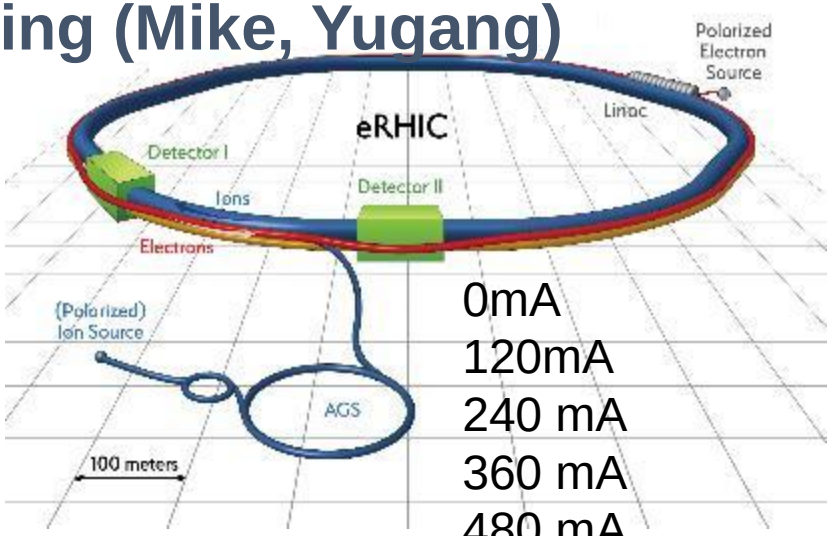
E-lens APEX Study

E-lens teams

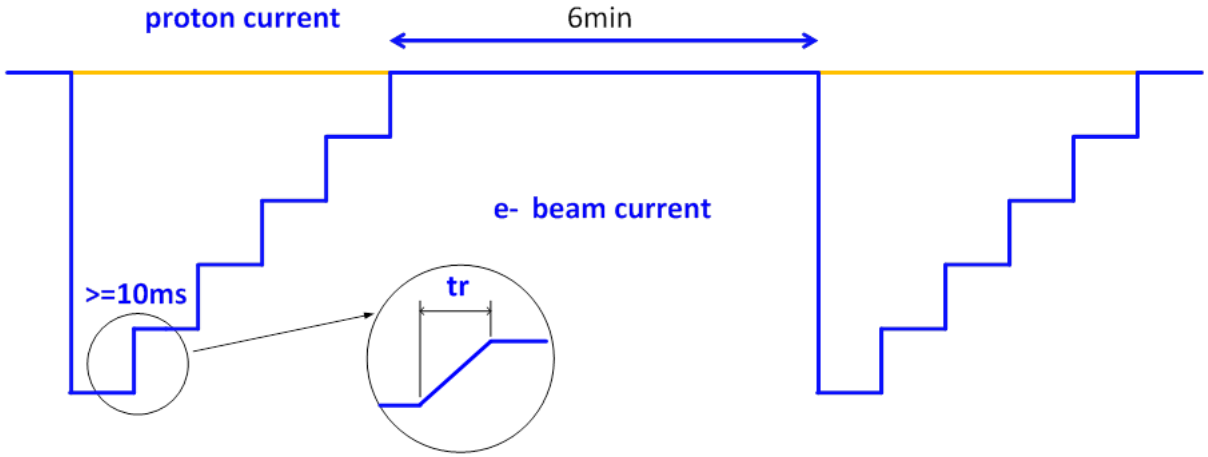
70 YEARS OF DISCOVERY
A CENTURY OF SERVICE
U.S. DEPARTMENT OF ENERGY
BROOKHAVEN NATIONAL LABORATORY

eRHIC experiments one: Developing (Mike, Yugang)

- RR version need bunch refilled every few min, possibly in several steps
  needed to maintain luminosity and good average polarization for bunches with the unstable polarization direction



