Hall B - Run Group K
Color Confinement and Strong QCD
Status Update

E12-16-010 **A Search for Hybrid Baryons in Hall B with CLAS12**
Annalisa D'Angelo

E12-16-010A Nucleon Resonance Structure Studies Via Exclusive KY Electroproduction at 6.6 GeV and 8.8 GeV
Daniel Carman

E12-16-010B Deeply Virtual Compton Scattering with CLAS12 at 6.6 GeV and 8.8 GeV
Latifa Elouadrhiri

E12-16-010C Separation of the σ_L and σ_T contributions to the production of hadrons in electroproduction
Tim Hayward, Harut Avakian

Approved:
50 PAC days at 8.8 GeV
50 PAC days at 6.6 GeV

Assigned Fall 2018:
5.5 PAC days at 7.5 GeV
4.0 PAC days at 6.5 GeV

Assigned Spring 2024:
2 PAC days commissioning at 6.5 GeV
16.5 PAC days at 6.4 GeV
13.5 PAC day at 8.5 GeV

Gran Total: 42 PAC days of collected data + 30 PAC days of assigned data → **72 PAC days globally assigned**

Main Questions to Address

- The N* spectrum: what is the role of glue?

  → **Search for new baryon states -** E12-16-010

- How does meson-baryon cloud emerge?

  → **Measure the Q^2 dependence of electrocoupling amplitudes -** E12-16-010A

- How is color confinement realized in the force and pressure distributions resulting in stable nucleons?

  → **Study GPDs and their moments from DVCS -** E12-16-010B

- What is the 3D internal structure of the nucleon?

  → **Study the nucleon structure function from SIDIS -** E12-16-010C

Run Group Proposal (RG K)

"Color Confinement and Strong QCD"

Hybrid Baryons E12-16-010	Search for hybrid baryons (qqqg) focusing on 0.05 GeV^2 < Q^2 < 2.0 GeV^2 in mass range from 1.8 to 3 GeV in KΛ, Nππ, Nπ *(A. D'Angelo, V. Burkert, D.S. Carman, V. Mokeev, R. Gothe)*
KY Electroproduction E12-16-010A	Study N* structure for states that couple to KY through measurements of cross sections and polarization observables that will yield Q^2 evolution of electrocoupling amplitudes *(D.S. Carman, V. Mokeev, R. Gothe)*
DVCS E12-16-010B	Access GPDs H, E, $\widetilde{H}$, $\widetilde{E}$ using DVCS process ep → epγ and the DVMP process ep → epπ^0 *(L.Elouadrhiri, F.X. Girod)*
SIDIS E12-16-010C	Measure the proton structure functions in the deep-inelastic scattering by Rosenbluth separation performed combining RG-K and RG-A data on semi-inclusive electro-production of hadrons. (*T. Hayward, Harut Avakian*)

100 days
approved by PAC 44 and
confirmed by PAC 48 (Jeopardy)

E_b = 6.6 GeV, 50 days – 3 passes

E_b = 8.8 GeV, 50 days – 4 passes

RUN CONDITIONS	
Torus Current	100% (3375 A) - negative out-bending
Solenoid	-100 %
FT	**ON @ 7.5 GeV -> OFF @ 6.5 GeV and 8.5 GeV**
Beam/Target	Polarized electrons, un-polarized LH_2 target
Luminosity	• ~ 5 10^{34} cm^{-2}s^{-1} @ 7.5 GeV ~ 0.87 10^{34} cm^{-2}s^{-1} @ 6.5 GeV 0.87 10^{35} cm^{-2}s^{-1} @ 6.4 GeV 10^{35} cm^{-2}s^{-1}@8.5 GeV **FULL LUMINOSITY**

