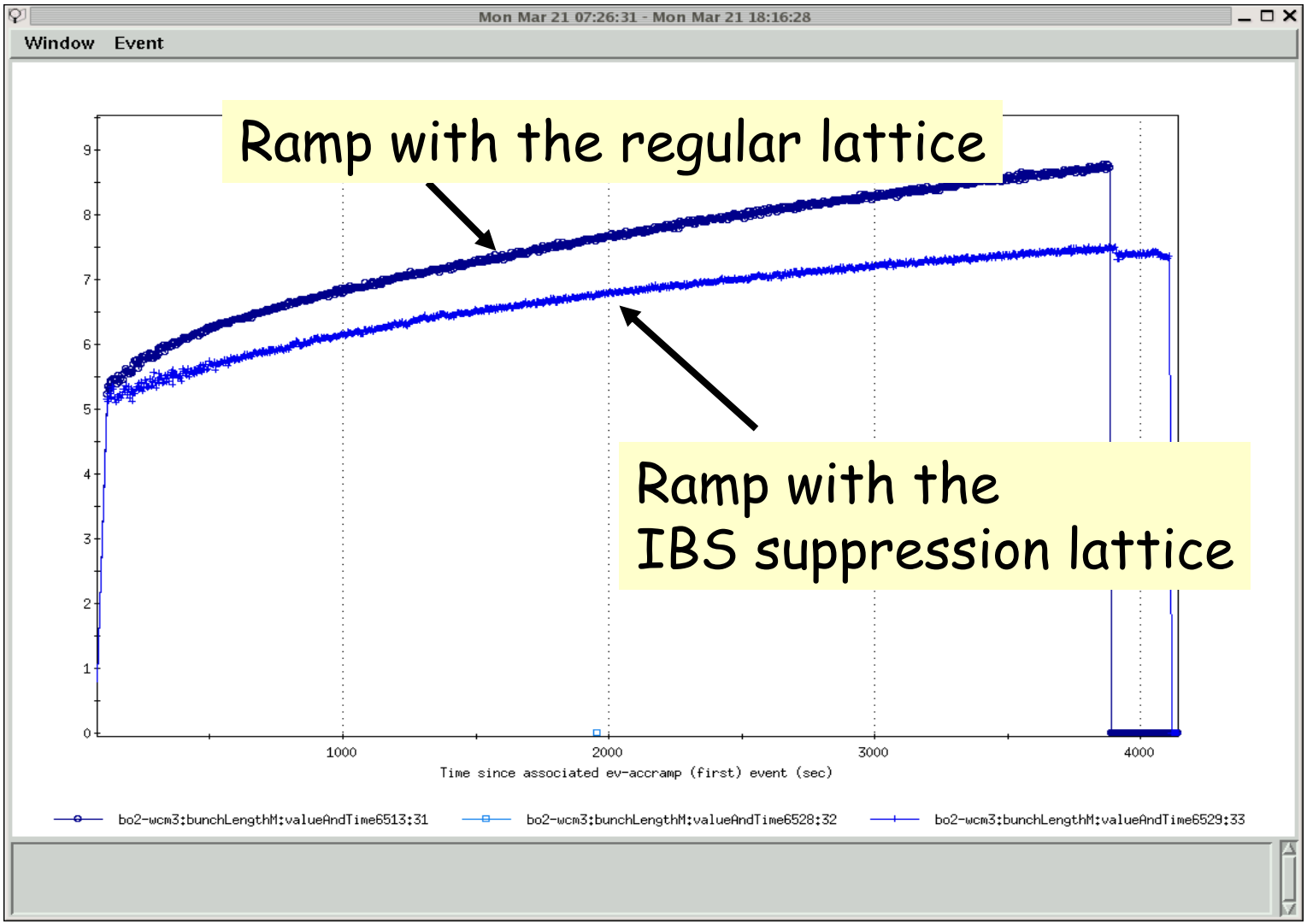
