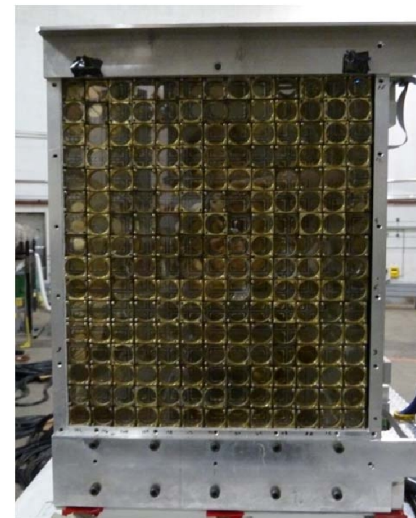


Status report on
2014 DVCS Run preparations (E12-06-114)

Rafayel Paremuzyan for Hall-A DVCS group

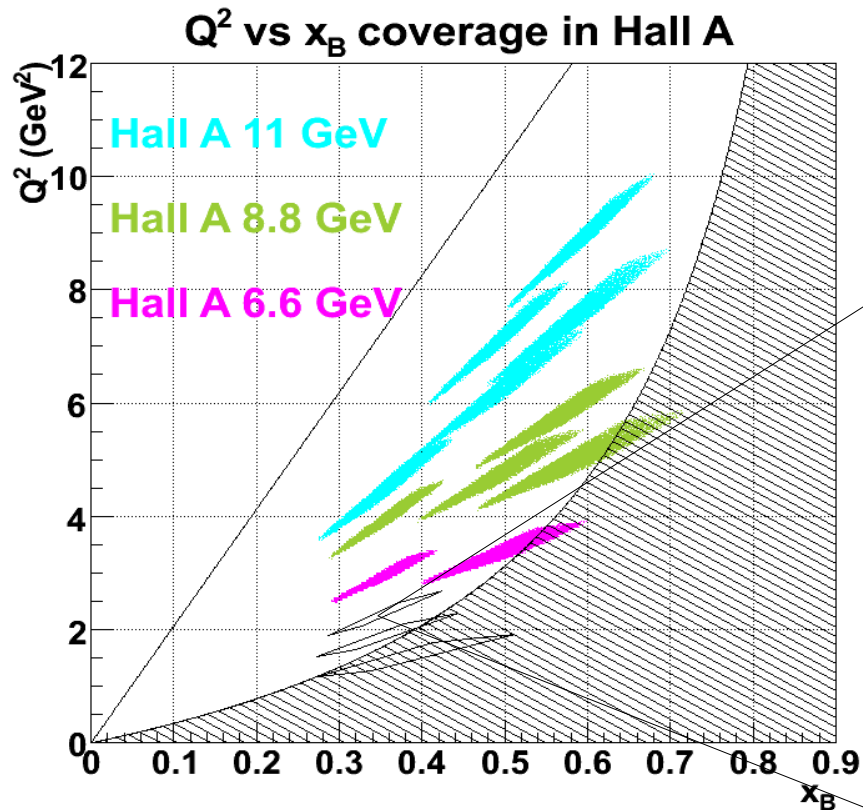
E12-06-114: DVCS at 11 GeV in Hall A

- ★ Absolute DVCS cross section
- ★ Test of Scaling
- ★ Expanded kinematic coverage over Q^2 and x_B
- ★ $ep \rightarrow ep\pi^0$ cross section in the DVCS kinematics