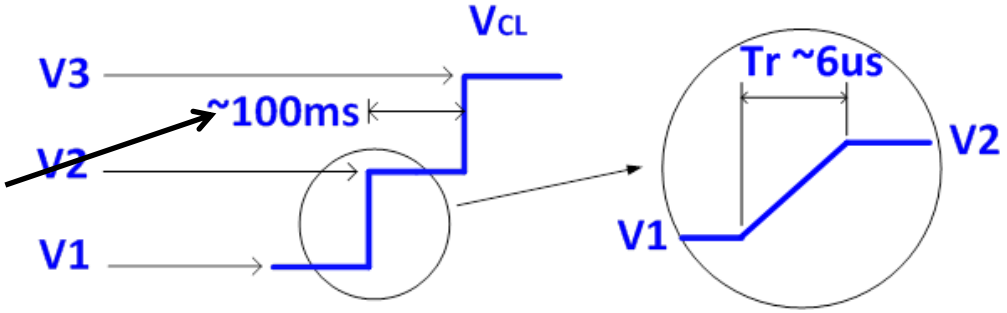
0mA
120mA
240 mA
360 mA
480 mA
620 mA



200mS
6 uS rising
2 uS falling

2 days testing

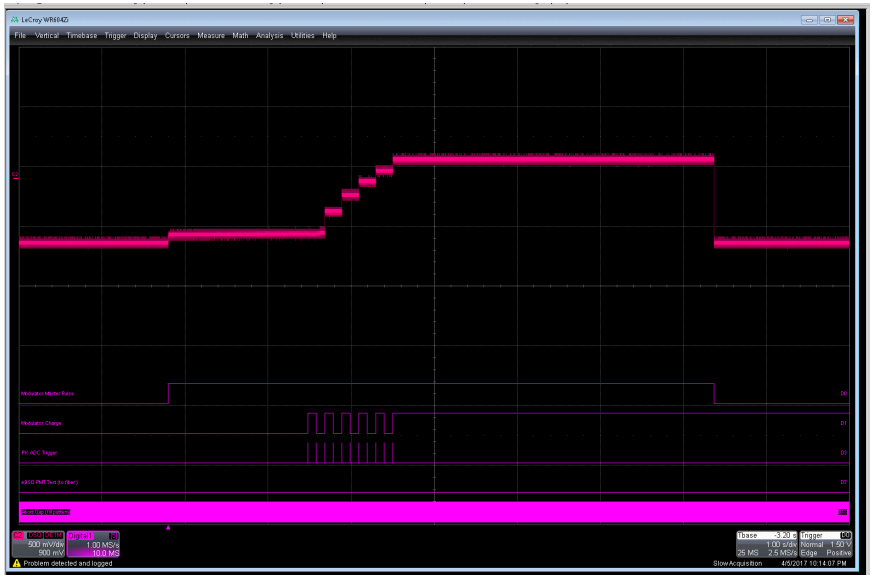
may have 300 ms here

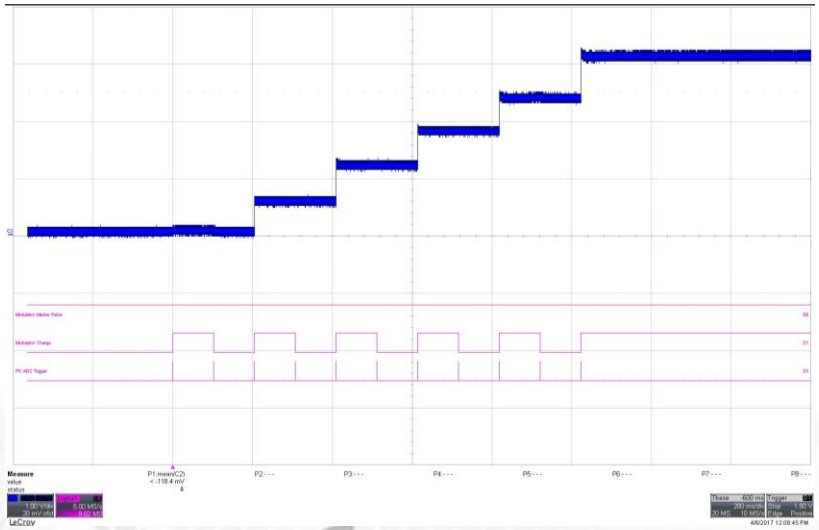


Experiment Setup

1. Pp17-elens0 store ramp
2. 31x31 bunches, only 1~181 buckets;
3. Un-cogged
4. Beam transverse position alignment
5. No angle alignment after e-beam angle change
6. Decrease store tune 0.007 unit

Stack Up Current Control (Mike Costanzo, Yugang Tan)