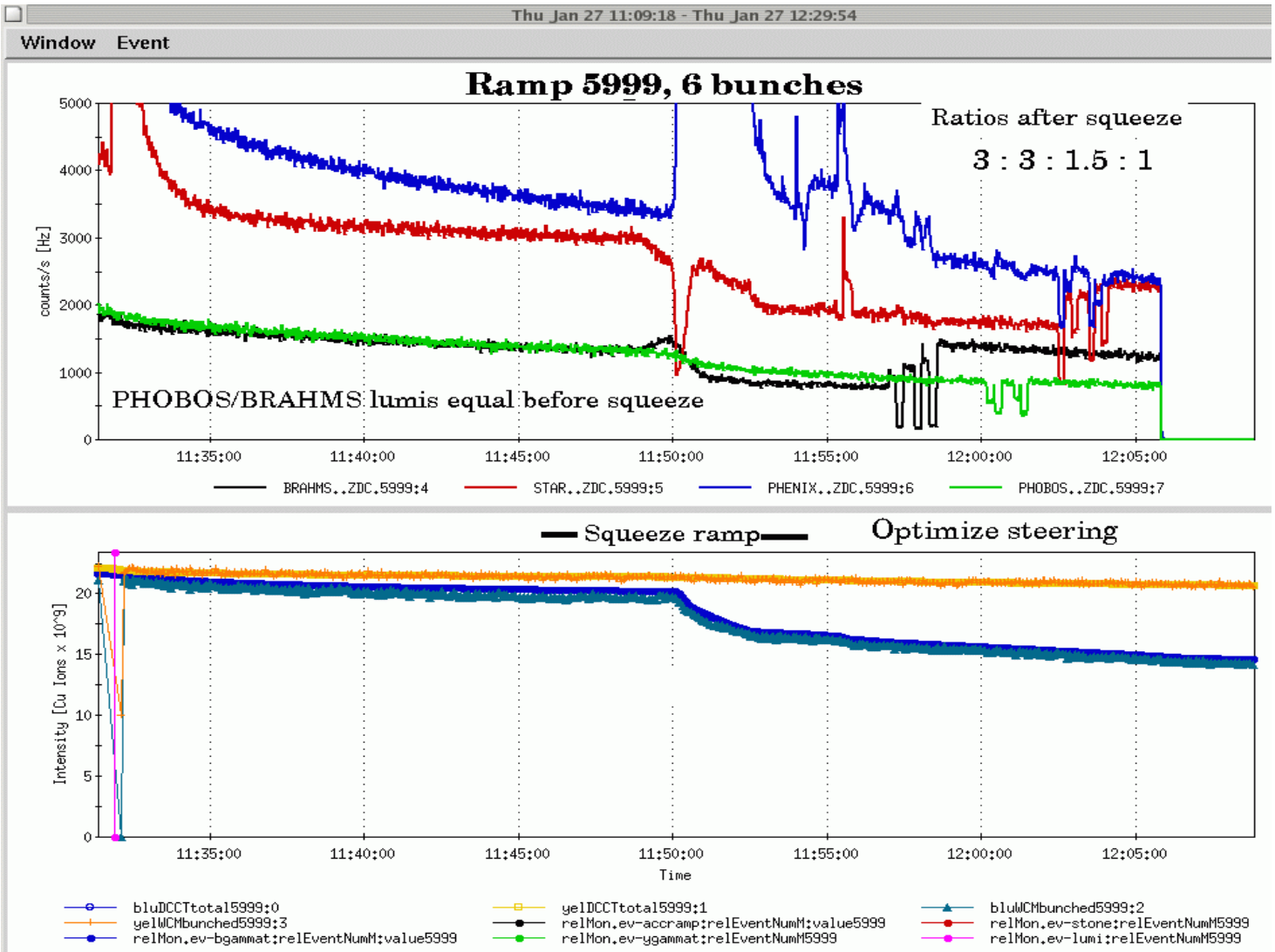
New accelerator physics experiments:

1. Anti-grazing rings to study effect on beam loss induced desorption and aperture limitation (Thieberger, Zhang).
2. Jet for emittance measurements(Luciano, Trbojevic)
3. Stochastic cooling (Brennan, Blaskiewicz)
4. IBS suppression lattice (Litvinenko, Satogata et. Al.).
5. Electron cooling related experiments (Fedotov, Cameron, etc.)
6. Polarization related experiments (Bai, Huang)

IBS lattice: bunch length comparison



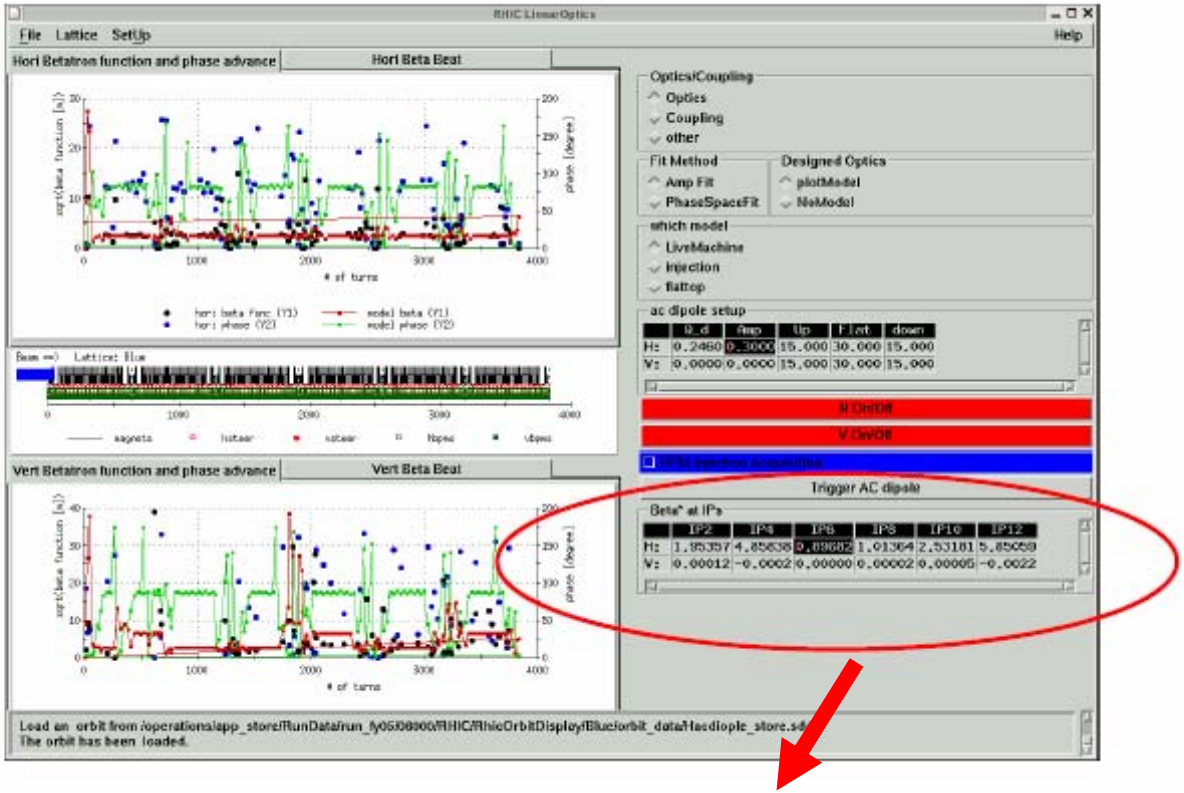
Beta squeeze in Brahms



Fulvia, Todd, Nikolay, Mei, Steve

Can be made operational

Beta measurements with AC dipole



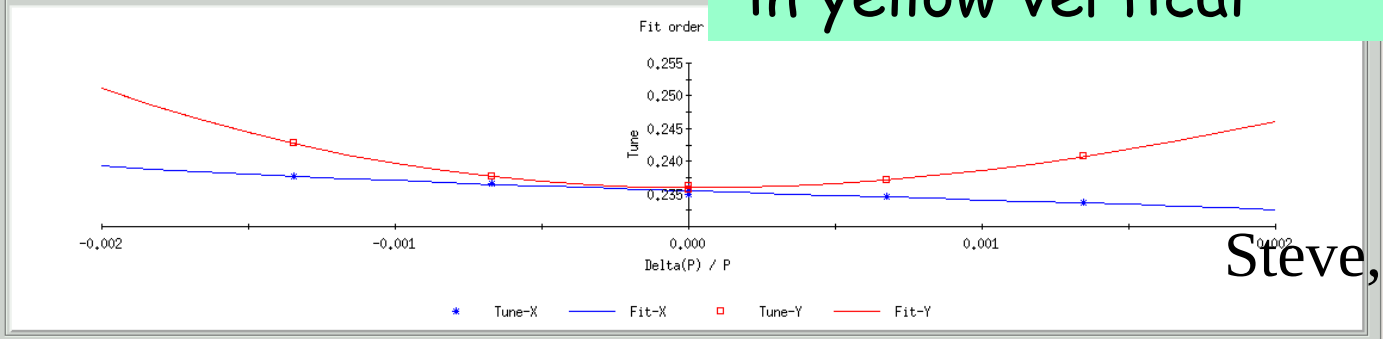
IP2	IP4	IP6	IP8	IP10	IP12
1.884	4.858	0.883	1.001	2.527	5.925
0.051	0.003	0.011	0.010	0.009	0.125

Non-linear chromaticity

Large nonlinear chromaticity in yellow vertical

Analysis of Data -- Yellow ring

Tune vs. Momentum



Steve, Vadim

Row	Delta(p)/p	PLL X	+- Sigma	Tune X #1	Tune X #2	Select	PLL Y	+- Sigma	Tune Y #1	Tune Y #2	Select
1	-0.00134485	0.237696	0.000178978	0.237305	0.244141	PLL	0.242697	8.65817e-05	0.244141	0.170898	PLL
2	-0.000671979	0.236539	0.000240549	0.235352	0.241211	PLL	0.237588	0.000189375	0.226562	0.37793	PLL