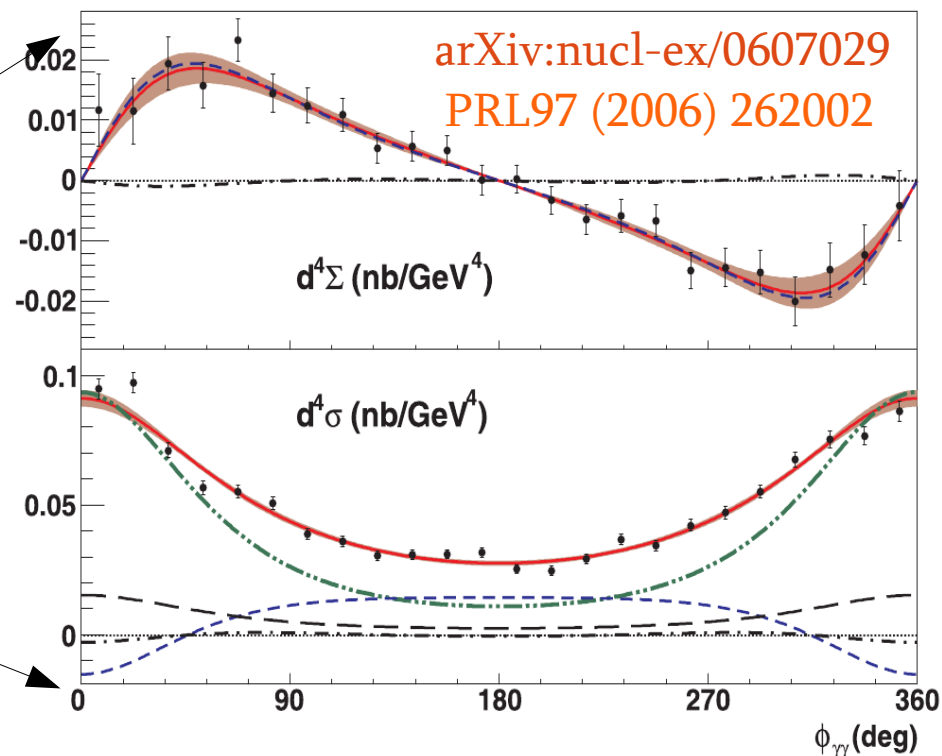
$16 \times 13 PbF_2$
blocks

$3 \times 3 \times 18.6 \text{ cm}^3$



$\approx 100 \text{ K}$ events per each setting

Total 88 (production) + 12 (curing) days



Hall A Projected Experiment Schedule as of 6/2013

	Spring	Fall	Spring	Fall	Spring	Fall	Spring
2014	DVCS -I/ GMp	DVCS - I/ GMp					
2015			DVCS - I/ GMp	$^3\text{H}/^3\text{He}$ (A_1^n)			
2016					A_1^n (APEX) (PREX)	PREX (APEX) (DVCS-II)	
2017							APEX (DVCS- II) (SBS)

Experiments in parentheses represent potential schedule changes.

SBS



...soon to be available on Hall A wiki

MOLLER,
SOLID...?....

3 running scenarios

Independence

- ★ GMp installs and runs 1st ~ 1 PAC month: -No Luminosity restrictions from DVCS
- ★ 1 month shutdown for DVCS installation
- ★ DVCS runs ~ 3 PAC months
- ★ No need for newer scattering chamber
- ★ No need for GMp/DVCS compatible vertical flow target

11 GeV will Not be available
before Autumn 2014

Cooperation

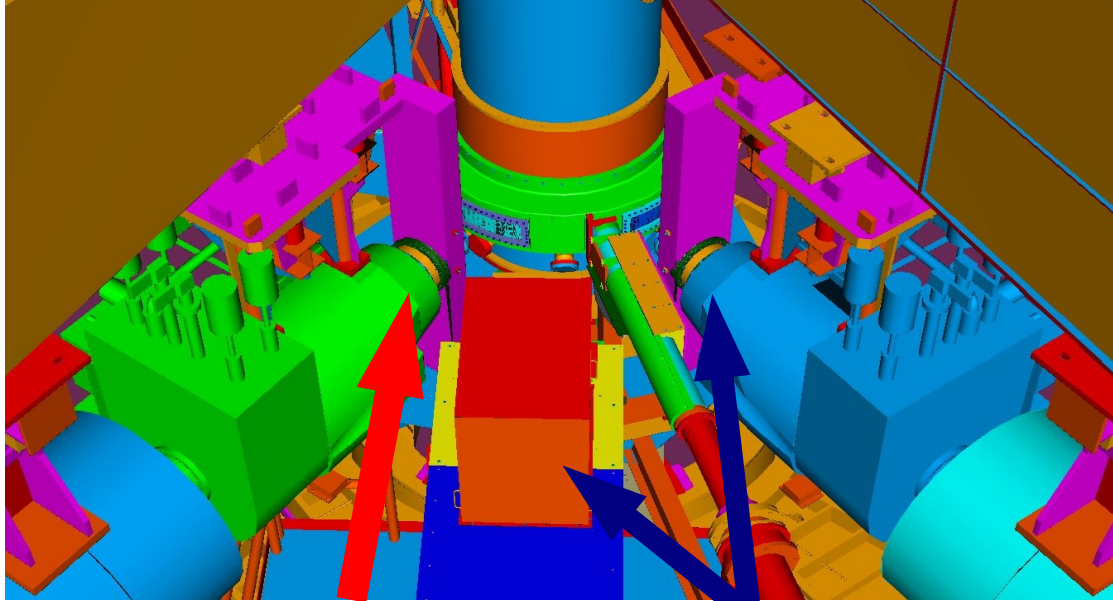
- ★ GMp and DVCS install together (except DVCS calo).
- ★ GMp runs independently at full luminosity
 - Restrictions on HRS angles from vacuum chamber and calo stand
 - Restrictions on HRS motions from DVCS cables and stands: Needs manual assistance
- ★ One week shutdown to install DVCS Calo.
- ★ DVCS runs ~ 3 PAC months
 - GMp acquires parasitic data in HRS-R at large angles

