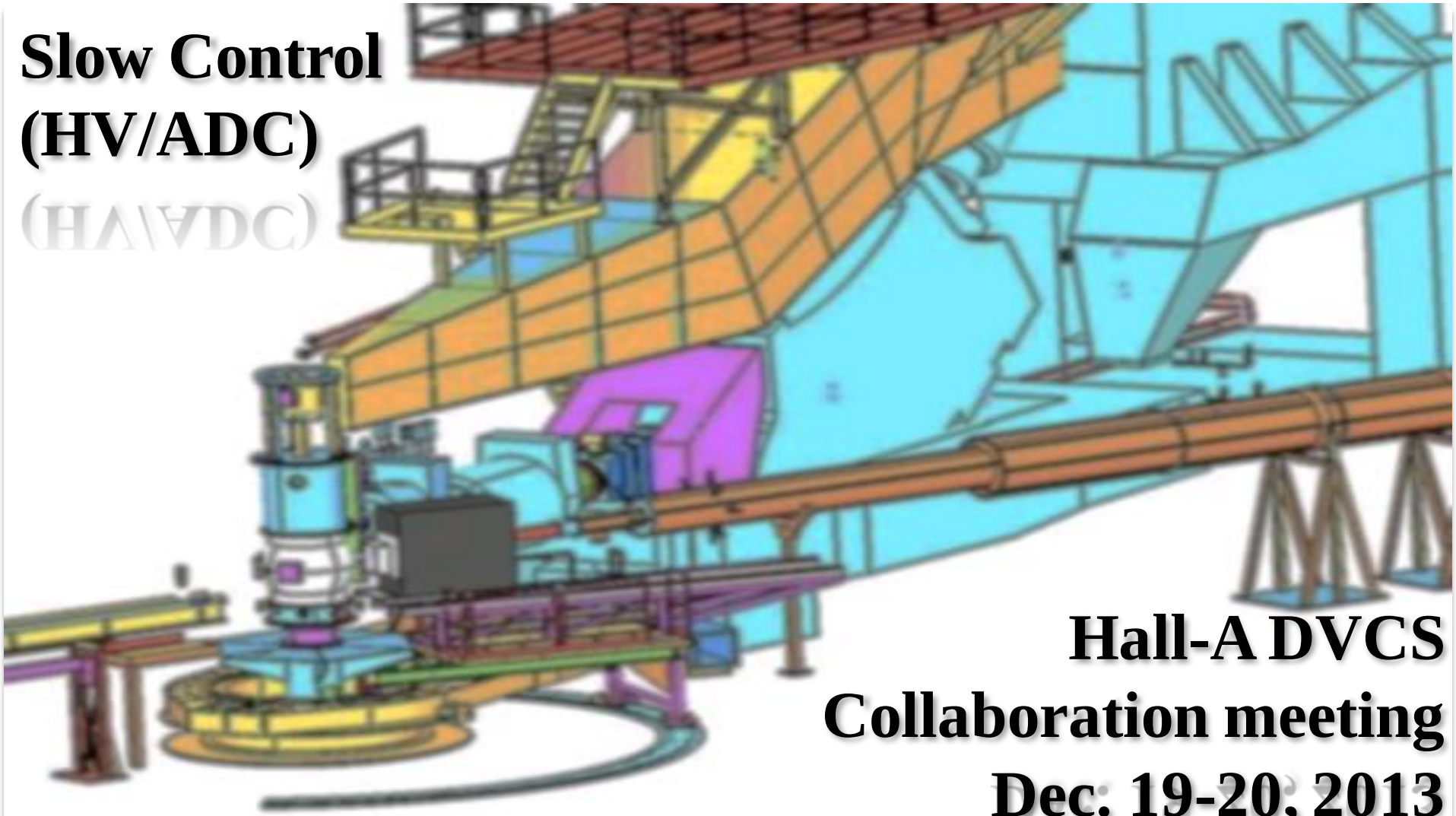
Slow Control (HV/ADC)



Hall-A DVCS Collaboration meeting

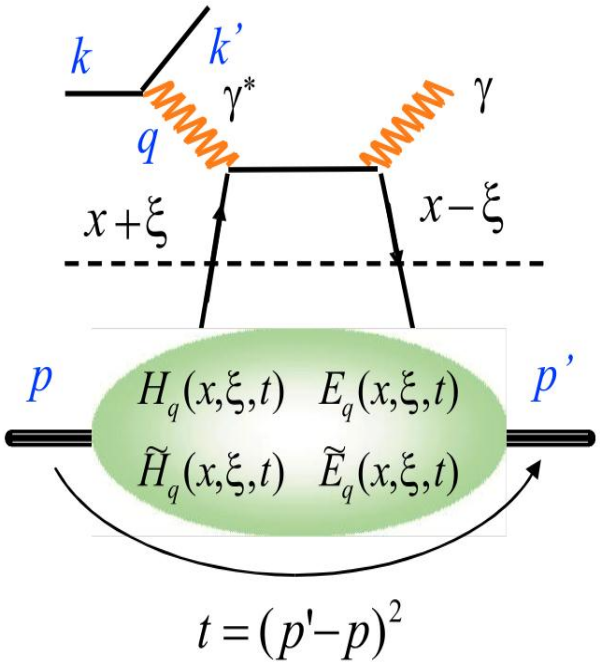
Dec. 19-20, 2013

K. Park

Old Dominion University

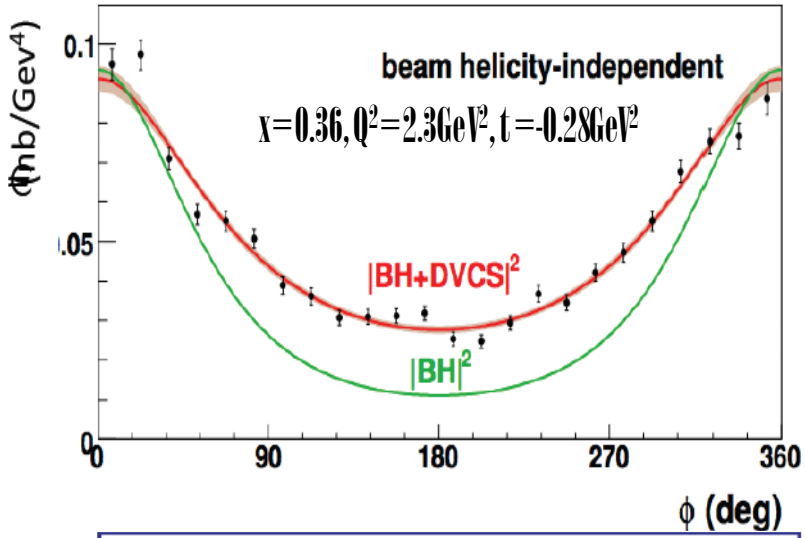
Jefferson Lab
Thomas Jefferson National Accelerator Facility

Physics DVCS2010



$$t = (p'-p)^2$$

$$d^5\sigma = |BH|^2 + (BH \bullet DVCS) + |DVCS|^2$$

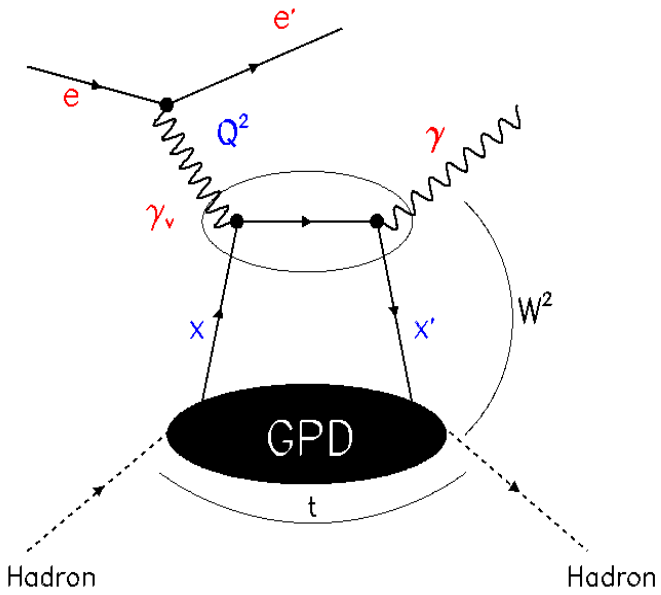


E00-110
PRL97:262002(2006)

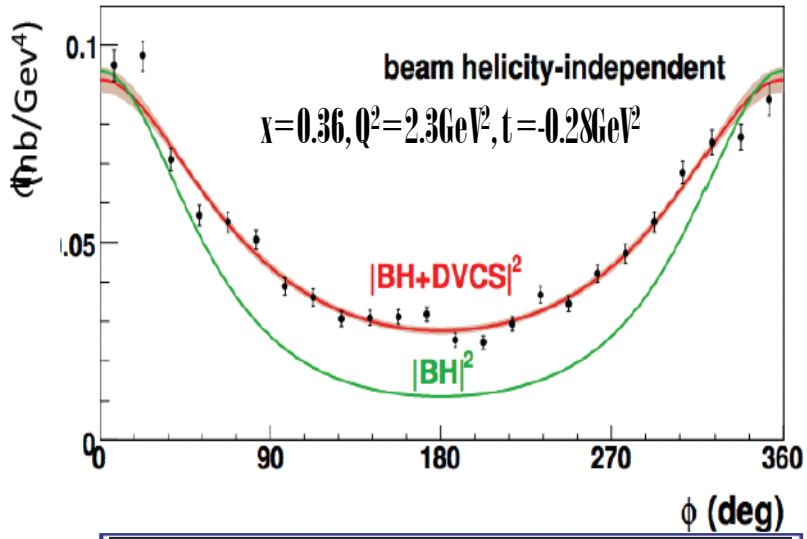
Statistics Collected by Kinematics

Kinematics	PAC Hours	% Completed
Proton Data		
Q^2=1.50 GeV² / E=5.5 GeV	20	100%
Q^2=1.50 GeV² / E=3.3 GeV	60	100%
Q^2=1.75 GeV² / E=5.5 GeV	30	100%
Q^2=1.75 GeV² / E=4.4 GeV	90	100%
Q^2=2.00 GeV² / E=5.5 GeV	50	100%
Q^2=2.00 GeV² / E=4.4 GeV	150	82%
Neutron Data		
Q^2=1.75 GeV² / E=5.5 GeV	200	60%
Q^2=1.75 GeV² / E=4.4 GeV	200	70%