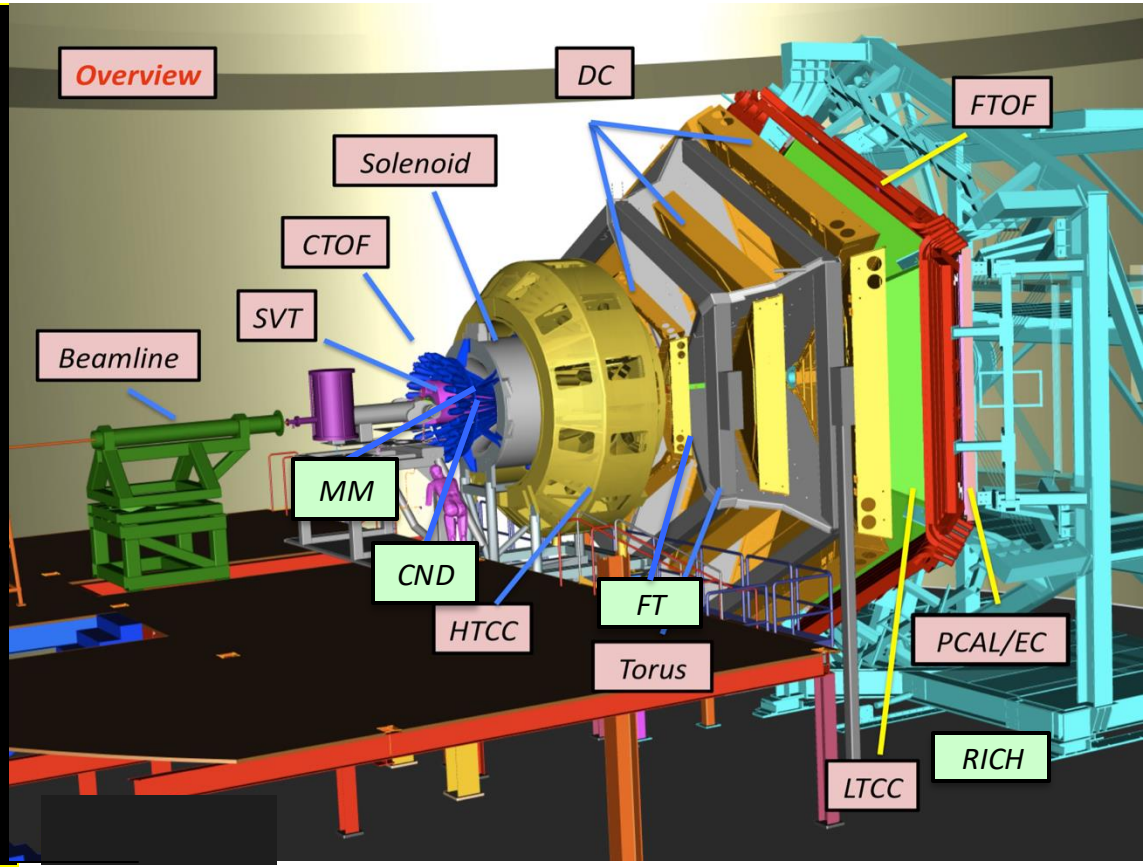
Equipment

Forward Detector (FD)
- TORUS magnet
- HT Cherenkov Counter
- Drift chamber system
- LT Cherenkov Counter
- Forward TOF System
- Pre-shower calorimeter
- E.M. calorimeter

Central Detector (CD)
- SOLENOID magnet
- Silicon Vertex Tracker
- Central Time-of-Flight

Beamline
- Cryo Target
- Moller polarimeter
- Shielding
- Photon Tagger

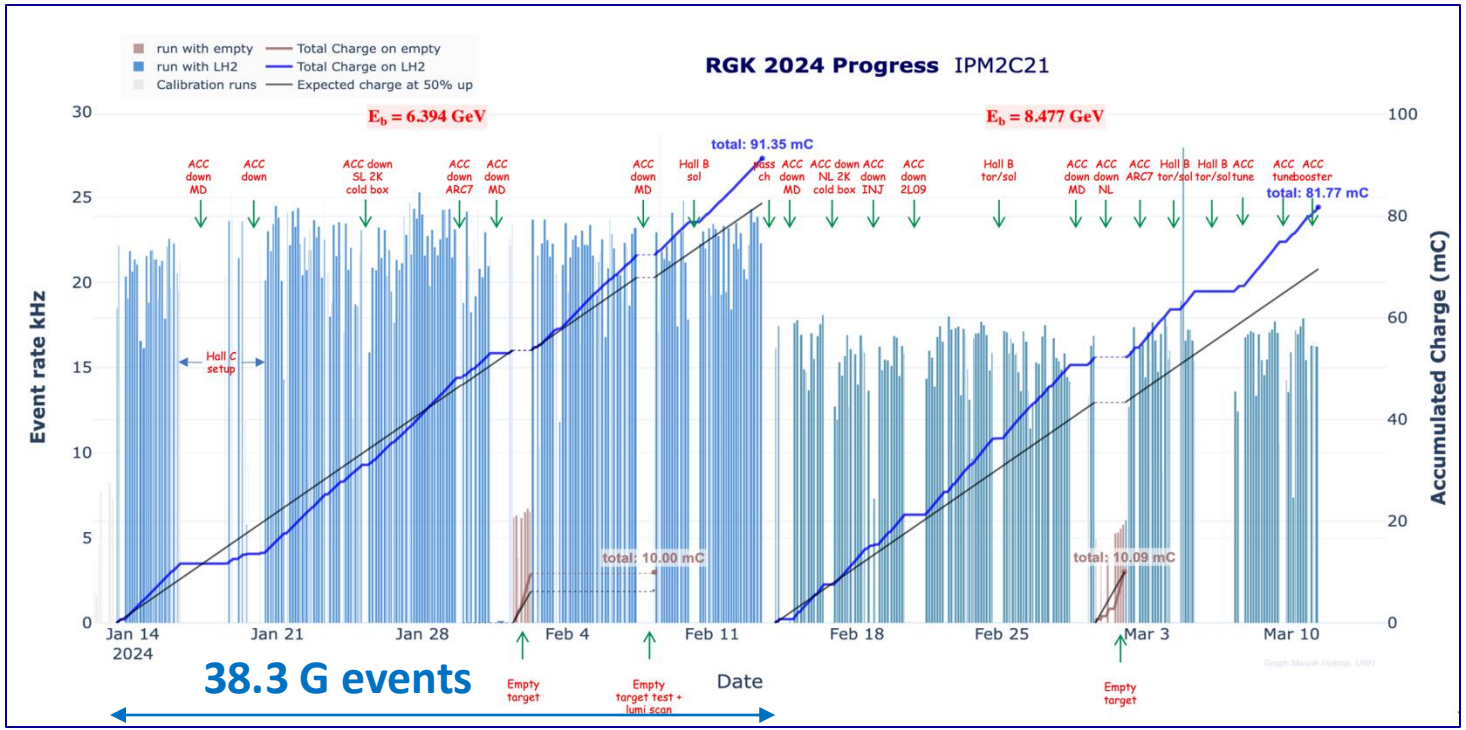
Upgrade to the baseline
- Central Neutron Detector
- MicroMegas
- Forward Tagger
- RICH detector
- Polarized target