Symbiosis

- ★ GMp and DVCS fully install together
- ★ GMp and DVCS runnings are interlaced week by week
 - Restrictions on HRS angles and movements
 - GMp acquires parasitic data in the HRS-R
 - DVCS calo is parked in a "safe mode" at 5.5 m from the target at 14°
 - Max. Lumin. is $25\mu A \times 15\text{ cm } LH_2$ (radiation limit for PbF_2 blocks)
 - GMp angles $< 49^\circ$ are only accessible with HRS-L

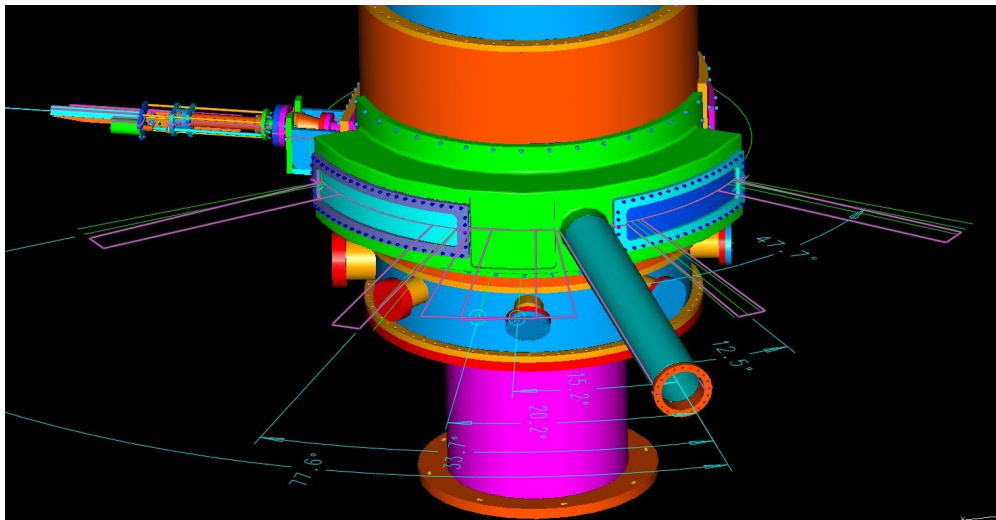
Many restrictions
on GMp

New Scattering chamber



Can be used for some of GMp kinematics

DVCS



$$7.3^\circ < \theta_{DVCS} < 28.9^\circ$$

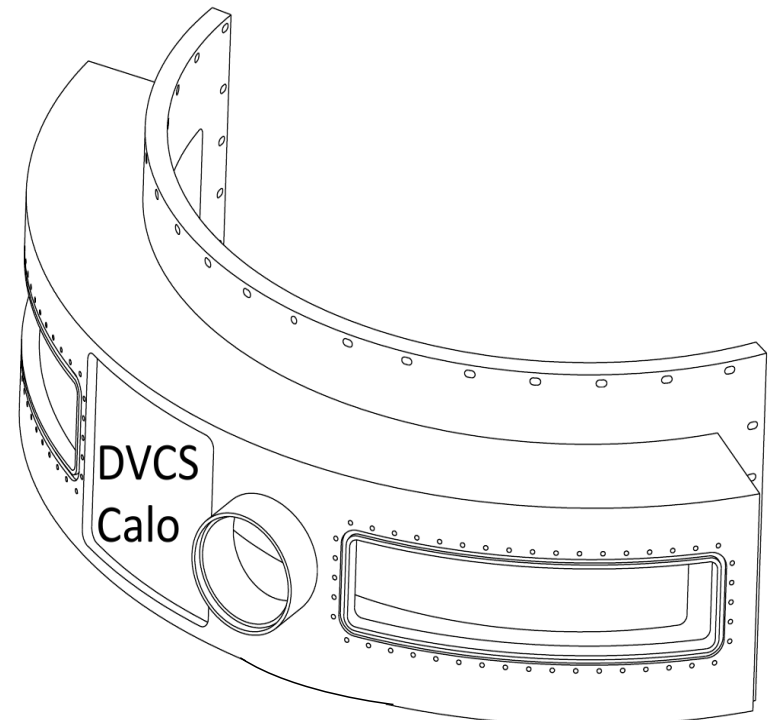
$$12.5^\circ < \theta_{HRS-L} < 47.7^\circ$$