E07-007 / E08-025



$$d^5\sigma = |BH|^2 + (BH \bullet DVCS) + |DVCS|^2$$

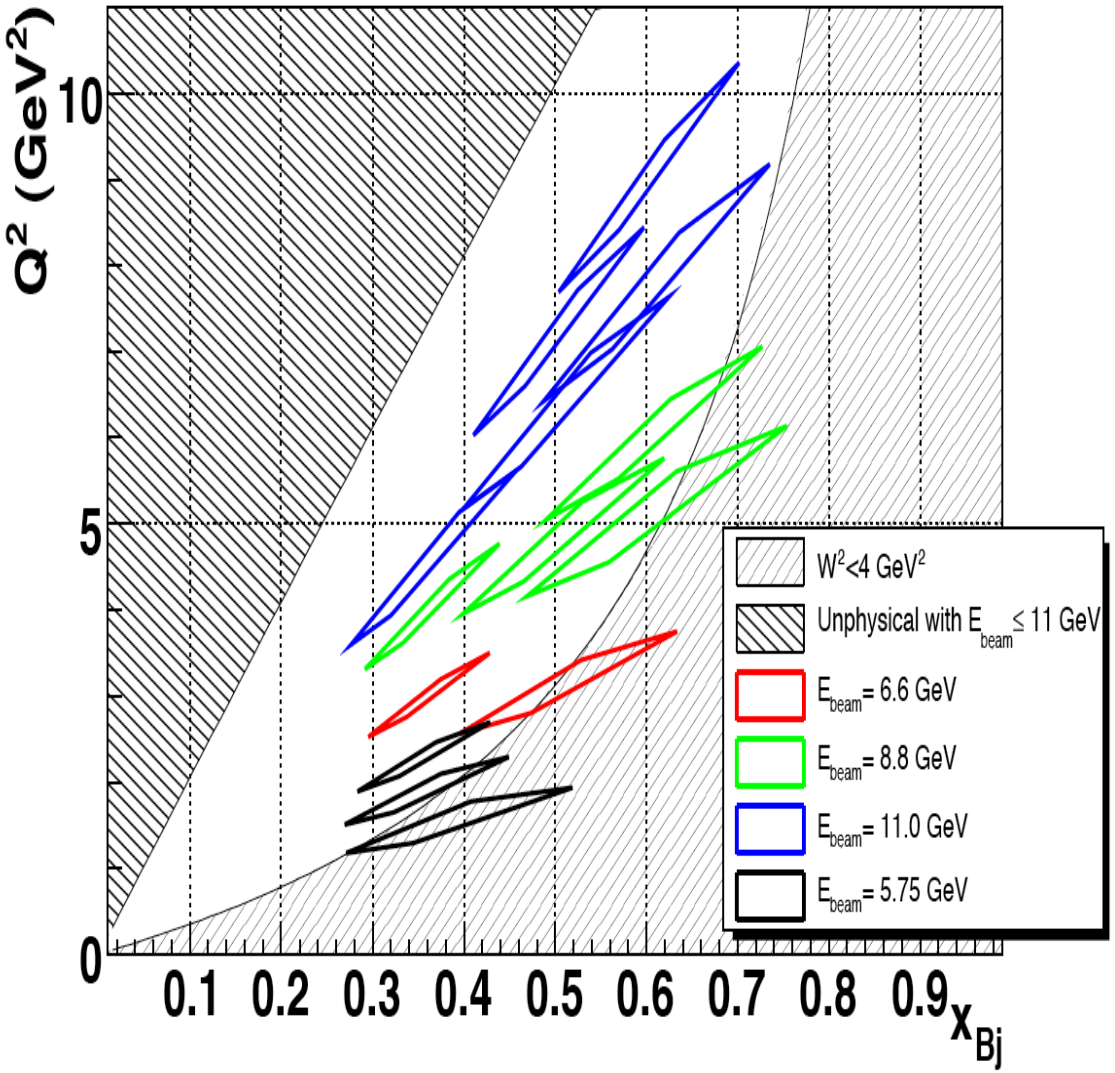


E00-110 PRL97:262002(2006)

- Separation BH*DVCS interference contribution from DVCS² contribution
- L/T separation of the DVMP(π^0)

E07-007 / E08-025

Insight E12-06-114



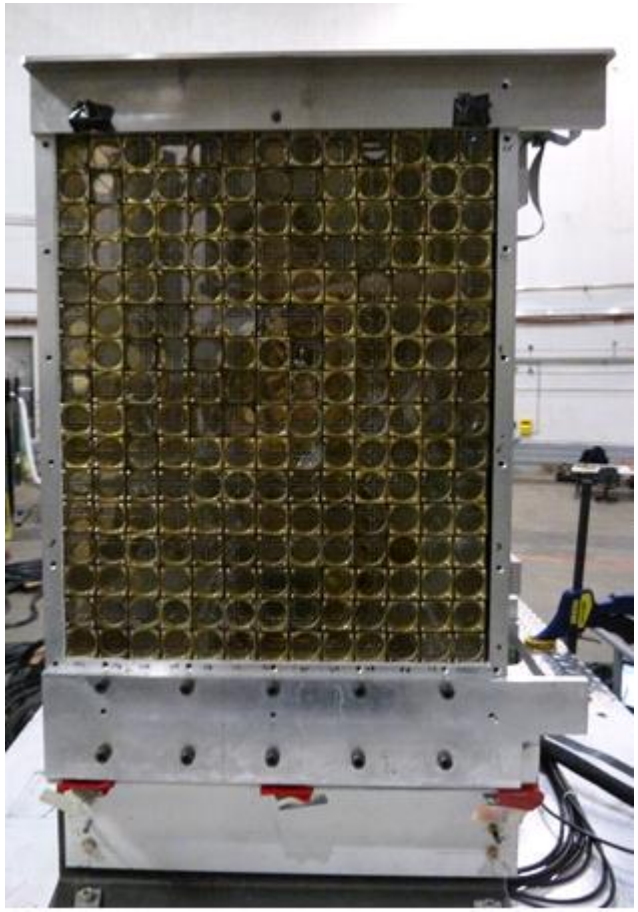
Beamtime request (days)

Q^2 (GeV)	x_B = 0.36	x_B = 0.5	x_B = 0.6
3.0	3		
4.0	2		
4.6	1		
3.1		5	
4.8		4	
6.3		4	
7.2		7	
5.1			13
6.0			16
7.7			13
9.0			20

Total: 88 + 12 (overhead) = 100 days

Current status

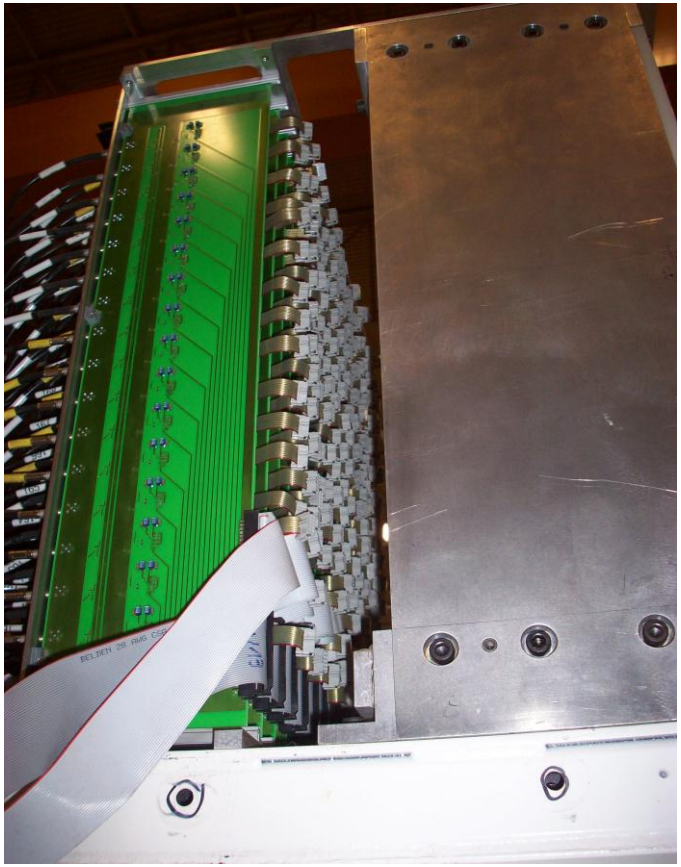
Year = 2010



E07-007 / E08-025

PbF2,
208=13x16 blocks
D= 3x3x18.4 cm^3
$\sigma(x) = 2\sim3mm$
$\sigma(E) = 5\%/\sqrt{\mathrm{E}}$

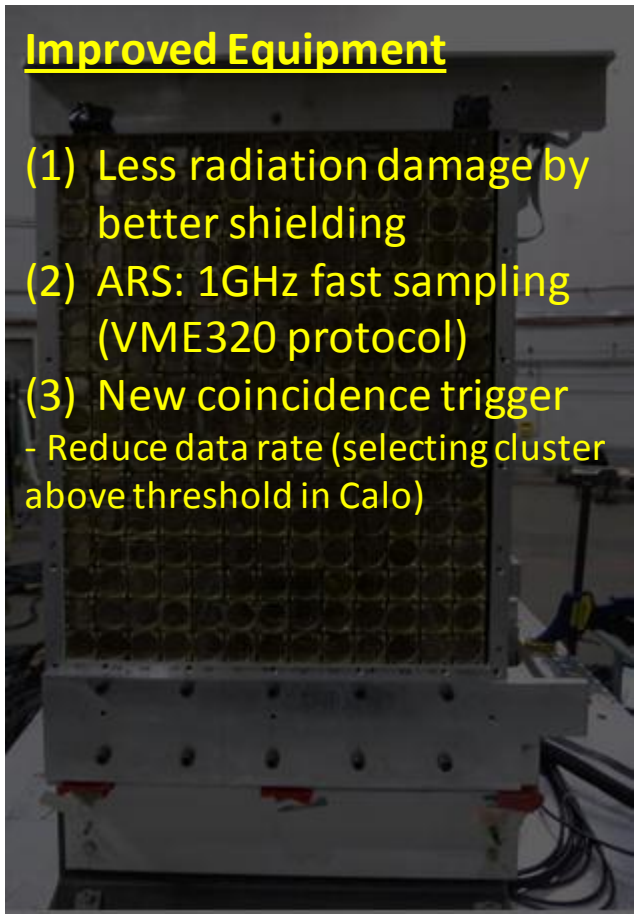
Year = 2013



E12-06-114

Current status

Year = 2010



Improved Equipment

(1) Less radiation damage by better shielding
(2) ARS: 1GHz fast sampling (VME320 protocol)
(3) New coincidence trigger
- Reduce data rate (selecting cluster above threshold in Calo)