Run Group K - SPRING 2024 Data Taking Overview

December 15-19, 2023 – 4 calendar days
Commissioning

January 11 - March 11, 2024 – 60 calendar days
Alignment and Production



3-passes
E_e = 6.39463 GeV
I_e = 65 nA
Lum. = 0.87 10^{35} cm^{-2} s^{-1}

Run Range:
19200 – 19659
259 Production Runs
38.3 G prod events
10 Empty tgt runs @ 200 nA
0.41 G ET events (~1% full)

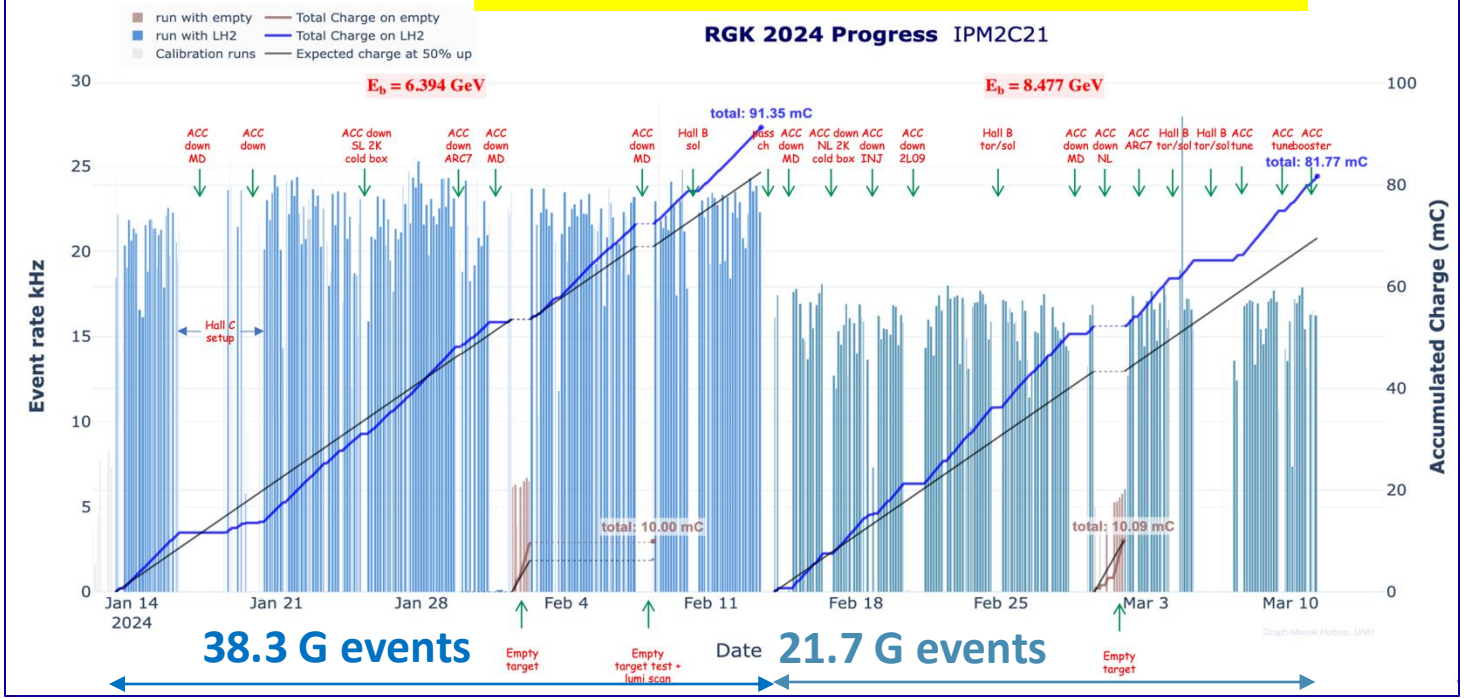
Accumulated Charge:
Full tgt = 91 mC
Empty tgt = 10 mC
Total = 101 mC