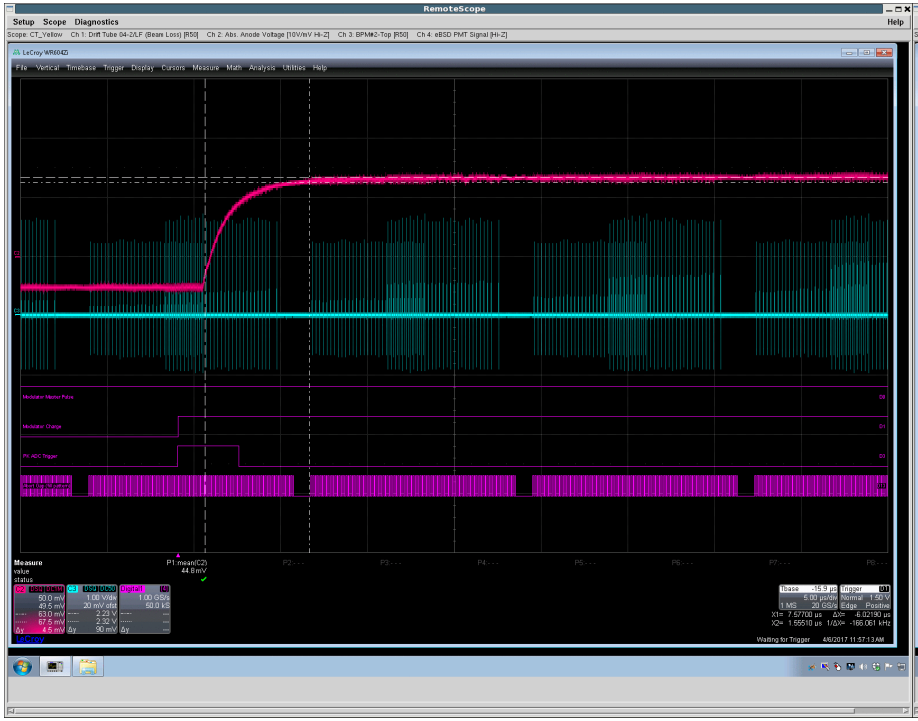
0mA
120mA
240 mA
360 mA
480 mA
620 mA

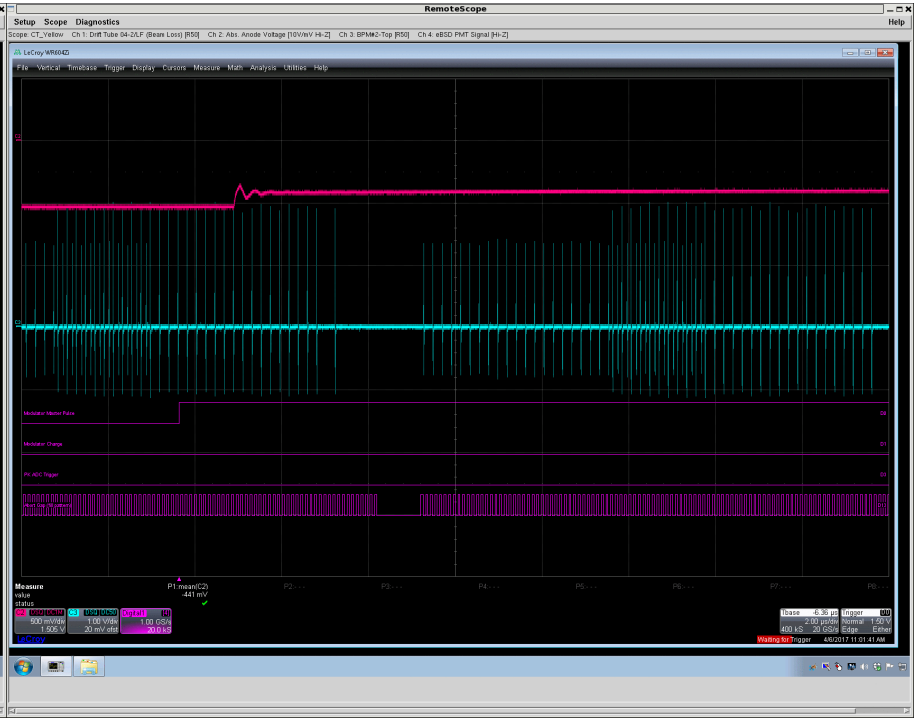
200mS
6 uS rising
2 uS falling

2 days
troubleshooting