Year = 2013

More improving

(1) Accurate cross-sections
- High luminosity (10^{38} $cm^{-2}s^{-1}$)
- Understanding acceptances

(2) High angle resolution
- Small bin analysis to understand rapid change of Bethe-Heitler cross-section

(3) Equal statistics in even bin

Goals

CRS: Stat. 3-4%, Sys. 4%
Scaling test
Separation $\mathfrak{Re}$, $\mathfrak{Im}$

Readiness of experiment

High Voltage System –power-supply

(1) Mount two HV supplies (LeCroy) in rack @ 1st week in Oct., 2013
Mount VME/24V power supply @ 3rd week in Nov., 2013

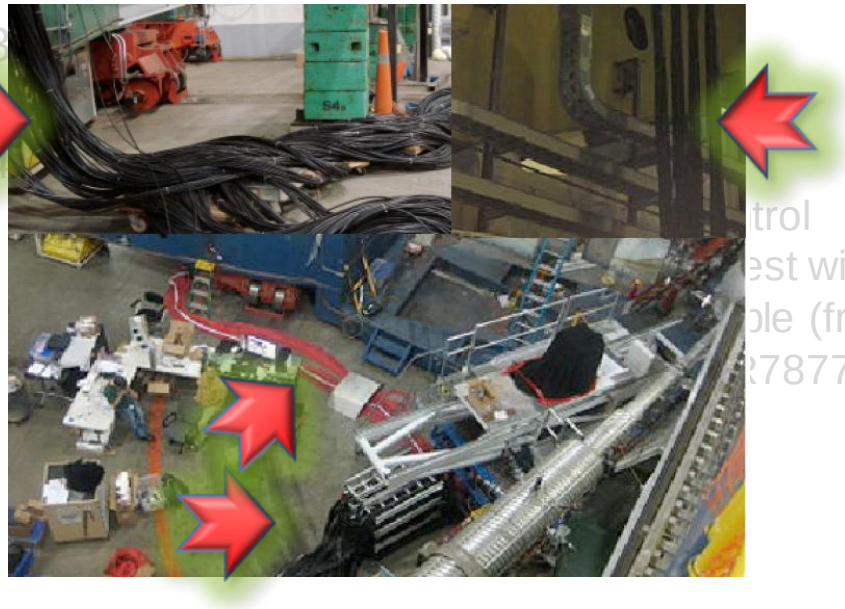
Readiness of experiment

High Voltage System - cabling

(1) Mount two HV supplies (LeCroy) in rack @ 1st week in Oct., 2013
Mount VME/24V power supply @ 3rd week in Nov., 2013

(2) HV cabling is completed @ 2nd week in Oct., 2013

- 208 + (16 spares) cables are stored in the cart
- Connecting HV cable to patch-panel/HV supply
- Fixed the broken SHV plugs / secure 24V silver supply box



Readiness of experiment

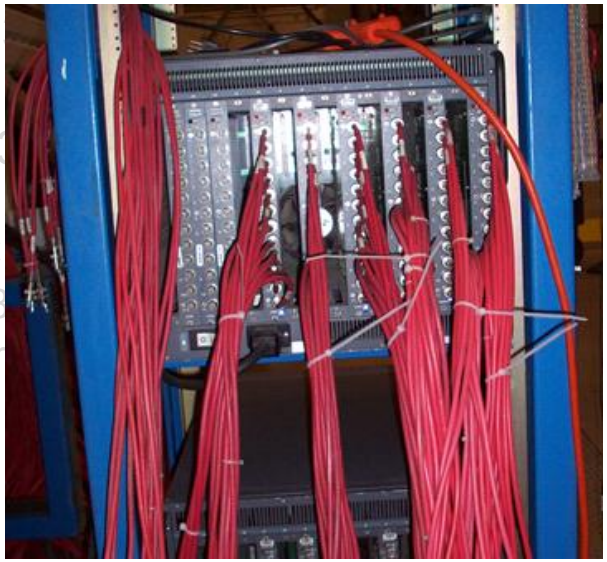
High Voltage System – cabling to channels

(1) Mount two HV supplies (LeCroy) in rack @ 1st week in Oct., 2013
Mount VME/24V power supply @ 3rd week in Nov., 2013

(2) HV cabling is completed @ 2nd week in Oct., 2013
- 208 + (16 spares) cables are stored in the cart
- Connecting HV cable to patch-panel/HV supply
- Fixed the broken SHV plugs / secure 24V silver supply box

(3) Power line has beer

(4) Secure the HV cont
- RS232 serial port
- GUI available and
- Secure pre-loadab
- Need to more stud



Readiness of experiment

High Voltage System - electricity

(1) Mount two HV supplies (LeCroy) in rack @ 1st week in Oct., 2013
Mount VME/24V power supply @ 3rd week in Nov., 2013

(2) HV pre-cabling is completed @ 2nd week in Oct., 2013
- 208 + (16 spares) cables are stored in the cart
- Connecting HV cable to patch-panel/HV supply
- Fixed the broken SHV plugs / 24V silver supply box

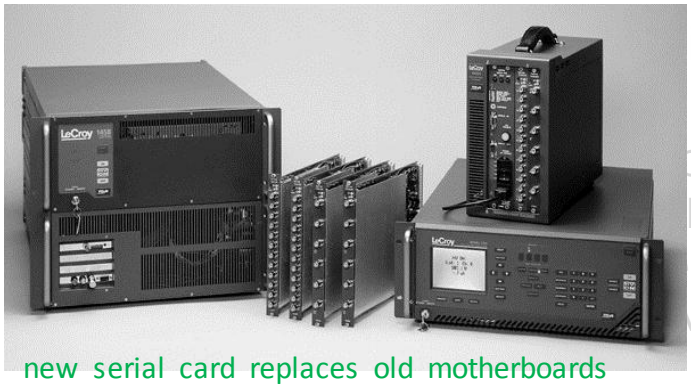
(3) Power line has been secured @ 3rd week in Oct., 2013

(4) Secure the HV control software @ 3rd wee
- RS232 serial port connection control
- GUI available and editable/ Will test with
- Secure pre-loadable HV value table (fro
- Need to more study about PMT R7877 (

Network access
12/02/2013

Readiness of experiment

High Voltage System - control



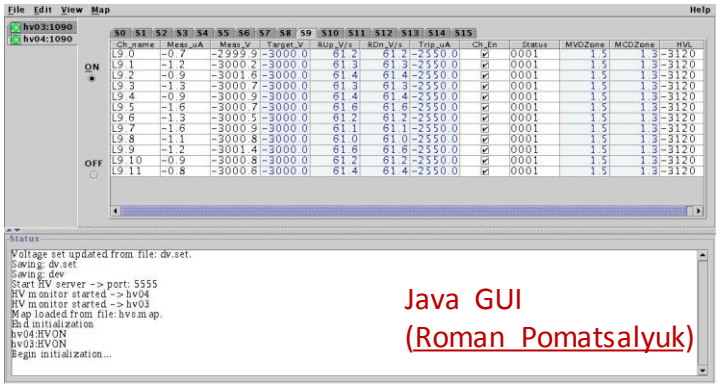
serial

or

network

motherboard emulator
Perl script
(Brad Sawatzky)

new serial card replaces old motherboards
(Javier, Jack, Chuck)
external 24V supply



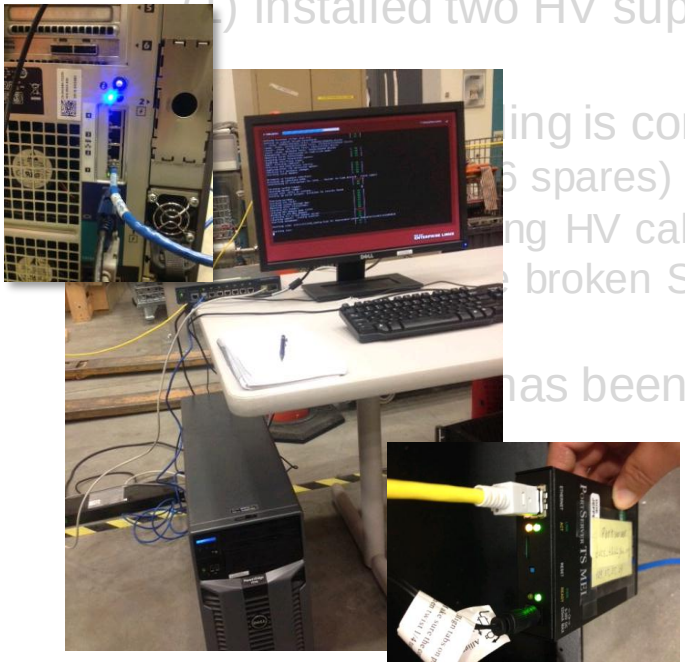
Java GUI
(Roman Pomatsalyuk)

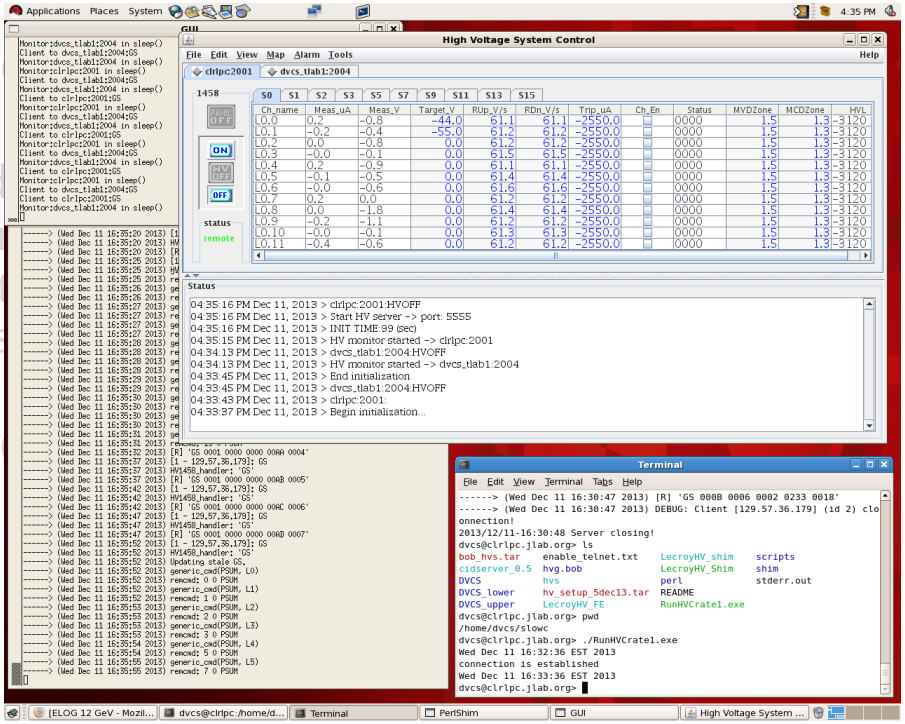
(4) Secure the HV control software @ 3rd week in Nov., 2013