$$33.7^\circ < \theta_{HRS-R} < 77.6^\circ$$

But w/ DVCS Calo stand installed

$$\theta_{HRS-L} - \theta_{Calo} \geq 28.7^\circ$$

$$\theta_{Calo} - \theta_{HRS-R} \geq 34.5^\circ$$



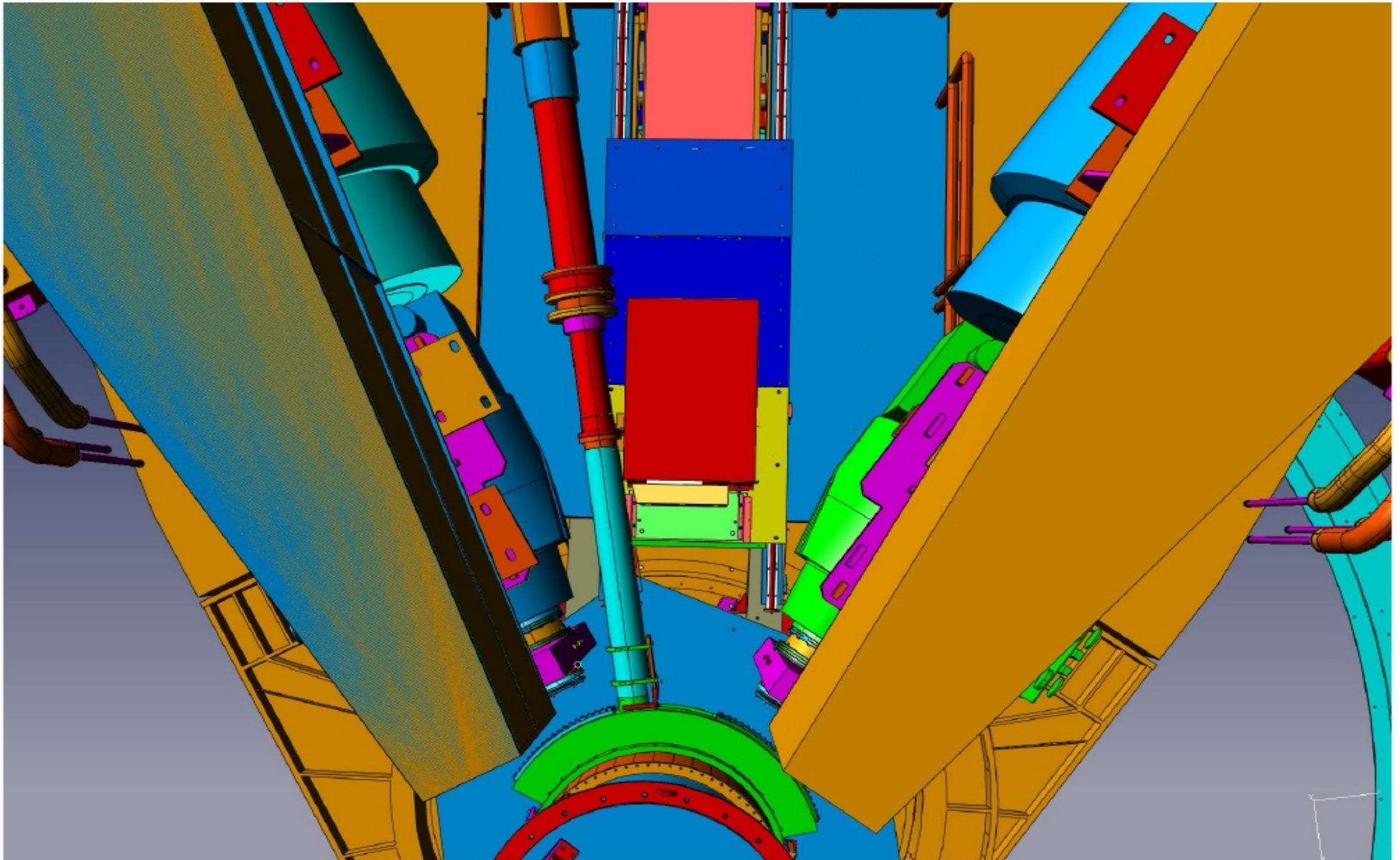
Top view

$$\theta_{HRS-L} = 20.2^\circ$$

$$D_{Calo} = 2m$$

$$\theta_{HRS-R} = -43.^\circ$$

$$\theta_{Calo} = -8.5^\circ$$



DVCS Cabling

Spectrometers movement must be monitored in the Hall



220 RG-213 cables



DVCS cables must be moved by hand
with HRS-L movement
(multi-person effort)

Jun 14, 2013

Hall A collaboration meeting
Jefferson Lab: 13-14 June 2013

E12-04-114 DVCS Kinematics:

nucl-ex/0609015

Beam (GeV)	k' (GeV)	θ (HRS-L)	Q^2 (GeV ²)	x_{Bj}	Beam (μ A)	θ (Calo)	d(Calo) (m)	Time (days)
6.6	2.15	26.5°	3.0	0.36	5.0	-11.7°	1.5	3
6.6	3.20	22.5	3.1	0.50	5.0	-18.5	1.5	5
Subtotal days @ 6.6 GeV								8
8.8	2.88	22.9	4.0	0.36	8.5	-10.3	2.0	2
8.8	3.68	22.2	4.8	0.50	8.5	-14.5	2.0	4
8.8	4.27	21.2	5.1	0.60	5.0	-17.8	1.5	13
8.8	3.47	25.6	6.0	0.60	5.0	-14.1	1.5	16
Subtotal days @ 8.8 GeV								35
11.0	4.26	17.9	4.5	0.36	13.	-10.8	2.5	1
11.0	4.29	21.1	6.3	0.50	13.	-12.4	2.5	4
11.0	3.32	25.6	7.2	0.50	13.	-10.2	2.5	7
11.0	4.16	23.6	7.7	0.60	13.	-13.1	2.5	13
11.0	3.00	30.2	9.0	0.60	20.	-10.2	3.0	20
Subtotal days @ 11 GeV								45

Have to come back for more data taking at 11 GeV later, if no 11 GeV beam in 2014