and testing

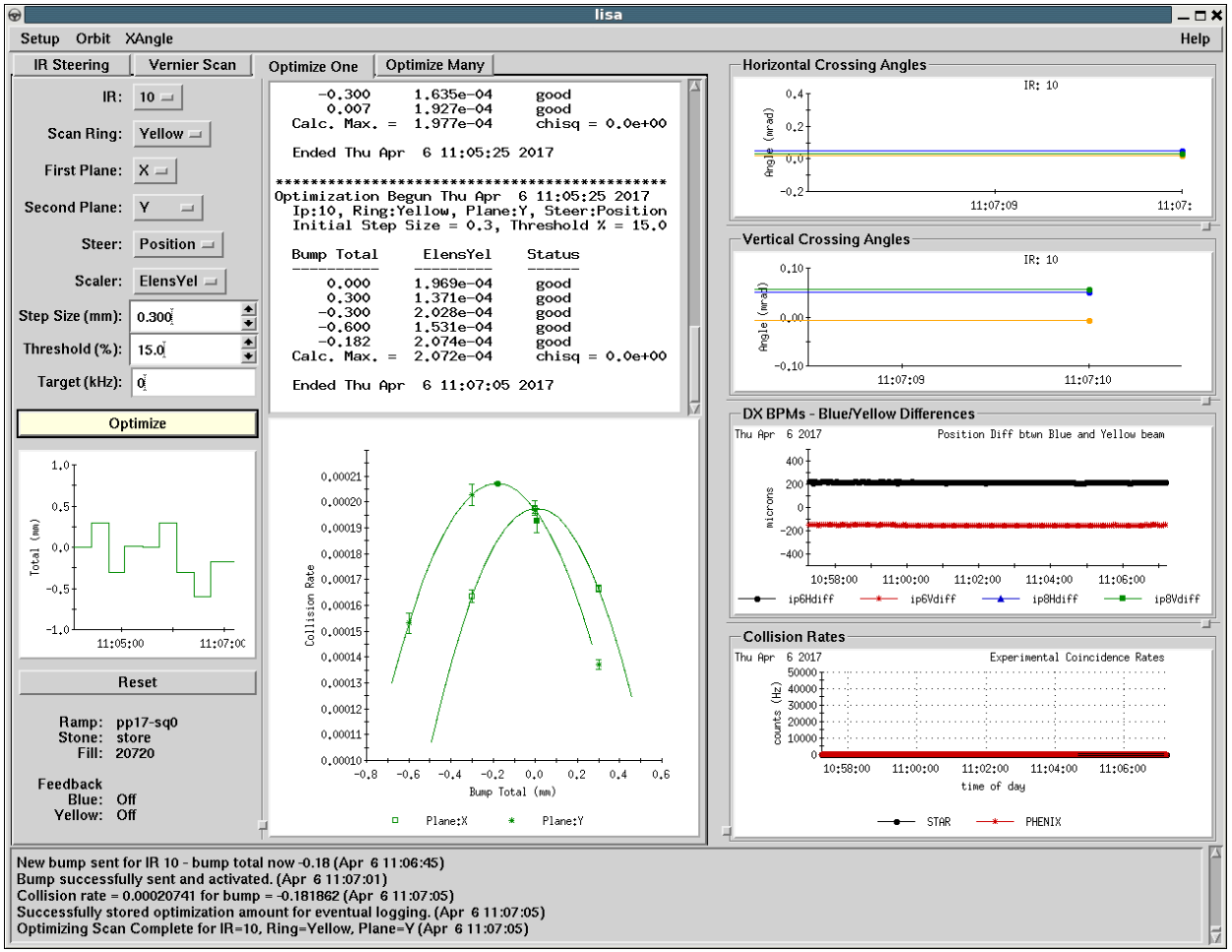
Longitudinal Alignment

First store was lost when we use Artus to kick blue 175 bucket 1 Hz event rate.