- RS232 serial port connection control (new serial card)
- GUI available and editable/ Will test with local PC (or VME intel w/ serial-port)
- Secure pre-loadable HV value table (from run#9870 @ 12/23/2010)

Readiness of experiment

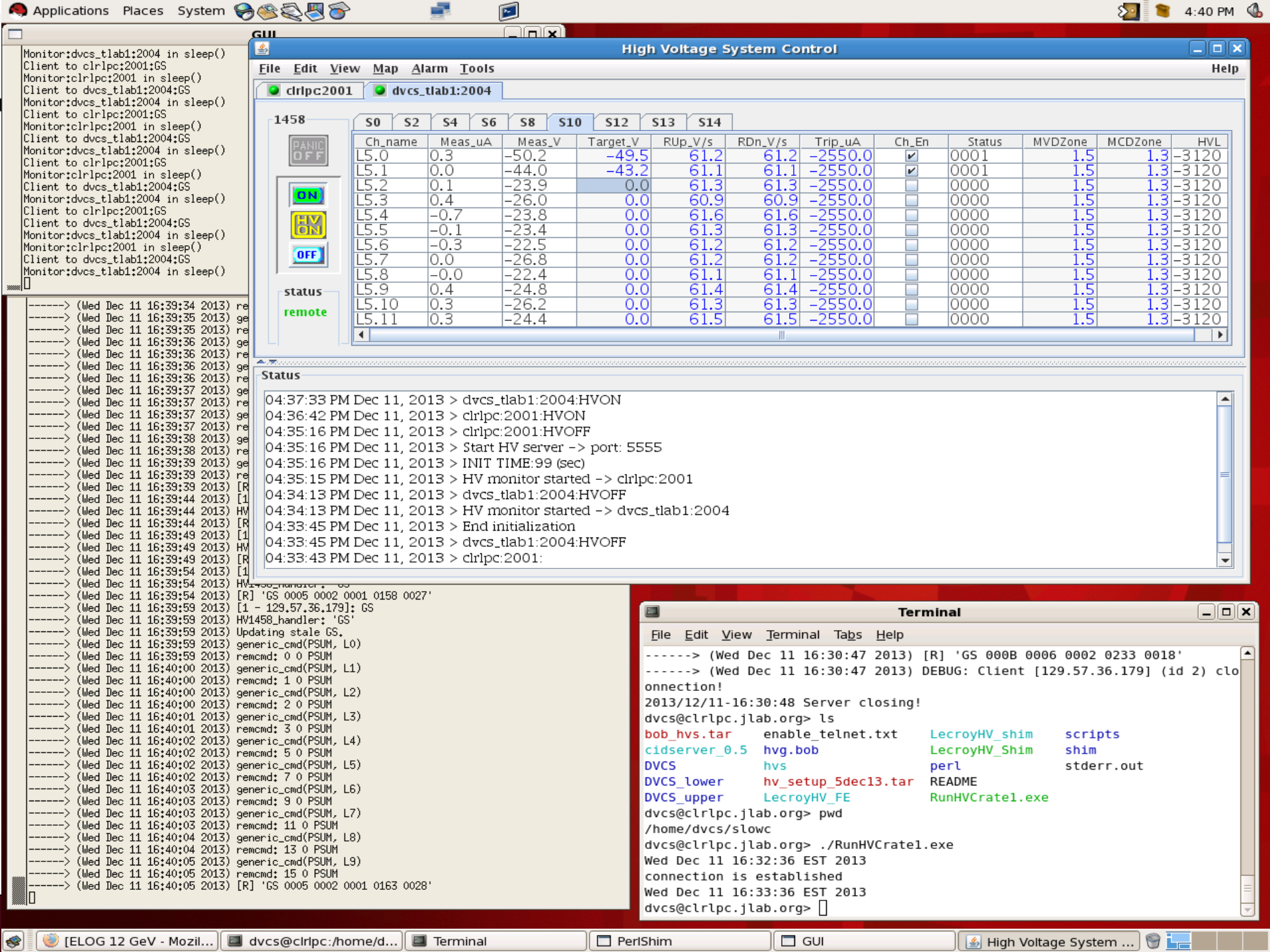
High Voltage System - control

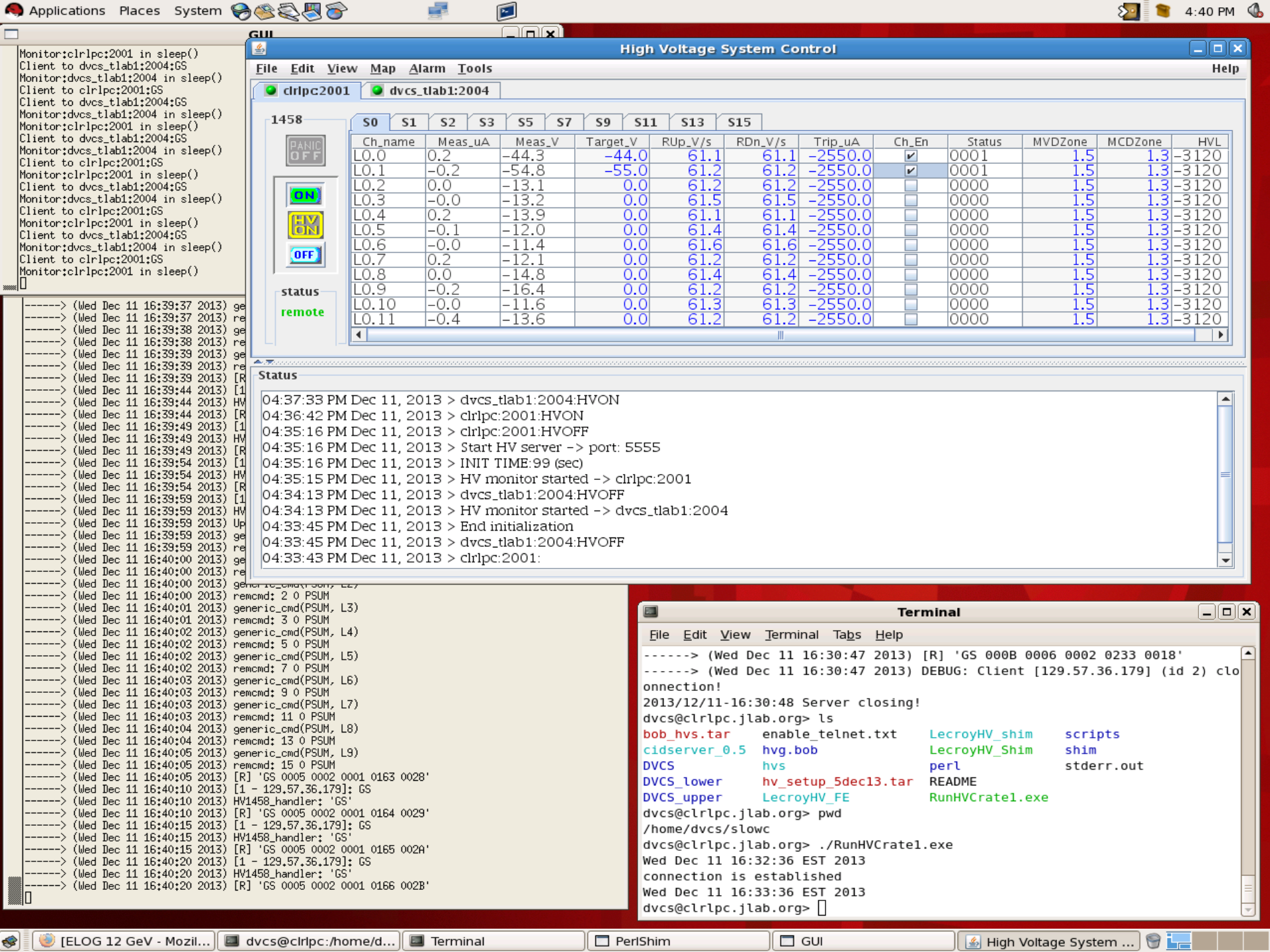




(4) Secure the HV control software @ 2nd week in Dec., 2013

- Secure a land-line network and computer is online
- Successful communication / control the both HV crates
- HV GUI is working properly
- Need a bit more improvement (speed/diagnostics)
- Another network jack installation for phone was requested