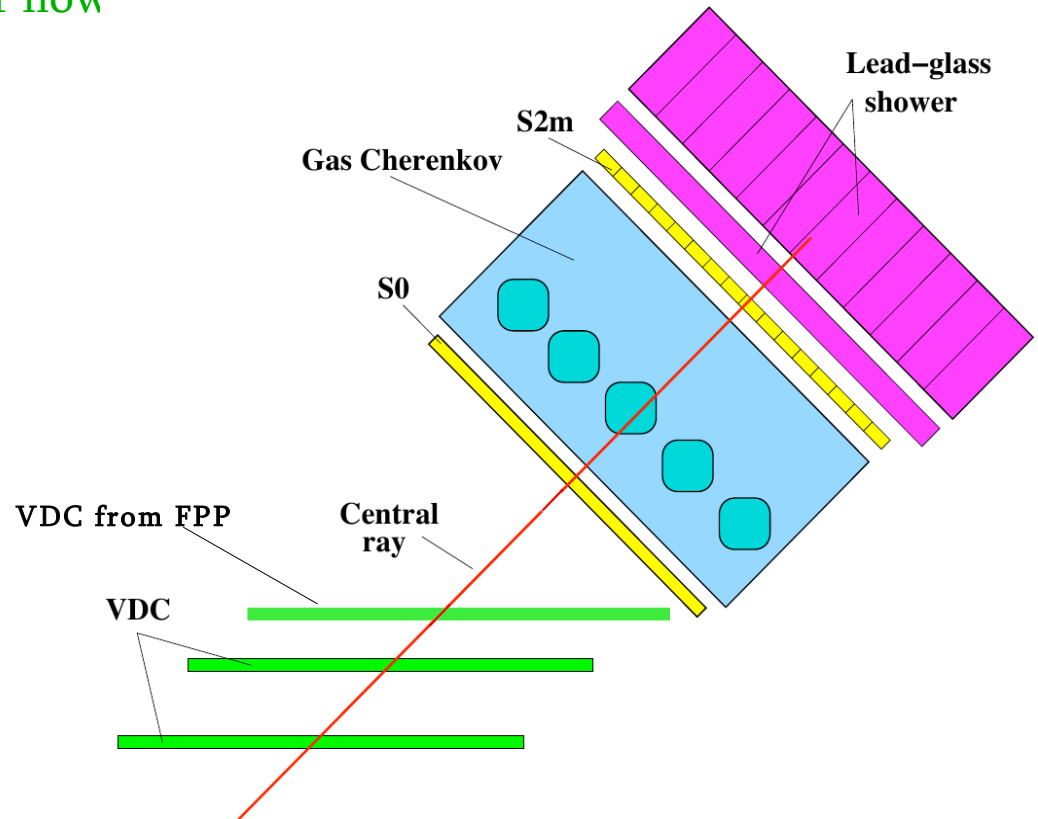
Detector configuration

Reflectivity of Cherenkov mirrors was tested,
And they were determined to be good for now

Add FPP Drift Chamber

Add 4" extension to Cherenkov

Different options for trigger
using S0, S2m, Cherenkov and
pion rejector



Timeline of DVCS collaboration work

	Calo Construction	Upgrade on trigger module
Jan	PMTs tested at Clermont-Ferrand	-Readout speed will be improved -More logic functionalities will be added Work is ongoing in Clermont-Ferrand
Feb		
Mar		
Apr	PMTs Sent from Clermont-Ferrand	
May	Arrived at JLab All in good condition	
Jun	- Re-wrapping is starting. (Some blocks & PMTs taken to ODU) - Will be assembled in TEDF building - Small stand for Calo is in place in TEDF	
Jul		
Aug		
Sep	Re-commissioning ARS/Trigger with CODA	
Oct	Test of Calo trigger module with CODA	
Nov		
Dec		

New collaborators are welcome!!

Hall A staff work

- ★ Construct/modify DVCS support and stand. Design finished/ parts ready to be ordered
- ★ Design/construct beam shielding (& support) Delivered
- ★ Cryo target
 - Beer can On Schedule
- ★ Standart equipment
 - Scattering chamber Design finished/ parts ready to be ordered
 - HRS:
 - Moller & Compton Polarimeters Spring 2014
 - Arc energy measurement