Run Group K - SPRING 2024 Data Taking Overview

December 15-19, 2023 – 4 calendar days
Commissioning

January 11 - March 11, 2024 – 60 calendar days
Alignment and Production

30 Assigned PAC days → 37 effective PAC days

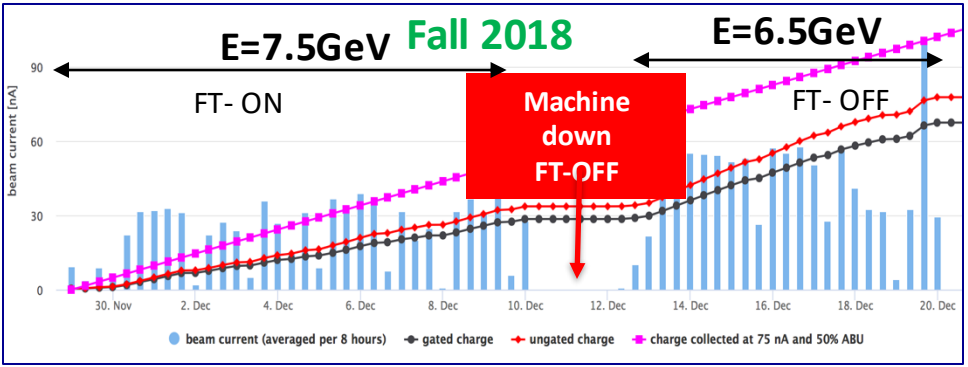


4-passes
E_e = 8.47757 GeV
I_e =75 nA
Lum. = 10^{35} cm^{-2} s^{-1}

Run Range:
19660 – 19893
174 Production Runs
21.7 G events
8 Empty tgt runs @ 200 nA
0.32 G ET events (~1.4% full)

Accumulated Charge:
Full tgt = 81.77 mC
Empty tgt = 10 mC
Total = 91.77 mC

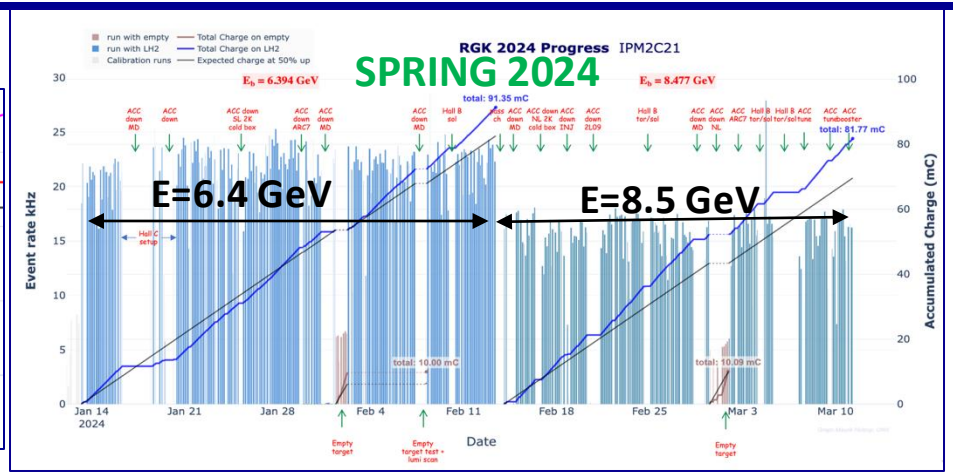
Run Group K Production



45mC of accumulated charge

Fall 2018		
Beam Energy	Beam Current	Collected Events
7.5 GeV	35 nA	3.5 G
7.5 GeV	45 nA	4.3 G
6.5 GeV	60 nA	7.8 G

EVENTS
15.6 G



193mC of accumulated charge

Spring 2024		
Beam Energy	Beam Current	Collected Events
6.4 GeV	65 nA	38.3 G
8.5 GeV	75 nA	21.7 G

EVENTS
60 G

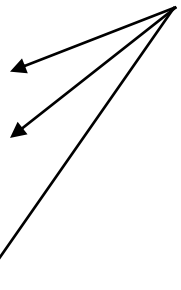
Statistics increased by a factor 4

Run Group K - Commissioning and Calibration Runs

December 15-19, 2023

- Trigger Studies - Valery Kubarosky
- Luminosity Scans
- DC HV scans - Florian Hauenstein
- Reversed solenoid polarization runs

