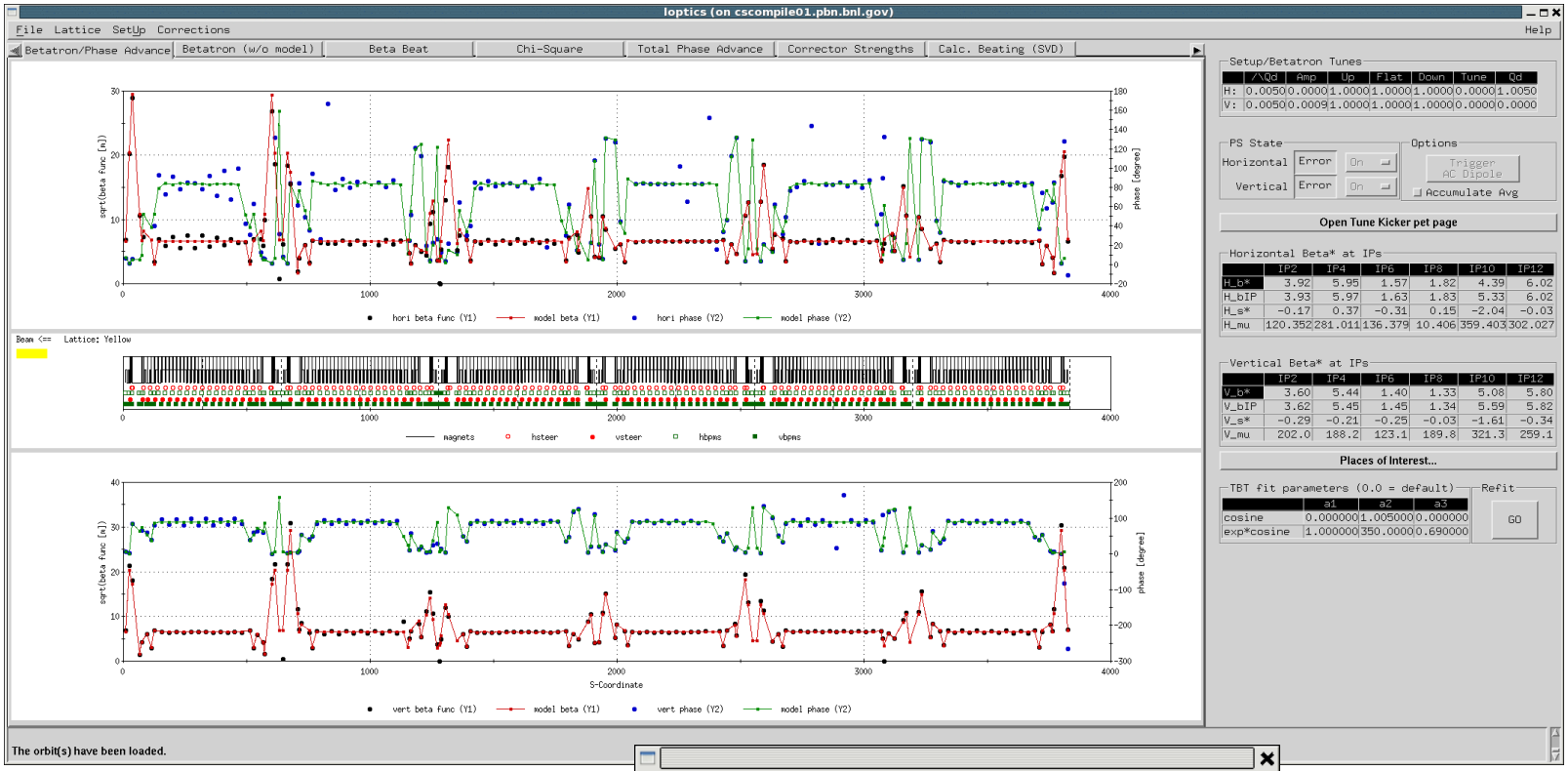
E-lens APEX Study Plan

E-lens teams

HOBBC experiments at 255 GeV

- Test of lattice
  - Dynamic Aperture (in operations with 1 BB collision)
  - Polarization and polarization lifetime (in operation)
  - Phase advance IP8 to e-lens (setup or APEX)
- Effect of e-beam on p-beam tune distribution (BTF)
  - Change in distribution with I_e and σ_e
  - BB footprint compression with e-lens
- Max beam-beam parameter ξ_p with 2 BB collisions and with and without e-lens
  - Need maximum available ξ_p, i.e. $N_b \geq 2.5\text{-}3.0\text{x}10^{11}$ with $\varepsilon_n = 2.5\ \mu\text{m}$
  - ~28x28 bunches, short stores (~10 min) get data for plot like this (much fewer points) =>
- Measurement of BB Resonance Driving Terms
- Test of beam stability

2017 lattice (yellow)