Applications Places System
4:40 PM
GUI
Monitor:dvcs_tlab1:2004 in sleep()
Client to clrlpc:2001:GS
Monitor:clrlpc:2001 in sleep()
Client to dvcs_tlab1:2004:GS
High Voltage System Control
File Edit View Map Alarm Tools
Help
clrlpc2001
dvcs_tlab1:2004
1458
PANIC OFF
ON
HV ON
OFF
status
remote
S0 S2 S4 S6 S8 S10 S12 S13 S14
Ch_name Meas_uA Meas_V Target_V RUp_V/s RDn_V/s Trip_uA Ch_En Status MVDZone MCDZone HVL
L5.0 0.3 -50.2 -49.5 61.2 61.2 -2550.0 0001 1.5 1.3 -3120
L5.1 0.0 -44.0 -43.2 61.1 61.1 -2550.0 0001 1.5 1.3 -3120
L5.2 0.1 -23.9 0.0 61.3 61.3 -2550.0 0000 1.5 1.3 -3120
L5.3 0.4 -26.0 0.0 60.9 60.9 -2550.0 0000 1.5 1.3 -3120
L5.4 -0.7 -23.8 0.0 61.6 61.6 -2550.0 0000 1.5 1.3 -3120
L5.5 -0.1 -23.4 0.0 61.3 61.3 -2550.0 0000 1.5 1.3 -3120
L5.6 -0.3 -22.5 0.0 61.2 61.2 -2550.0 0000 1.5 1.3 -3120
L5.7 0.0 -26.8 0.0 61.2 61.2 -2550.0 0000 1.5 1.3 -3120
L5.8 -0.0 -22.4 0.0 61.1 61.1 -2550.0 0000 1.5 1.3 -3120
L5.9 0.4 -24.8 0.0 61.4 61.4 -2550.0 0000 1.5 1.3 -3120
L5.10 0.3 -26.2 0.0 61.3 61.3 -2550.0 0000 1.5 1.3 -3120
L5.11 0.3 -24.4 0.0 61.5 61.5 -2550.0 0000 1.5 1.3 -3120
Status
04:37:33 PM Dec 11, 2013 > dvcs_tlab1:2004:HVON
04:36:42 PM Dec 11, 2013 > clrlpc:2001:HVON
04:35:16 PM Dec 11, 2013 > clrlpc:2001:HVOFF
04:35:16 PM Dec 11, 2013 > Start HV server -> port: 5555
04:35:16 PM Dec 11, 2013 > INIT TIME:99 (sec)
04:35:15 PM Dec 11, 2013 > HV monitor started -> clrlpc:2001
04:34:13 PM Dec 11, 2013 > dvcs_tlab1:2004:HVOFF
04:34:13 PM Dec 11, 2013 > HV monitor started -> dvcs_tlab1:2004
04:33:45 PM Dec 11, 2013 > End initialization
04:33:45 PM Dec 11, 2013 > dvcs_tlab1:2004:HVOFF
04:33:43 PM Dec 11, 2013 > clrlpc:2001:
Terminal
File Edit View Terminal Tabs Help
------> (Wed Dec 11 16:30:47 2013) [R] 'GS 000B 0006 0002 0233 0018'
------> (Wed Dec 11 16:30:47 2013) DEBUG: Client [129.57.36.179] (id 2) clo
onnection!
2013/12/11-16:30:48 Server closing!
dvcs@clrlpc.jlab.org> ls
bob_hvs.tar enable_telnet.txt LecroyHV_shim scripts
cidserver_0.5 hvg.bob LecroyHV_Shim shim
DVCS hvs perl stderr.out
DVCS_lower hv_setup_5dec13.tar README
DVCS_upper LecroyHV_FE RunHVCrate1.exe
dvcs@clrlpc.jlab.org> pwd
/home/dvcs/slowc
dvcs@clrlpc.jlab.org> ./RunHVCrate1.exe
Wed Dec 11 16:32:36 EST 2013
connection is established
Wed Dec 11 16:33:36 EST 2013
dvcs@clrlpc.jlab.org>
[ELOG 12 GeV - Mozil...
dvcs@clrlpc:/home/d...
Terminal
PerlShim
GUI
High Voltage System ...


Applications Places System
4:40 PM
GUI
Monitor:clrlpc:2001 in sleep()
Client to dvcs_tlab1:2004:GS
Monitor:dvcs_tlab1:2004 in sleep()
Client to clrlpc:2001:GS
Client to dvcs_tlab1:2004:GS
Monitor:dvcs_tlab1:2004 in sleep()
Monitor:clrlpc:2001 in sleep()
Client to dvcs_tlab1:2004:GS
Monitor:dvcs_tlab1:2004 in sleep()
Client to clrlpc:2001:GS
Monitor:clrlpc:2001 in sleep()
Client to dvcs_tlab1:2004:GS
Monitor:dvcs_tlab1:2004 in sleep()
Client to clrlpc:2001:GS
Monitor:clrlpc:2001 in sleep()
Client to dvcs_tlab1:2004:GS
Monitor:dvcs_tlab1:2004 in sleep()
Client to clrlpc:2001:GS
Monitor:clrlpc:2001 in sleep()
High Voltage System Control
File Edit View Map Alarm Tools
Help
clrlpc2001
dvcs_tlab1:2004
1458
PANIC OFF
ON
HV ON
OFF
status
remote
S0 S1 S2 S3 S5 S7 S9 S11 S13 S15
Ch_name Meas_uA Meas_V Target_V RUp_V/s RDn_V/s Trip_uA Ch_En Status MVDZone MCDZone HVL
L0.0 0.2 -44.3 -44.0 61.1 61.1 -2550.0 0001 1.5 1.3 -3120
L0.1 -0.2 -54.8 -55.0 61.2 61.2 -2550.0 0001 1.5 1.3 -3120
L0.2 0.0 -13.1 0.0 61.2 61.2 -2550.0 0000 1.5 1.3 -3120
L0.3 -0.0 -13.2 0.0 61.5 61.5 -2550.0 0000 1.5 1.3 -3120
L0.4 0.2 -13.9 0.0 61.1 61.1 -2550.0 0000 1.5 1.3 -3120
L0.5 -0.1 -12.0 0.0 61.4 61.4 -2550.0 0000 1.5 1.3 -3120
L0.6 -0.0 -11.4 0.0 61.6 61.6 -2550.0 0000 1.5 1.3 -3120
L0.7 0.2 -12.1 0.0 61.2 61.2 -2550.0 0000 1.5 1.3 -3120
L0.8 0.0 -14.8 0.0 61.4 61.4 -2550.0 0000 1.5 1.3 -3120
L0.9 -0.2 -16.4 0.0 61.2 61.2 -2550.0 0000 1.5 1.3 -3120
L0.10 -0.0 -11.6 0.0 61.3 61.3 -2550.0 0000 1.5 1.3 -3120
L0.11 -0.4 -13.6 0.0 61.2 61.2 -2550.0 0000 1.5 1.3 -3120
Status
04:37:33 PM Dec 11, 2013 > dvcs_tlab1:2004:HVON
04:36:42 PM Dec 11, 2013 > clrlpc:2001:HVON
04:35:16 PM Dec 11, 2013 > clrlpc:2001:HVOFF
04:35:16 PM Dec 11, 2013 > Start HV server -> port: 5555
04:35:16 PM Dec 11, 2013 > INIT TIME:99 (sec)
04:35:15 PM Dec 11, 2013 > HV monitor started -> clrlpc:2001
04:34:13 PM Dec 11, 2013 > dvcs_tlab1:2004:HVOFF
04:34:13 PM Dec 11, 2013 > HV monitor started -> dvcs_tlab1:2004
04:33:45 PM Dec 11, 2013 > End initialization
04:33:45 PM Dec 11, 2013 > dvcs_tlab1:2004:HVOFF
04:33:43 PM Dec 11, 2013 > clrlpc:2001:
------> (Wed Dec 11 16:39:37 2013) ge
------> (Wed Dec 11 16:39:37 2013) re
------> (Wed Dec 11 16:39:38 2013) ge
------> (Wed Dec 11 16:39:38 2013) re
------> (Wed Dec 11 16:39:39 2013) ge
------> (Wed Dec 11 16:39:39 2013) re
------> (Wed Dec 11 16:39:39 2013) [R
------> (Wed Dec 11 16:39:44 2013) [1
------> (Wed Dec 11 16:39:44 2013) HV
------> (Wed Dec 11 16:39:44 2013) [R
------> (Wed Dec 11 16:39:49 2013) [1
------> (Wed Dec 11 16:39:49 2013) HV
------> (Wed Dec 11 16:39:49 2013) [R
------> (Wed Dec 11 16:39:54 2013) [1
------> (Wed Dec 11 16:39:54 2013) HV
------> (Wed Dec 11 16:39:54 2013) [R
------> (Wed Dec 11 16:39:59 2013) [1
------> (Wed Dec 11 16:39:59 2013) HV
------> (Wed Dec 11 16:39:59 2013) Up
------> (Wed Dec 11 16:39:59 2013) ge
------> (Wed Dec 11 16:39:59 2013) re
------> (Wed Dec 11 16:40:00 2013) ge
------> (Wed Dec 11 16:40:00 2013) re
------> (Wed Dec 11 16:40:00 2013) remcmd: 2 0 PSUM
------> (Wed Dec 11 16:40:01 2013) generic_cmd(PSUM, L3)
------> (Wed Dec 11 16:40:01 2013) remcmd: 3 0 PSUM
------> (Wed Dec 11 16:40:02 2013) generic_cmd(PSUM, L4)
------> (Wed Dec 11 16:40:02 2013) remcmd: 5 0 PSUM
------> (Wed Dec 11 16:40:02 2013) generic_cmd(PSUM, L5)
------> (Wed Dec 11 16:40:02 2013) remcmd: 7 0 PSUM
------> (Wed Dec 11 16:40:03 2013) generic_cmd(PSUM, L6)
------> (Wed Dec 11 16:40:03 2013) remcmd: 9 0 PSUM
------> (Wed Dec 11 16:40:03 2013) generic_cmd(PSUM, L7)
------> (Wed Dec 11 16:40:03 2013) remcmd: 11 0 PSUM
------> (Wed Dec 11 16:40:04 2013) generic_cmd(PSUM, L8)
------> (Wed Dec 11 16:40:04 2013) remcmd: 13 0 PSUM
------> (Wed Dec 11 16:40:05 2013) generic_cmd(PSUM, L9)
------> (Wed Dec 11 16:40:05 2013) remcmd: 15 0 PSUM
------> (Wed Dec 11 16:40:05 2013) [R] 'GS 0005 0002 0001 0163 0028'
------> (Wed Dec 11 16:40:10 2013) [1 - 129.57.36.179]: GS
------> (Wed Dec 11 16:40:10 2013) HV1458_handler: 'GS'
------> (Wed Dec 11 16:40:10 2013) [R] 'GS 0005 0002 0001 0164 0029'
------> (Wed Dec 11 16:40:15 2013) [1 - 129.57.36.179]: GS
------> (Wed Dec 11 16:40:15 2013) HV1458_handler: 'GS'
------> (Wed Dec 11 16:40:15 2013) [R] 'GS 0005 0002 0001 0165 002A'
------> (Wed Dec 11 16:40:20 2013) [1 - 129.57.36.179]: GS
------> (Wed Dec 11 16:40:20 2013) HV1458_handler: 'GS'
------> (Wed Dec 11 16:40:20 2013) [R] 'GS 0005 0002 0001 0166 002B'
Terminal
File Edit View Terminal Tabs Help
------> (Wed Dec 11 16:30:47 2013) [R] 'GS 000B 0006 0002 0233 0018'
------> (Wed Dec 11 16:30:47 2013) DEBUG: Client [129.57.36.179] (id 2) clo
onnection!
2013/12/11-16:30:48 Server closing!
dvcs@clrlpc.jlab.org> ls
bob_hvs.tar enable_telnet.txt LecroyHV_shim scripts
cidserver_0.5 hvg.bob LecroyHV_Shim shim
DVCS hvs perl stderr.out
DVCS_lower hv_setup_5dec13.tar README
DVCS_upper LecroyHV_FE RunHVCrate1.exe
dvcs@clrlpc.jlab.org> pwd
/home/dvcs/slowc
dvcs@clrlpc.jlab.org> ./RunHVCrate1.exe
Wed Dec 11 16:32:36 EST 2013
connection is established
Wed Dec 11 16:33:36 EST 2013
dvcs@clrlpc.jlab.org>
[ELOG 12 GeV - Mozil...
dvcs@clrlpc:/home/d...
Terminal
PerlShim
GUI
High Voltage System ...