Service studies useful for all Run Groups



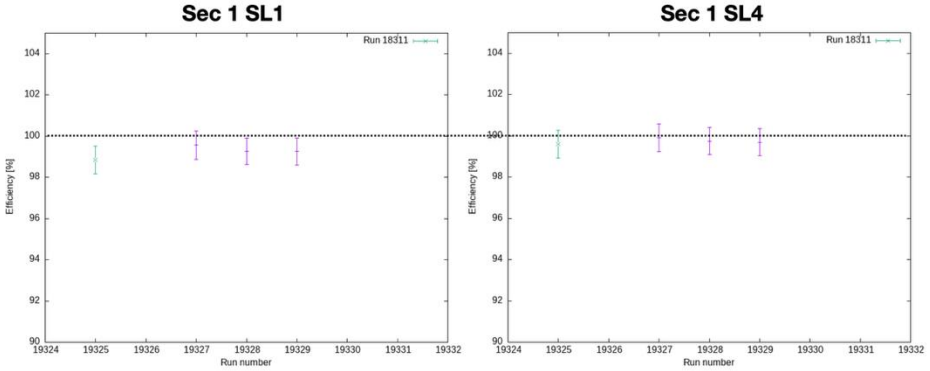
January 11-13, 2024

- Warm/cold empty target alignment studies: zero magnetic fields – Raffaella De Vita
- DC studies
- Empty target runs
- Luminosity scans

DC HV Scans

R1 DC HV setting	R2 DC HV setting	R3 DC HV setting	Current
10	11	11	40 nA
11	12	12	40 nA
9	10	10	40 nA
10	10	10	40 nA
10	10	11	40 nA
10	10	11	40 nA
10	12	11	40 nA
10	11	10	40 nA
10	11	12	40 nA
12	13	13	40 nA
11	11	11	40 nA
10	12	10	40 nA

- **HV 11,12,12**
  - **Threshold 30,45,45 (run 19327)**
  - **Threshold 45,60,60 (run 19328)**
  - **Threshold 60,60,60 (run 19329)**
- **Comparison RGD with threshold 30,45,45**



- **No decrease in efficiency for higher thresholds**

(11, 12, 12) – SPRING 2024 – 3-passes configuration

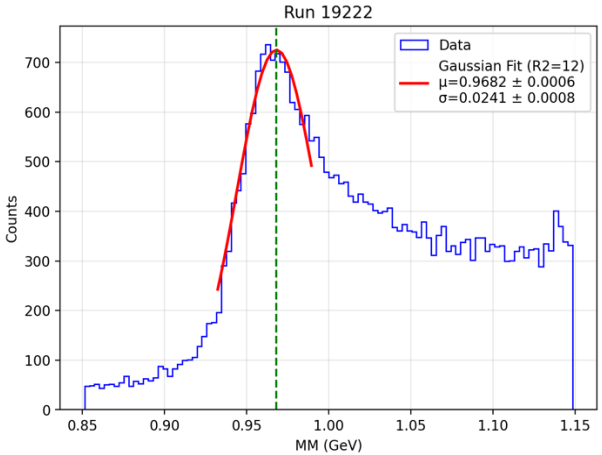
(10, 12, 11) – SPRING 2024 – 4-passes configuration

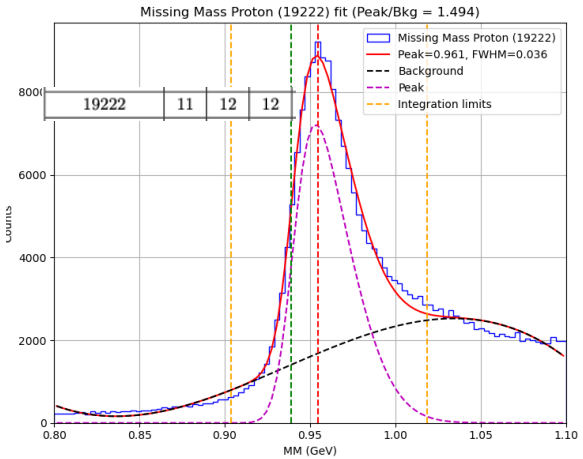
(9, 10, 10) – FALL 2018 configuration

By Florian Hauenstein

DC HV Scans

Run Number	R1	R2	R3	$N_{triggers}$
19220	10	11	11	85.98 M
19222	11	12	12	100.51 M
19223	9	10	10	100.37 M
19224	10	10	10	101.31 M
19225	10	10	11	45.80 M
19226				30.02 M
19228	10	12	11	88.51 M
19229	10	11	10	89.29 M
19238	10	11	12	75.20 M
19239	12	13	13	81.29 M
19243	11	11	11	60.22 M
19244	10	12	10	67.48 M