3	0	0.234974	2.76123e-05	0.235352	0.229492	PLL	0.235729	2.7923e-05	0.235352	0.376953	PLL
4	0	0.235846	3.93315e-05	0.235352	0.244141	PLL	0.236228	2.86892e-05	0.235352	0.151367	PLL
5	0.000672876	0.234602	0.000153771	0.234375	0.242188	PLL	0.237063	0.000238561	0.237305	0.217773	PLL
6	0.00134575	0.233599	0.000107498	0.234375	0.243164	PLL	0.240742	0.000147032	0.34082	0.164062	PLL
0	0	0	0	0	0	PLL	0	0	0	0	PLL
0	0	0	0	0	0	PLL	0	0	0	0	PLL
0	0	0	0	0	0	PLL	0	0	0	0	PLL
0	0	0	0	0	0	PLL	0	0	0	0	PLL
0	0	0	0	0	0	PLL	0	0	0	0	PLL

	Corr	Tune	+-Sigma	Chrom[1]	+-Sigma	Chrom[2]	+-Sigma	Chrom[3]	+-Sigma
Horizontal	0.981507	0.235457	0.000180828	-1.41321	0.208248	114.403	235.125	-60570.4	383540
Vertical	0.998247	0.235938	0.00010565	-0.281648	0.12167	3187.44	137.373	-247268	224085

Set Peak #1 | Set PLL | Close

AP Experiment Categories

Class:

- **0:** likely to immediately benefit RHIC machine performance, or crucial to RHIC hardware decision-making
- **1:** directly benefiting RHIC machine performance
- **2:** benefiting general accelerator community

Priority:

- **A:** a) benefiting RHIC operation; b) well prepared; and c) likely to succeed
- **B:** has at least two of the above
- **C:** has at least one of the above
- **D:** has none of the above