Transverse Alignment



Emittance increased

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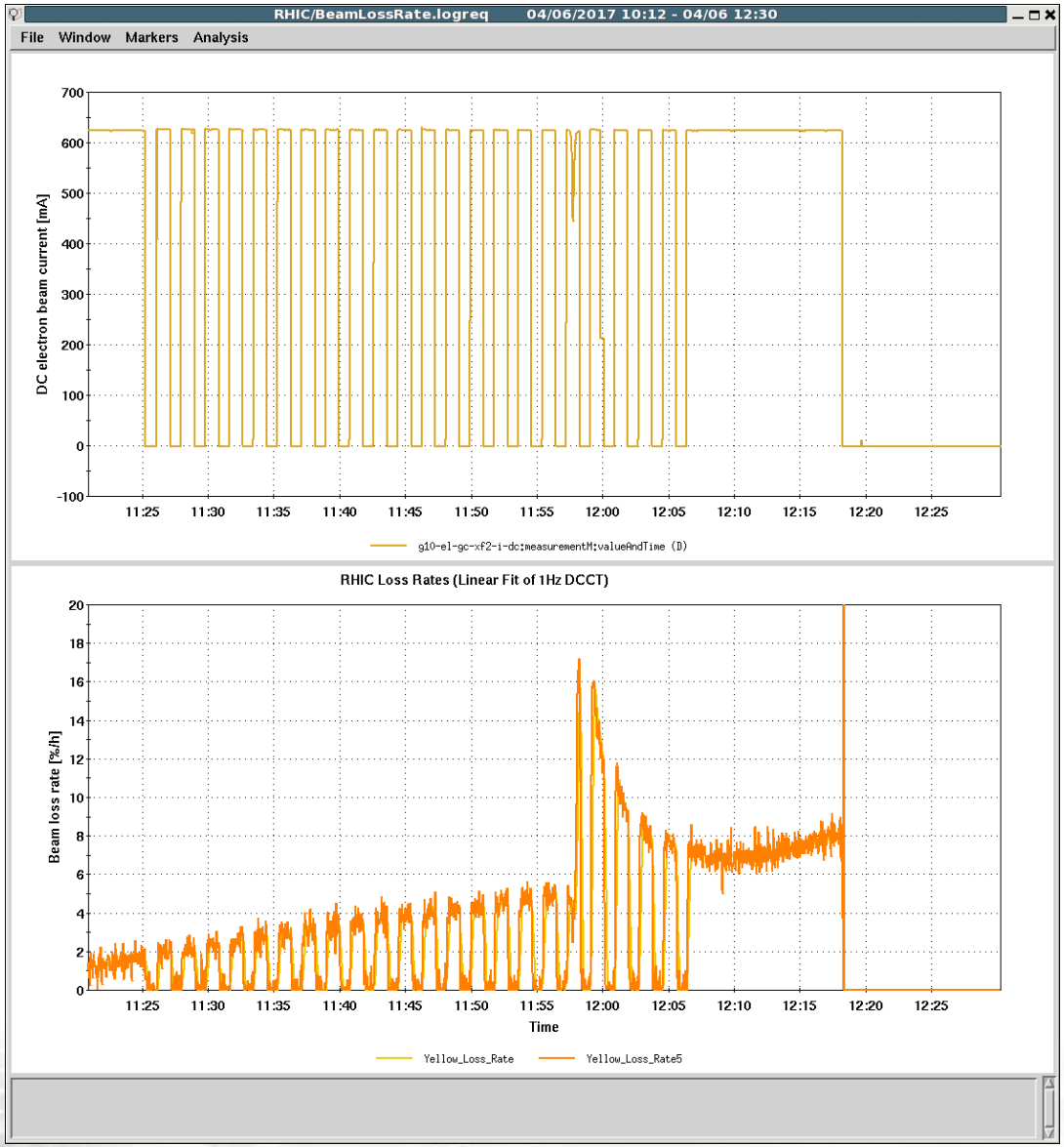
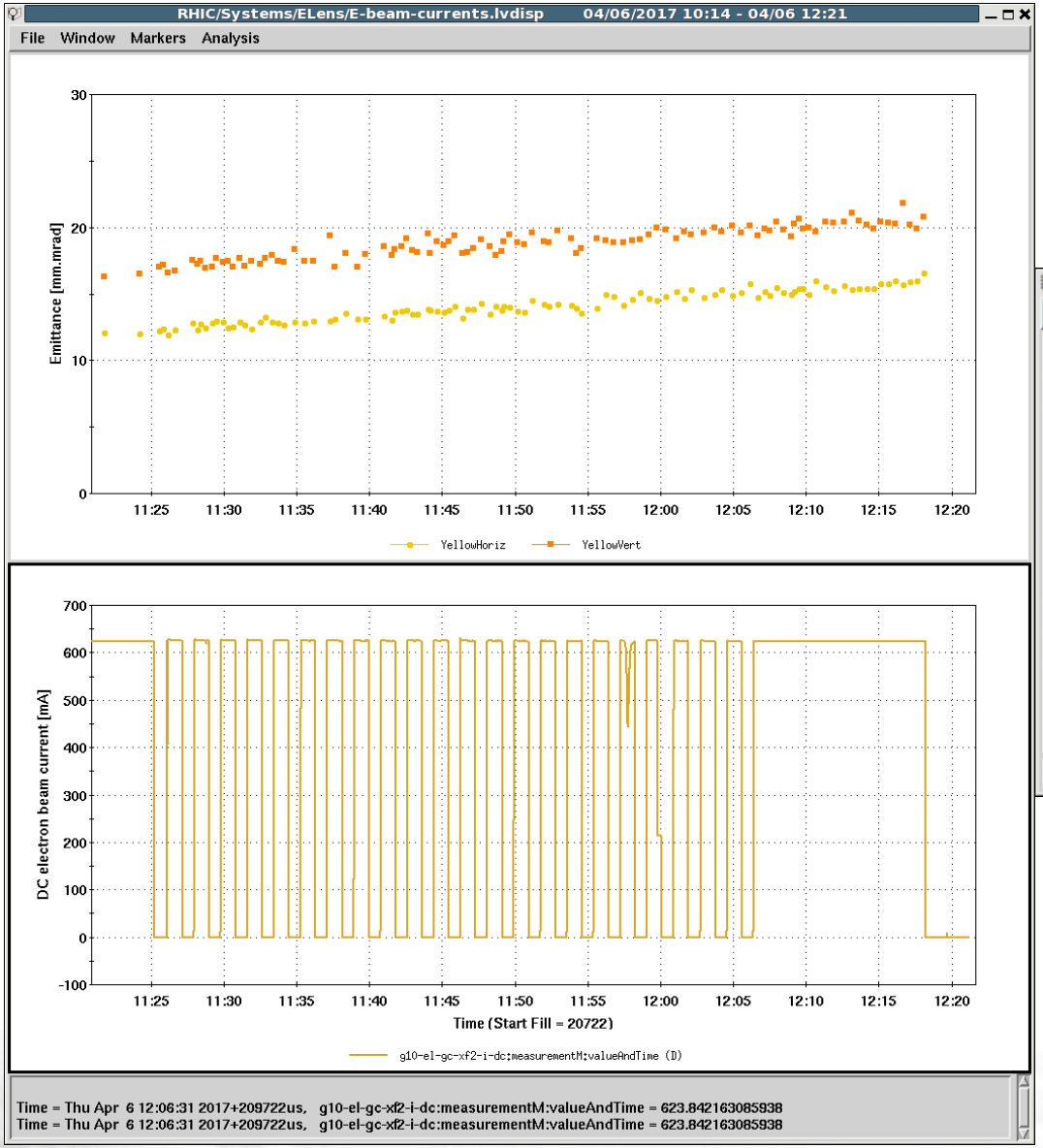
Beam loss