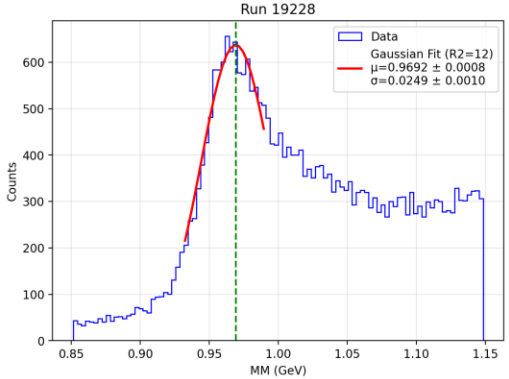


(11, 12, 12) – SPRING 2024 – 3-passes configuration

$ep \rightarrow ep\pi^+\pi^-$

By Krishna Neupane

(10, 12, 11) – SPRING 2024 – 4-passes configuration



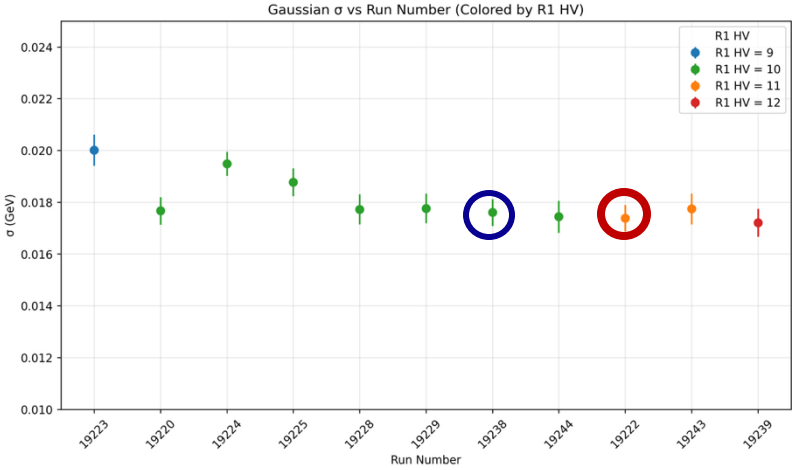
Proton missing mass

DC HV Scans

Run Number	R1	R2	R3	$N_{triggers}$
19220	10	11	11	85.98 M
19222	11	12	12	100.51 M
19223	9	10	10	100.37 M
19224	10	10	10	101.31 M
19225	10	10	11	45.80 M
19226				30.02 M
19228	10	12	11	88.51 M
19229	10	11	10	89.29 M
19238	10	11	12	75.20 M
19239	12	13	13	81.29 M
19243	11	11	11	60.22 M
19244	10	12	10	67.48 M