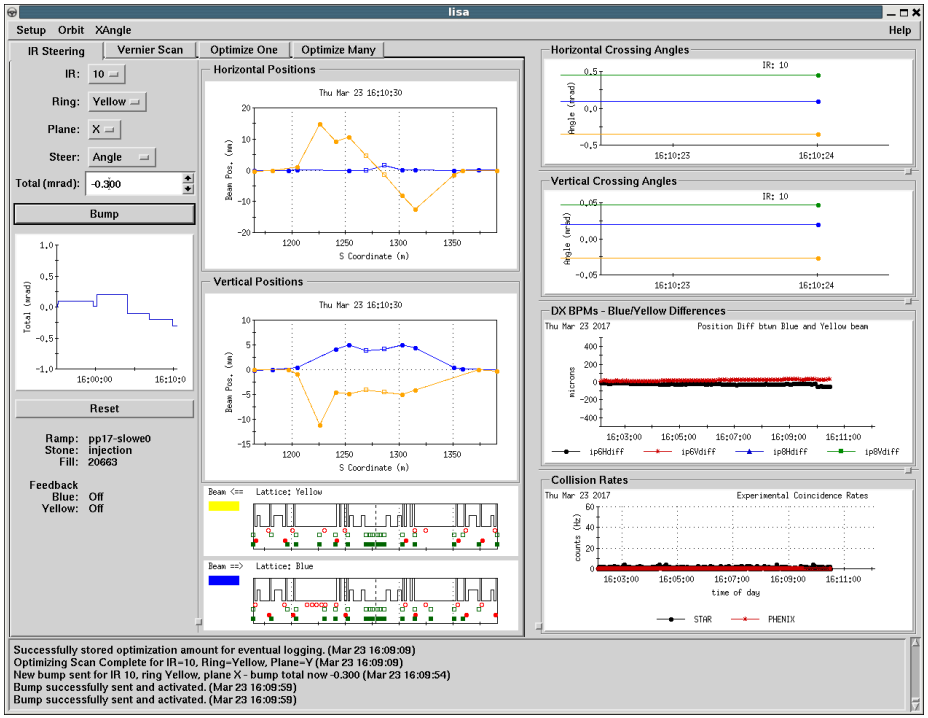


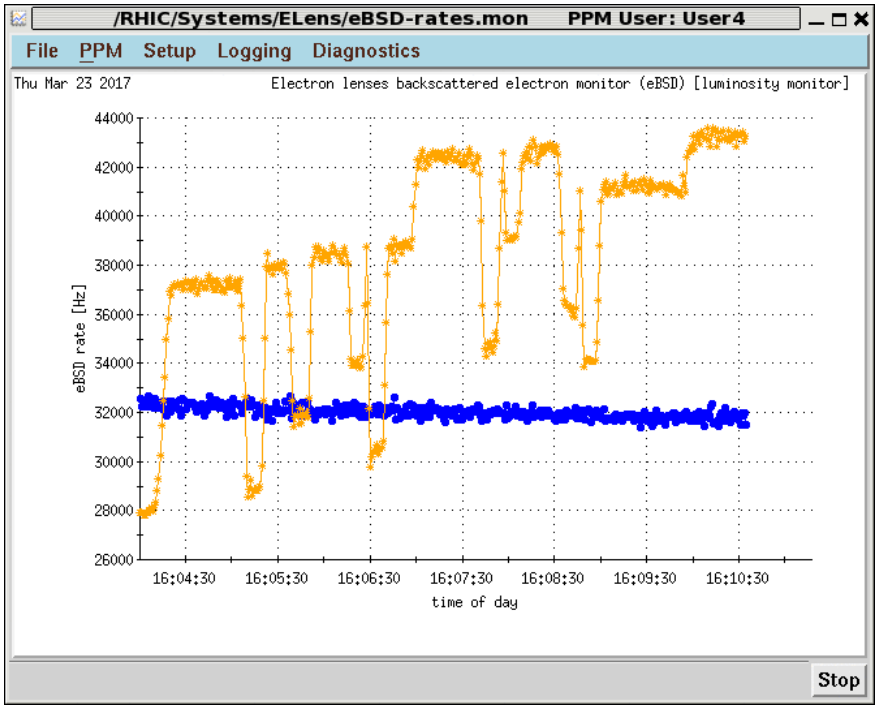
Places of interest around RHIC

========== YELLOW ==========			
1=Element	2=SiteWideName	3=BetaX	4=BetaY
Hori. IPM	yi2-ipm3	276.484	86.0256
Vert. IPM	yo12-ipm3	35.7244	167.083
COLO	yi7-c3	593.63	246.958
COLH1	yi7-ch3.1	348.537	94.8068
COLV1	yi7-cv3	227.466	36.2156
COLH2	yi7-ch3.2	209.925	29.3074
ELENS	g10-markx.6	10.8792	9.82977
SC Hori. PU	yo12-cpuh3	56.6278	205.886
SC Vert. PU	yo12-cpuv3	18.6859	38.4544
SC Long. PU	yi2-cpul3.2	3.98856	34.7097
SC L. Kicker	yi11-kscl3.3	-1	18.264
SC V. Kicker	yi3-kscv3	33.3823	18.4595
SC H. Kicker	yi3-ksch3.1	46.7049	11.0743