APEX Run-6: goals, recall

GOALS

- Improve machine performance (longer time scale than 'now' machine performance) - Class1
- Luminosity, upgrade (RHIC-II) Class 1.5?
- Development of_beam diagnostics techniques
- Inter-lab collaborations
- Class 2 experiments – general accelerator physics or for other projects (none so far)

Organization, recall

Program preparation

- AP Experiments workshop – **NOW**
- WEB based proposals: November 30 → ***December 30***
- AEAC Committee: mid December → ***mid January***
- Start AP experiments: beginning January→ ***beginning February?***

During operations

- **12h /week** during physics running – regularly scheduled during Run-5 for Cu-Cu and PP
- **Friday 11 am meeting** – results + planning
- Scheduling meeting – Monday (a keeper!)
- Ideal schedule for APEX experiments **day of Tuesday** or **Wednesday – flex start OK** (9-12) **Tuesday night** before a scheduled maintenance

Program, Workshop - 1

Opening Session – November 9 (Morning)
Session Chair: T. Roser

8:30-10:10		
Welcome	F. Pilat	
Opening remarks	D. Lowenstein	10
RHIC outlook: the next few years	T. Roser	20
Run-6: P-P	V. Ptitsyn	20
Run-6: Au-Au	A. Drees	20
APEX in Run-5 and outlook for Run-6	F. Pilat	20
10:00-10:30	coffee break	
10:30-12:00		
Beam studies for RHIC II	W. Fischer	20
Beam studies for ERL and ECOOL	V. Litvinenko	20
Beam studies for eRHIC	V. Ptitsyn	20
Beam studies and developments for the injectors	L. Ahrens	20
Discussion		10

Session 1 - November 9 (Afternoon)
Session Chair: W. Fischer

14:00 - 15:30		
Pressure rise experiments 1	SY. Zhang	20
Pressure rise experiments 2	H. Huang	20
Transition PR and instabilities	V. Ptitsyn	20
Electron flux in dipole fields	A. Drees	20
Discussion		10
15:30-16:00	coffee break	
16:00-17:30		
Present understanding of RHIC IBS	A. Fedotov	20
IBS lattice development	V. Litvinenko	20
Stochastic cooling	M. Brennan	20
Gold 77 in RHIC	D. Trbojevic	20
Discussion		10
(Workshop Dinner)		

Program, Workshop - 2

Session 2 – November 10 (Morning)
Session Chair: F. Pilat

8:30-10:10		
RHIC Spin experiments	M. Bai	20
AGS Spin studies and development	H. Huang	20
LARP update	S. Peggs	20
LHC Controls, LARP first results	H. Schmickler	20
LHC Commissioning Update	M. Lamont	20
10:10-10:40	coffee break	
10:40-12:20		
e-lenses for RHIC and LHC	V. Shiltsev	20
Beam-beam compensation	W. Fischer	20
LHC luminosity monitor calibration	A. Ratti	20
ATLAS ZDC prototype testing	S. White	20
Beam studies at JLAB	M. Spata	20

Session 3 – November 10 (Afternoon)
Session Chair: V. Litvinenko

14:00-15:40		
Shottky – system and studies	K. Brown	20
PLL – systems and studies	P. Cameron	20
Diagnostics and physics from BPM's	T. Satogata	20
AC dipole based diagnostics	M. Bai	20
10 Hz orbit feedback	C. Montag	20
16:00-16:20	coffee break	
16:20-18:00		
Echoes as a diagnostic tool	W. Fischer	20
Compensation of 0.66 at injection	Y. Luo	20
Dynamic aperture measurements	F. Pilat	20
Beam-gas fluorescence measurements at the hydrogen jet polarimeter	P. Thieberger	20
Emittance: polarimeter	H. Huang	20

Announcements

- If interested in dinner tonight at Pasta Pasta in Port Jefferson please tell me before the lunch break.
- Thank you to all for your participation!