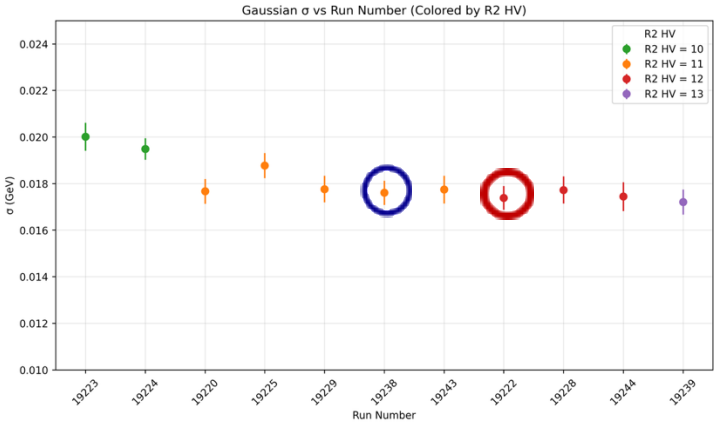
3 passes

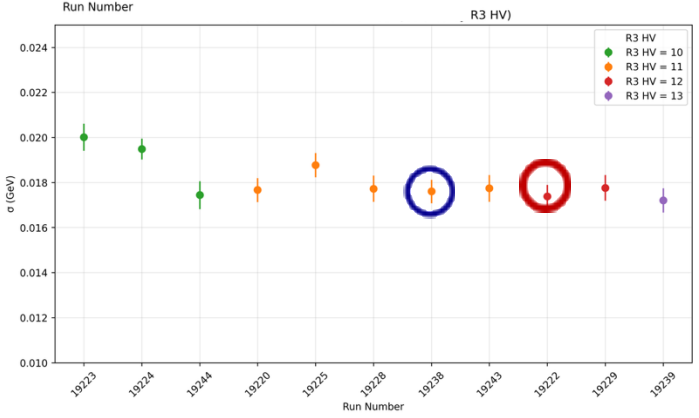
4 passes



By Krishna Neupane

DC HV has been optimized





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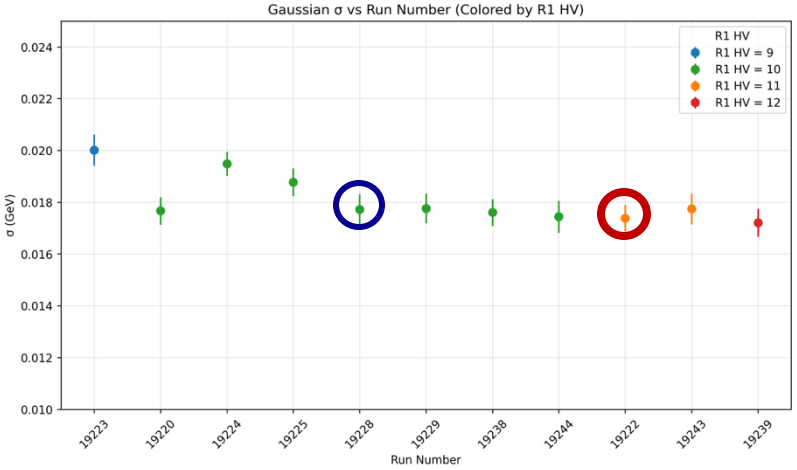
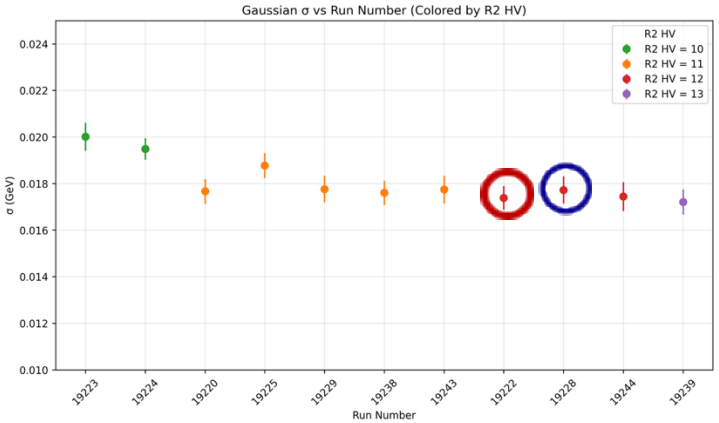
3 passes