OK

eBSD Alignment (Yellow) -0.3 mrad



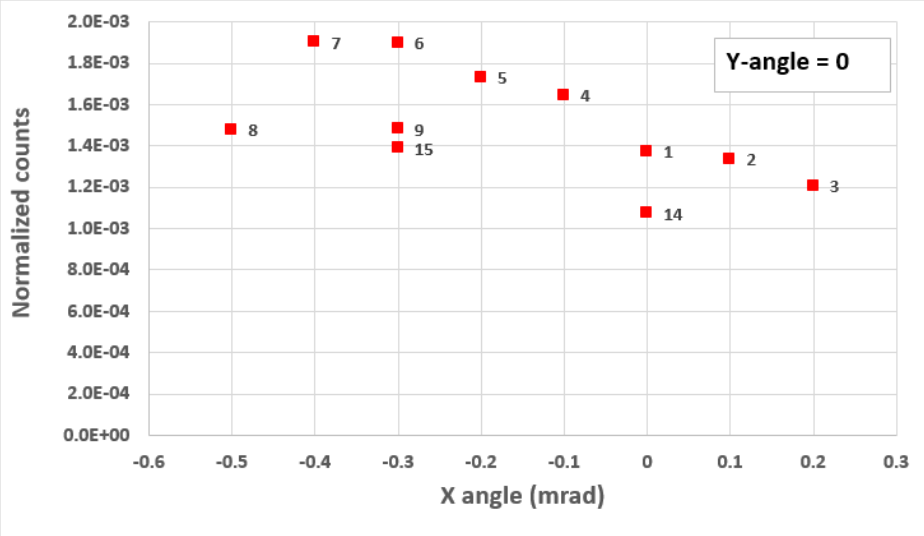


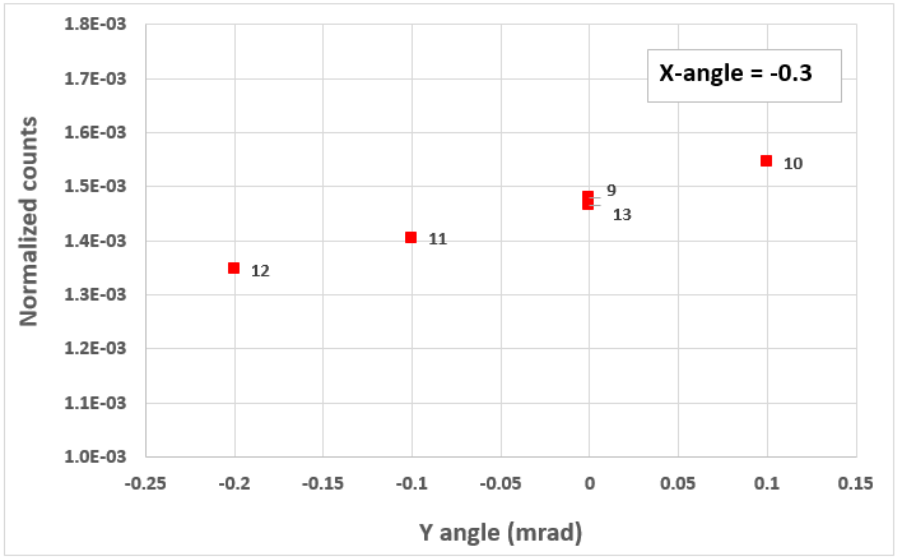
eBSD Alignment (Yellow)

Angle values in the Yellow alignment scan:

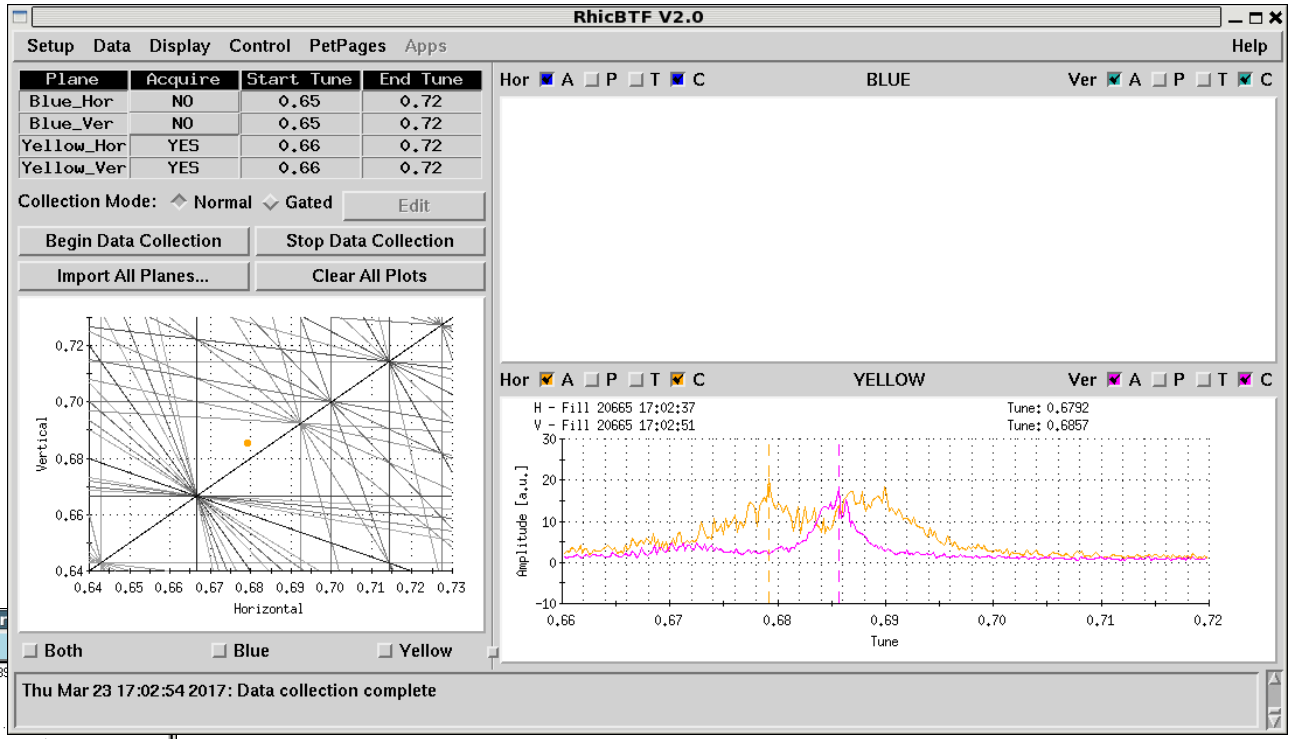
A. hor scan: 0.0, +0.1, +0.2, -0.1, -0.2, -0.3, -0.4, -0.5 mrad
At each step x-y position optimization with LISA.
Set to -0.3 mrad.