Readiness of experiment

High Voltage System – map file

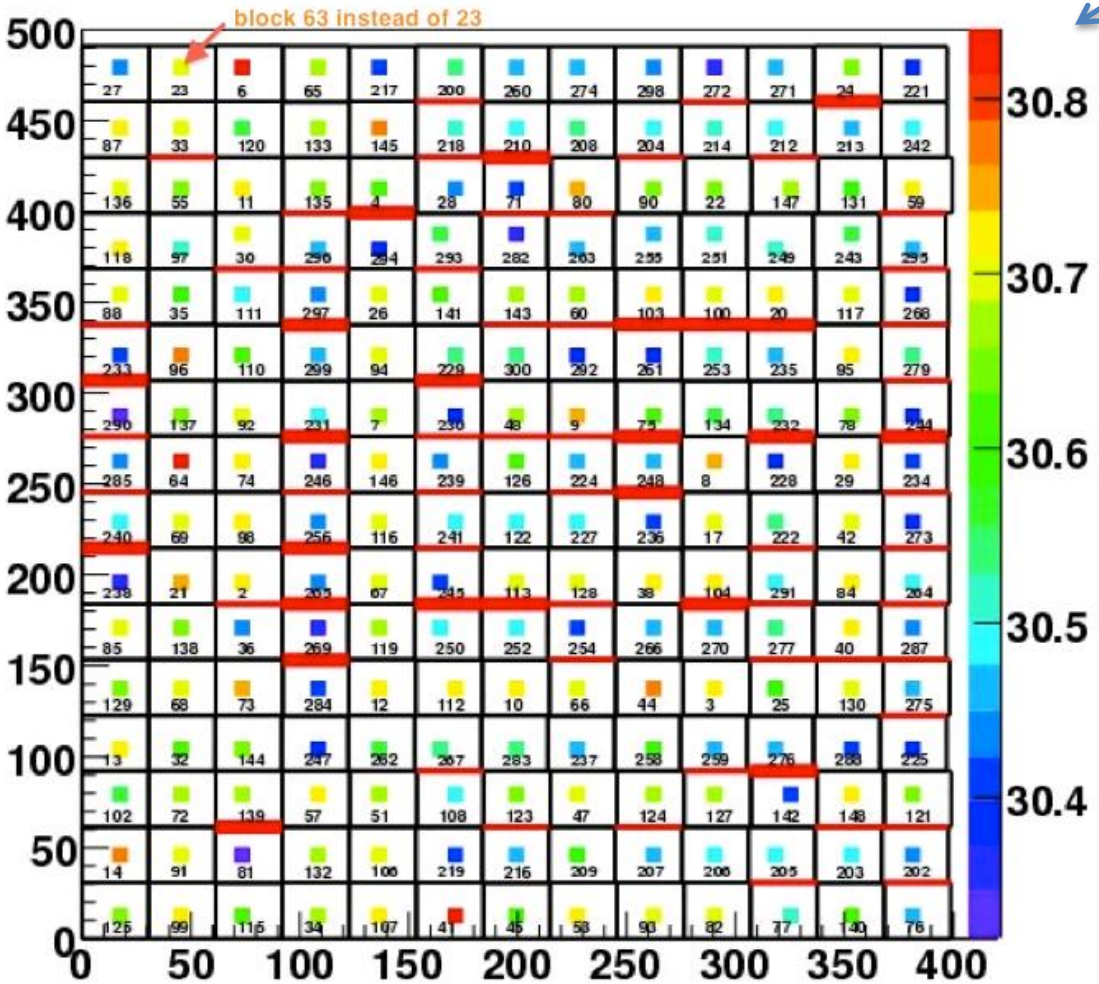
```
=== DVCS Calorimeter ===
recording at Thu Dec 23 05:26:49 EST 2010
Measured HV voltages
  0 :   -495   -515   -494   -537   -515   -520   -588   -482   -516   -538   -489   -476   -526
  1 :   -528   -512   -538   -472   -509   -469   -458   -486   -453   -484   -479   -473   -463
  2 :   -546   -536   -518   -478   -488   -479   -501   -470   -472   -502   -502   -493   -525
  3 :   -542   -483   -478   -444   -466   -450   -468   -456   -487   -479   -486   -495   -471
  4 :   -576   -525   -524   -466   -469   -566   -500   -473   -473   -489   -488   -480   -518
  5 :   -569   -467   -492   -529   -479   -522   -484   -442   -475   -467   -445   -528   -490
  6 :   -565   -520   -529   -509   -500   -470   -509   -510   -518   -470   -454   -499   -505
  7 :   -545   -548   -524   -470   -501   -551   -487   -450   -467   -508   -454   -494   -552
  8 :   -534   -537   -499   -480   -511   -501   -555   -433   -477   -475   -453   -517   -477
  9 :   -506   -485   -482   -547   -509   -527   -501   -493   -537   -472   -456   -527   -447
 10 :   -512   -528   -517   -518   -500   -468   -498   -508   -442   -515   -451   -516   -475
 11 :   -545   -523   -475   -521   -482   -549   -538   -518   -487   -520   -490   -486   -488
 12 :   -488   -501   -506   -466   -472   -470   -483   -454   -496   -473   -459   -511   -500
 13 :   -476   -542   -501   -521   -507   -553   -484   -526   -532   -472   -496   -497   -492
 14 :   -561   -532   -537   -520   -474   -492   -502   -475   -525   -467   -465   -500   -510
 15 :   -512   -504   -499   -490   -527   -490   -485   -532   -535   -516   -504   -462   -516

Measured HV currents
  0 :   -473   -519   -490   -544   -510   -525   -550   -478   -512   -540   -485   -471   -523
  1 :   -499   -516   -532   -475   -504   -474   -431   -481   -448   -488   -476   -469   -461
  2 :   -518   -540   -511   -484   -484   -482   -466   -466   -468   -510   -497   -489   -523
  3 :   -522   -486   -472   -453   -461   -454   -432   -453   -480   -485   -482   -490   -470
  4 :   -528   -528   -521   -469   -463   -524   -495   -468   -470   -495   -483   -479   -516
  5 :   -538   -470   -489   -533   -475   -490   -440   -438   -472   -475   -442   -527   -490
  6 :   -528   -522   -525   -512   -498   -465   -504   -505   -515   -476   -451   -498   -503
  7 :   -509   -552   -519   -477   -495   -512   -465   -445   -465   -514   -452   -489   -551
  8 :   -529   -533   -494   -485   -519   -455   -522   -432   -472   -481   -451   -515   -478
  9 :   -475   -482   -482   -551   -515   -503   -499   -491   -532   -476   -454   -524   -450
 10 :   -509   -524   -513   -523   -506   -462   -465   -504   -437   -520   -448   -512   -470
 11 :   -541   -520   -470   -526   -488   -507   -518   -516   -484   -525   -487   -481   -487
 12 :   -492   -495   -498   -458   -477   -432   -480   -451   -490   -470   -456   -508   -499
 13 :   -484   -535   -499   -517   -511   -496   -480   -524   -528   -471   -492   -493   -493
 14 :   -567   -527   -532   -518   -479   -460   -498   -466   -521   -465   -461   -497   -502
 15 :   -516   -499   -493   -483   -532   -485   -480   -526   -530   -512   -499   -459   -513
recording at Thu Dec 23 05:26:50 EST 2010
```