- ★ Be ready to install one month before expected beam time
 - Nov 2013 for Jan 2014

Conclusions

- ★ More or less flexible options are possible for parallel running with GMP
- ★ Preparations of the experiment E12-06-114 ongoing
- ★ Lots of work remaining to take beam in Feb 2014

G_M^p Proposal

Kinematics

Update for the PAC35 presentation

- 3 Beam Energies
I = 80 μ A
- Last two kinematic points rejected by PAC
- Possible parasitic points in blue
- Both HRSs in symmetric configuration*
- 3 Redundant Q^2
 - Different ϵ
- 21.5 days for LH_2
- 31 days requested

E_e (GeV)	Q^2 (GeV) ²	θ_e (deg)	E' (GeV)	ϵ	Rate (Hz)	Time (hours)	Events	
4.8**	7.0	71.0	1.08	0.25	0.60	9.3	40k	
6.6	7.0	35.4	2.87	0.62	7.45	0.7	40k	
6.6	8.0	42.0	2.35	0.51	2.29	2.4	40k	
5.8**	9.0	77.0	1.00	0.18	0.15	36.3	40k	
6.6	9.0	52.0	1.78	0.37	0.48	11.6	40k	
8.8	9.0	29.3	4.00*	0.67	3.38	3.3	40k	
6.6	10.0	67.0	1.25	0.23	0.15	38.3	40k	
8.8	10.0	33.3	3.47*	0.59	1.31	8.5	40k	
8.8	11.0	38.0	2.95	0.51	0.53	10.5	40k	
8.8	12.0	44.0	2.42	0.41	0.21	26.7	40k	
8.8	13.0	53.0	1.86	0.30	0.06	67.4	28k	
11.0	13.0	31.3	4.07*	0.58	0.36	21.2	28k	
11.0	14.0	35.0	3.54*	0.50	0.17	39.0	24k	
11.0	15.5	42.0	2.74	0.39	0.053	52.8	20k	
11.0	17.0	53.0	1.94	0.26	0.013	175.2	16k	
							503.3	