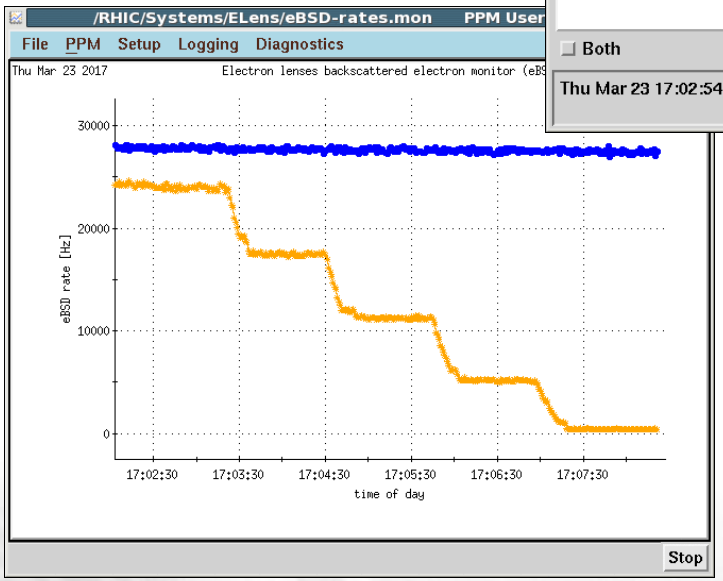
B. ver scan: 0.0, +0.1, -0.-1, -0.2 mrad (see increased losses at +0.1 and -0.2 mrad)
At each step x-y position optimization with LISA.
Set to 0 mrad





BTF


RhicBTF V2.0
Setup Data Display Control PetPages Apps Help
Plane Acquire Start Tune End Tune
Blue_Hor NO 0.65 0.72
Blue_Ver NO 0.65 0.72
Yellow_Hor YES 0.66 0.72
Yellow_Ver YES 0.66 0.72
Collection Mode: Normal Gated Edit
Begin Data Collection
Stop Data Collection
Import All Planes...
Clear All Plots
Vertical
Horizontal
Both Blue Yellow
Hor A P T C BLUE Ver A P T C
Hor A P T C YELLOW Ver A P T C
H - Fill 20665 17:02:37
V - Fill 20665 17:02:51
Tune: 0.6792
Tune: 0.6857
Amplitude [a.u.]
Tune
Thu Mar 23 17:02:54 2017: Data collection complete


/RHIC/Systems/ELens/eBSD-rates.mon PPM User
File PPM Setup Logging Diagnostics
Thu Mar 23 2017
Electron lenses backscattered electron monitor
eBSD rate [Hz]
time of day
Stop

Summary

1. New store ramp pp17-elens0 instead of pp17-s0. Acceleration ramp unchanged.
Measured optics for pp17-elens0 (Yellow should have multiple of 180 deg between IP8 and Yellow e-lens).
2. Turned on warm solenoids in both e-lenses.
3. Turned on electron beam in both e-lenses (~500 mA). Immediate signal in Blue and Yellow eBSD.
4. Position and angle alignment scan with the Yellow lens:

Angle values in the Yellow alignment scan:

4A. hor scan: 0.0, +0.1, +0.2, -0.1, -0.2, -0.3, -0.4, -0.5 mrad
At each step x-y position optimization with LISA.
Set to -0.3 mrad.

4B. ver scan: 0.0, +0.1, -0.-1, -0.2 mrad (see increased losses at +0.1 and -0.2 mrad)
At each step x-y position optimization with LISA.
Set to 0 mrad

5. Current scan with BTF at final angle and position values (480, 390, 290, 190, 90 mA)