Readiness of experiment

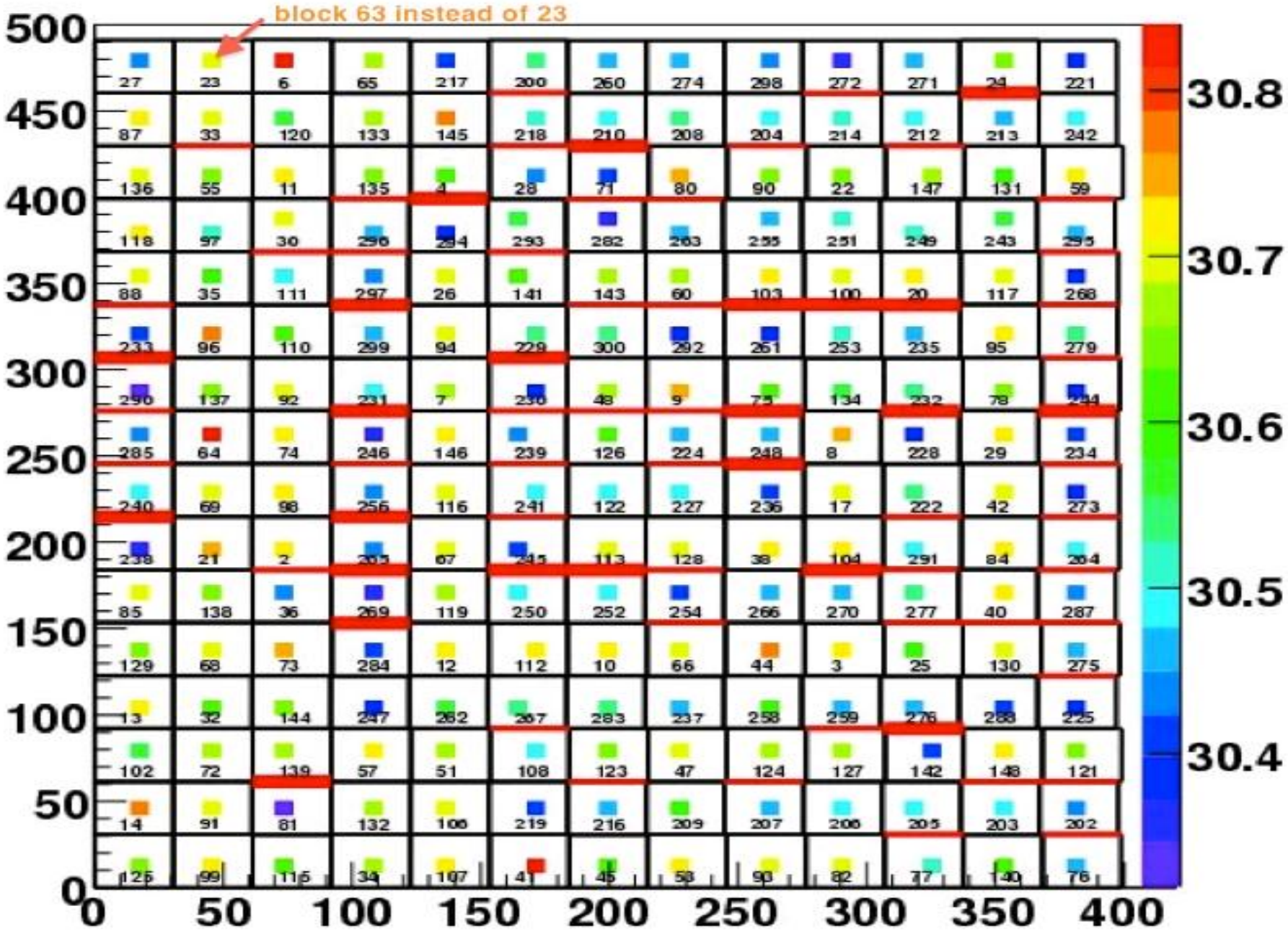
http://www. Hall-A wiki

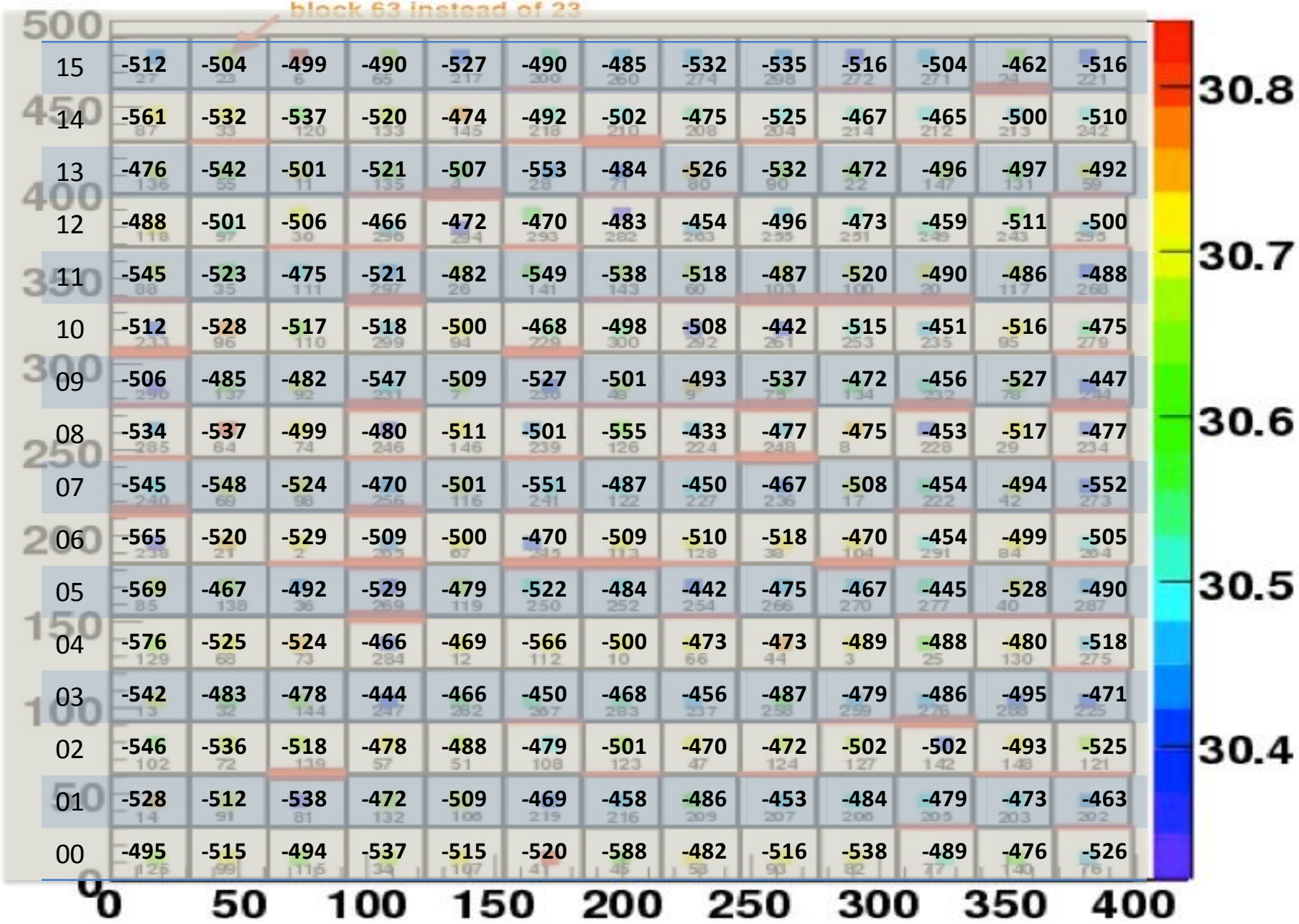
High Voltage System vs. Crystals #/loc.



Seen by the back

- Shims added to level each row
- 71 shims used: 0.01 inch
  - 48 0.254mm thick
  - 23 0.381mm thick 0.015 inch


block 63 instead of 23
500
450
400
350
300
250
200
150
100
50
0
0
50
100
150
200
250
300
350
400
30.8
30.7
30.6
30.5
30.4


block 63 instead of 23
15 -512 -504 -499 -490 -527 -490 -485 -532 -535 -516 -504 -462 -516
14 -561 -532 -537 -520 -474 -492 -502 -475 -525 -467 -465 -500 -510
13 -476 -542 -501 -521 -507 -553 -484 -526 -532 -472 -496 -497 -492
12 -488 -501 -506 -466 -472 -470 -483 -454 -496 -473 -459 -511 -500
11 -545 -523 -475 -521 -482 -549 -538 -518 -487 -520 -490 -486 -488
10 -512 -528 -517 -518 -500 -468 -498 -508 -442 -515 -451 -516 -475
09 -506 -485 -482 -547 -509 -527 -501 -493 -537 -472 -456 -527 -447
08 -534 -537 -499 -480 -511 -501 -555 -433 -477 -475 -453 -517 -477
07 -545 -548 -524 -470 -501 -551 -487 -450 -467 -508 -454 -494 -552
06 -565 -520 -529 -509 -500 -470 -509 -510 -518 -470 -454 -499 -505
05 -569 -467 -492 -529 -479 -522 -484 -442 -475 -467 -445 -528 -490
04 -576 -525 -524 -466 -469 -566 -500 -473 -473 -489 -488 -480 -518
03 -542 -483 -478 -444 -466 -450 -468 -456 -487 -479 -486 -495 -471
02 -546 -536 -518 -478 -488 -479 -501 -470 -472 -502 -502 -493 -525
01 -528 -512 -538 -472 -509 -469 -458 -486 -453 -484 -479 -473 -463
00 -495 -515 -494 -537 -515 -520 -588 -482 -516 -538 -489 -476 -526
500
450
400
350
300
250
200
150
100
50
0
0 50 100 150 200 250 300 350 400
30.8
30.7
30.6
30.5
30.4

Thank you

Readiness of experiment

Electronics

- 1 VME64X crate with intel CPU in FPP rack
- Readout and decoder using Intel CPU (90 MB/s per crate)
- Calorimeter trigger installed
  - Logic and readout on separate FPGA
  - larger bus for interFPGA transfer to not loose resolution on threshold
  - block transfer mode implemented but need to be debugged and tested
- Review in March

- from Alexandre Camsonne at Hall-A meeting

Readiness of experiment

TASK time line

- Calorimeter
  - Stack calorimeter - 2 weeks – end Dec. 2013
  - Test cosmics – Jan. 2014 to Jun. 2014
  - Test DC current ADC (missing patch panel) - 1 week
  - Layout RG213 install stand - 2 month
- DVCS Electronics
  - Install 2nd and 3rd VME crate - 3 days – Jan. 2014
  - Test trigger Block Transfer (Need engineer for debugging) 2 weeks – Feb. 2014
  - Cable trigger - 3 days – Jan. 2014
  - Timing with HRS - 3 days – Jan. 2014

- from Alexandre Camsonne at Hall-A meeting

Readiness of experiment

TASK time line

- DVCS electronics
  - Test high rates full setup – end Feb. 2014
- Hall A standard equipment
  - HRS
    - High Resolution VME TDC - 2 weeks – Feb. 2014
    - Scintillator timing - 1 week – Feb / Mar. 2014
  - BCM -1 week – Jan. 2014
  - BPM - 1 week – Jan. 2014
  - Helicity - 1 week – Jan. 2014
  - Polarimetry

- from Alexandre Camsonne at Hall-A meeting

Readiness of experiment

Crystals

(1) Separated into two steps for wrapping
- Take a photo/Clean Crystal/white paper wrap
- Applying optical grease (~90sec)/engage PMT/black paper wrap

(2) 86% completion of inventory @ Nov. 14, 2013
- 180 crystals are done, 28 are under-going
- Completed 4 spares/ 5(+3) spares will be available (due to limited base)
- All crystal work : Thank to Chris Wooten
- Repair brass (soldering)/storage shelves : Thanks to Tom Hartlove