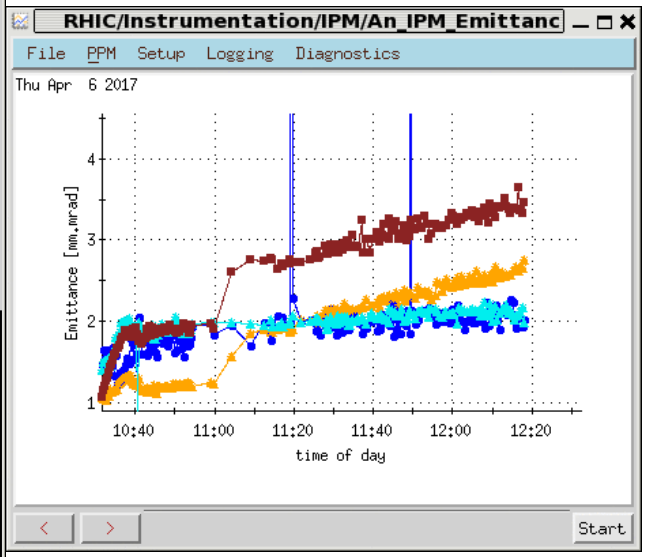


22 simulated replacements

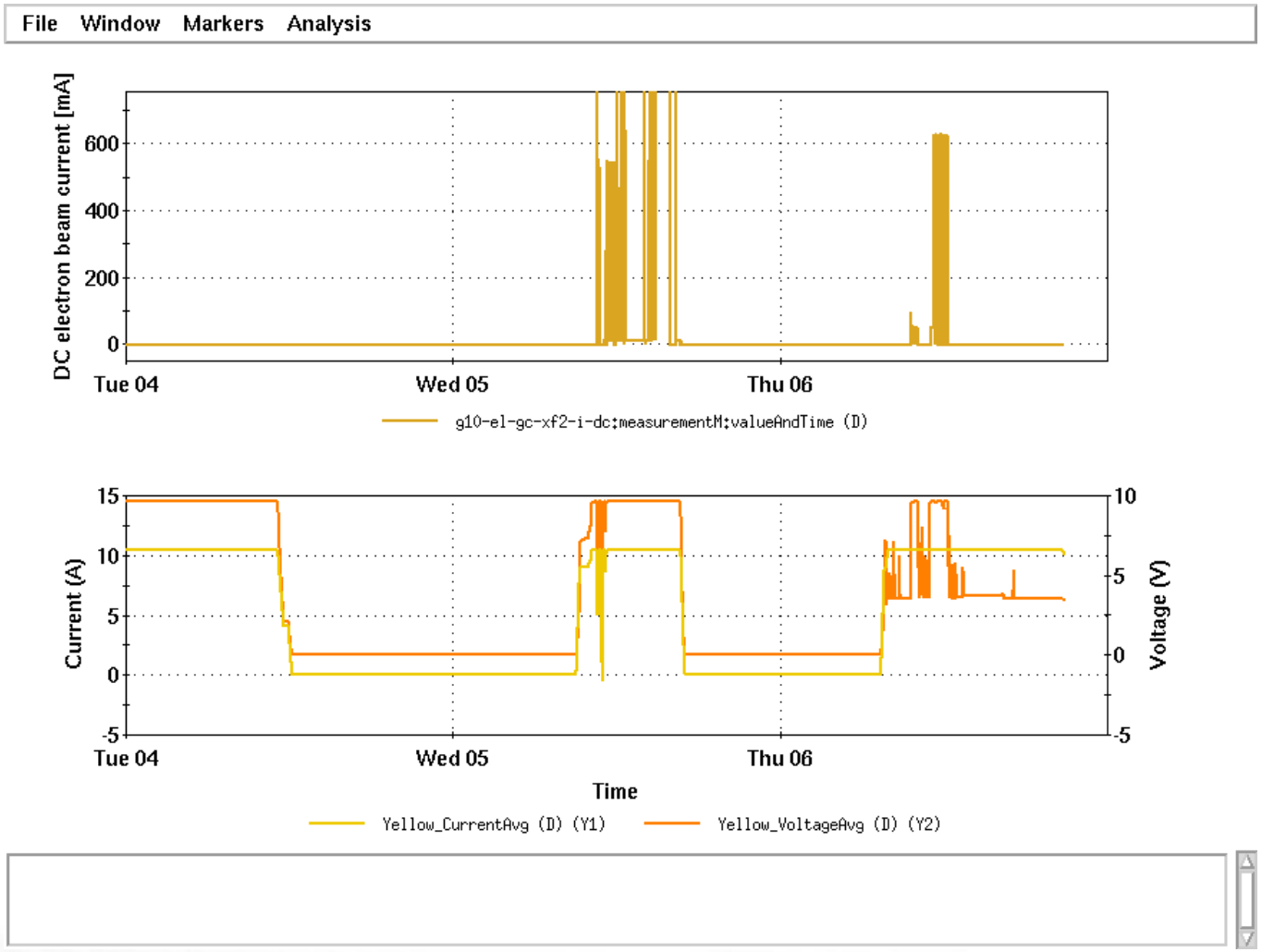
1 min on, 45 sec off

Emittance


RHIC/Systems/ELens/E-beam-currents.lvdisp 04/06/2017 10:14 - 04/06 12:21
File Window Markers Analysis
Emittance [mm.mrad]
YellowHoriz
YellowVert
DC electron beam current [mA]
Time (Start Fill = 20722)
g10-el-gc-xf2-i-dc:measurementM:valueAndTime (D)
Time = Thu Apr 6 12:06:31 2017+209722us, g10-el-gc-xf2-i-dc:measurementM:valueAndTime = 623.842163085938
Time = Thu Apr 6 12:06:31 2017+209722us, g10-el-gc-xf2-i-dc:measurementM:valueAndTime = 623.842163085938


RHIC/Instrumentation/IPM/An_IPM_Emittanc
File PPM Setup Logging Diagnostics
Thu Apr 6 2017
Emittance [mm.mrad]
time of day
Start

Cathode Heater: abnormal behavior



Summary

1. The stack up e-beam current has been achieved via timing and modulator control;

2. Emittance growth can be seen during 22 simulated bunches experiment;

3. Need to check angle alignment later;

4. Cathode heater need to be checked.