(3) Testing will start @ Dec. 07, 2013

(4) Will document a correct assembly procedure

Readiness of experiment

Crystals

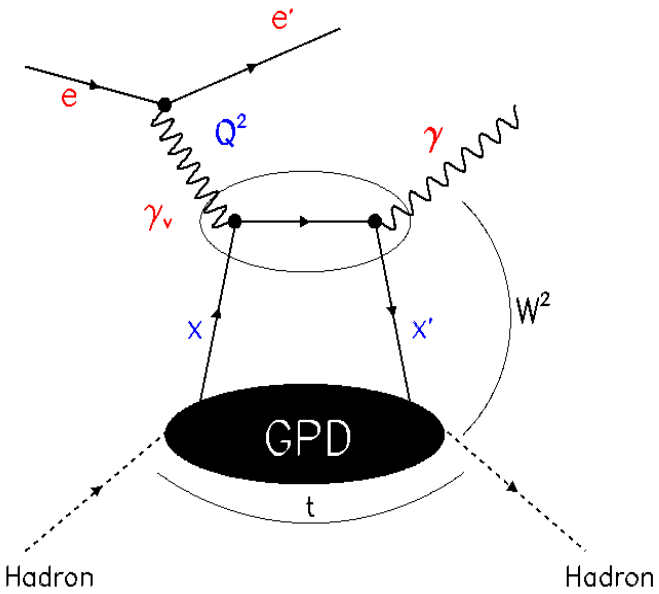
(1) Separated into two steps for wrapping
- Take a photo/Clean Crystal/white paper wrap
- Applying optical grease (~90sec)/engage PMT/black paper wrap

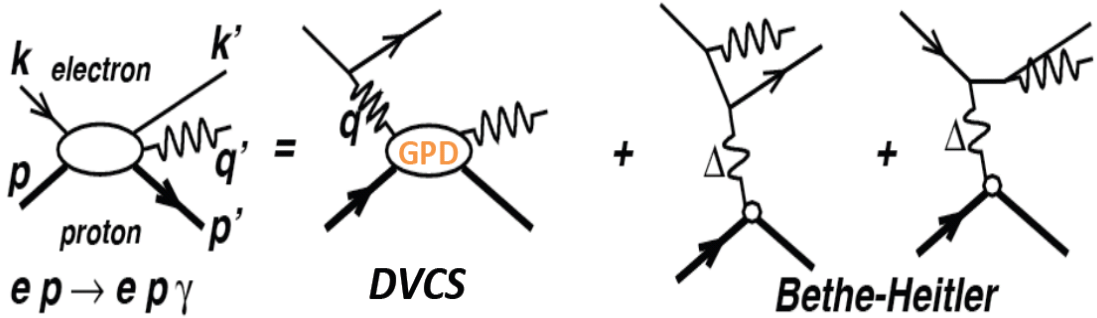
(2) 86% completion of inventory @ Nov. 14, 2013
- 180 crystals are done, 28 are under-going
- Completed 4 spares/ 5(+3) spares will be available (due to limited base)
- All crystal work : Thank to Chris Wooten
- Repair brass (soldering)/storage shelves : Thanks to Tom Hartlove
- Delivered the 156 crystals to Jlab @ Nov. 22, 2013
- Rest of them will be Jlab soon

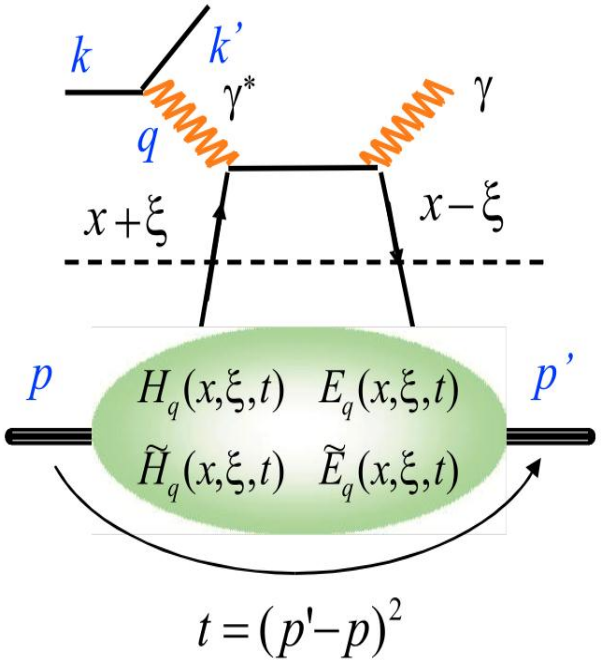
(3) Testing will start

(4) Will [illegible]mbly procedure

Physics DVCS





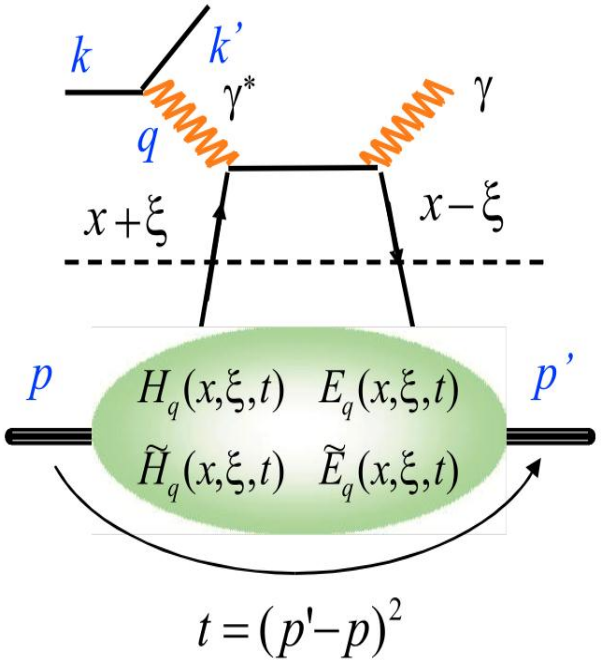


DVCS full amplitude =

$$T_{VCS}(e^{\pm}) = \bar{u}(k',\lambda)\gamma_\mu u(k,\lambda)\frac{\pm e}{q^2}\boldsymbol{H}^{\mu\nu}\epsilon_\nu{}^{\dagger}$$

Hadronic tensor =

$$\boldsymbol{H}^{\mu\nu}{}_{LO,twist2} =$$
$$\frac{1}{2}(-g^{\mu\nu})_\perp\ \bar{U}(p')\left[(n\cdot\gamma)H(\xi,t)+\frac{i}{2M}n_\kappa\sigma^{\kappa\lambda}\Delta_\lambda E(\xi,t)\right]U(p)$$
$$-(\epsilon^{\mu\nu})_\perp\ \bar{U}(p')\left[(n\cdot\gamma\gamma_5)\tilde{H}(\xi,t)+(\gamma_5 n\cdot\Delta)\tilde{E}(\xi,t)\right]U(p)$$



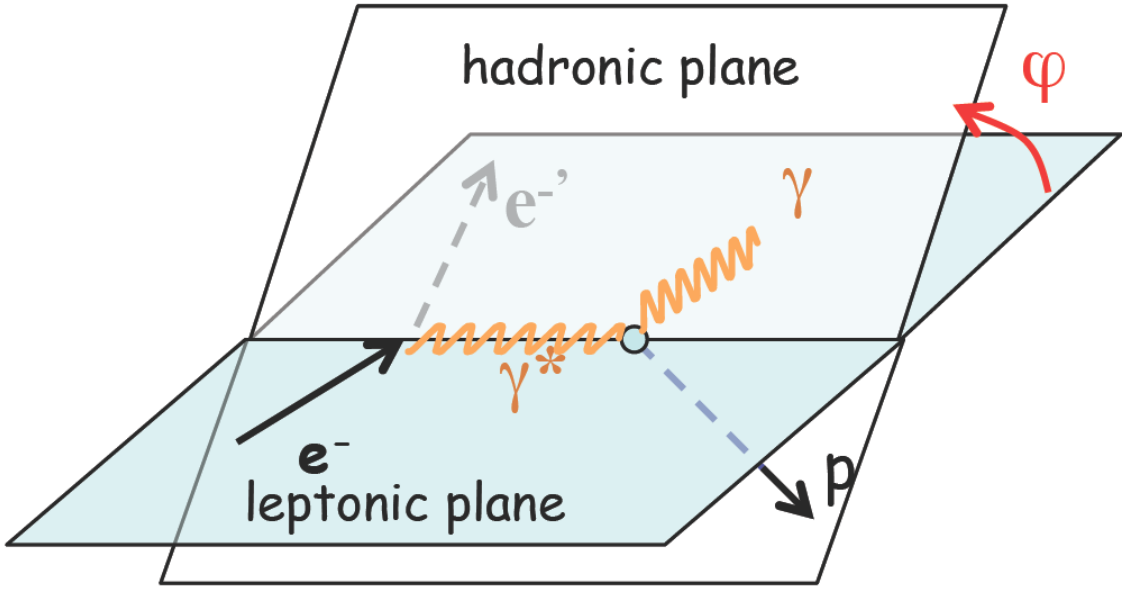
CFF by the integration over the quark loop =

$$[\boldsymbol{H},\boldsymbol{E}](\xi,t) = \int_{-1}^{+1} dx \left[\frac{1}{x-\xi+i\epsilon}+\frac{1}{x+\xi-i\epsilon}\right][H,E](x,\xi,t)$$

$$[\tilde{\boldsymbol{H}},\tilde{\boldsymbol{E}}](\xi,t) = \int_{-1}^{+1} dx \left[\frac{1}{x-\xi+i\epsilon}-\frac{1}{x+\xi-i\epsilon}\right][\tilde{H},\tilde{E}](x,\xi,t)$$

Azimuthal modulation =

$$|T_{DVCS}|^2 = \frac{e^6(s_e-M^2)^2}{{x_B}^2 Q^6}\left[\sum_{n=0}^{2} {c_n}^{DVCS}\cos(n\phi_{\gamma\gamma}) + \sum_{n=1}^{2} {s_n}^{DVCS}\sin(n\phi_{\gamma\gamma})\right]$$



Azimuthal modulation =

$$|T_{DVCS}|^2 = \frac{e^6(s_e - M^2)^2}{{x_B}^2 Q^6}\left[\sum_{n=0}^{2} {c_n}^{DVCS}\cos(n\phi_{\gamma\gamma}) + \sum_{n=1}^{2} {s_n}^{DVCS}\sin(n\phi_{\gamma\gamma})\right]$$