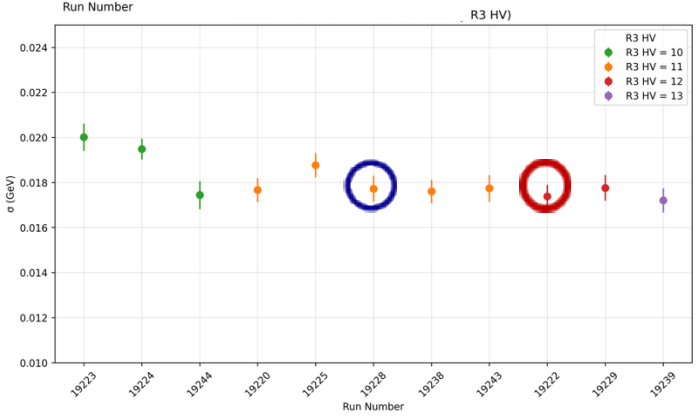
4 passes



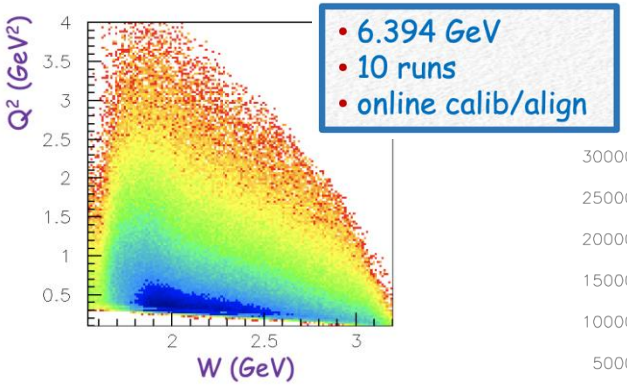
By Krishna Neupane

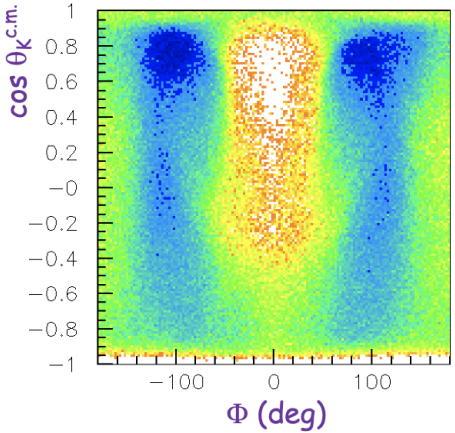
DC HV has been optimized



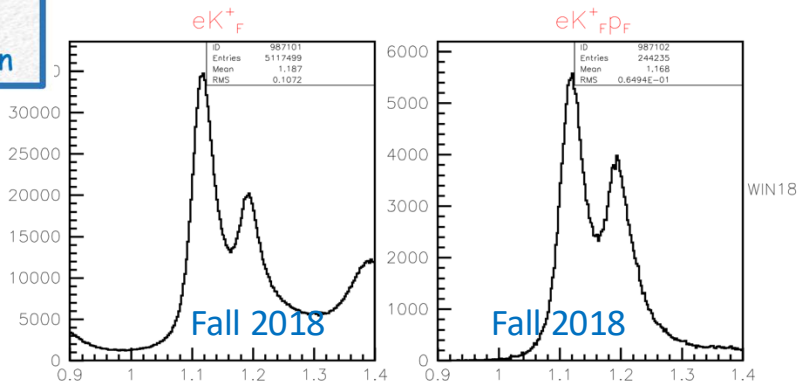


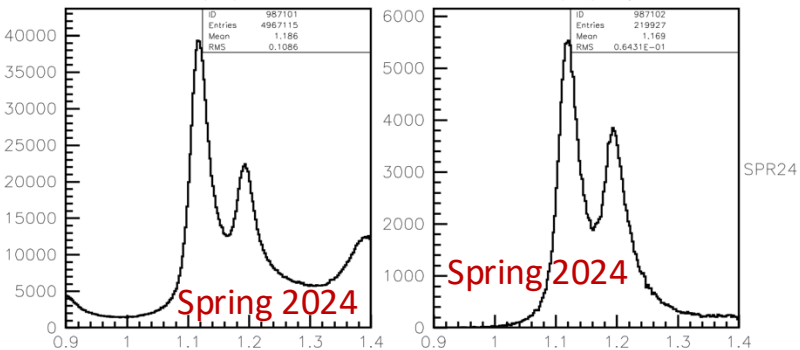
RG-K Production – KY Data analysis





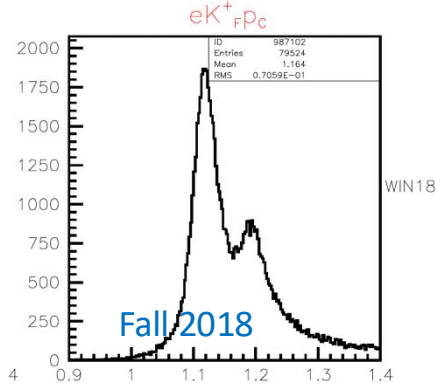
Forward k⁺

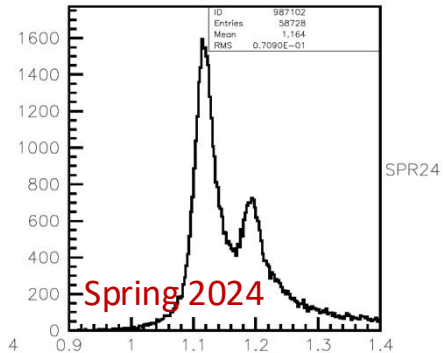




forward k⁺ forward p

forward k⁺ central p





By: Daniel Carman

Resolution is improved with higher DC HV settings

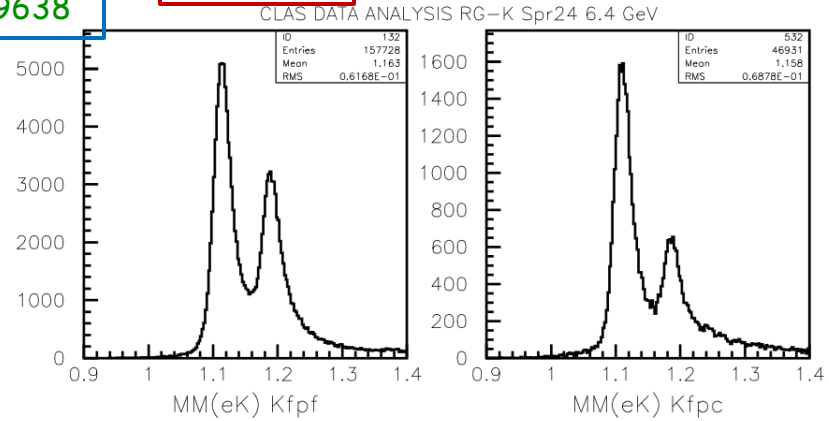
19410
19476
19571
19638

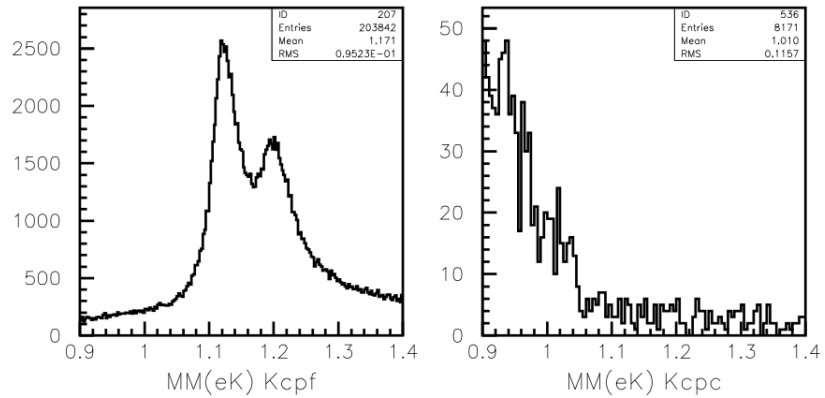
RG-K Spr24 KY Validation Studies

By: Daniel Carman

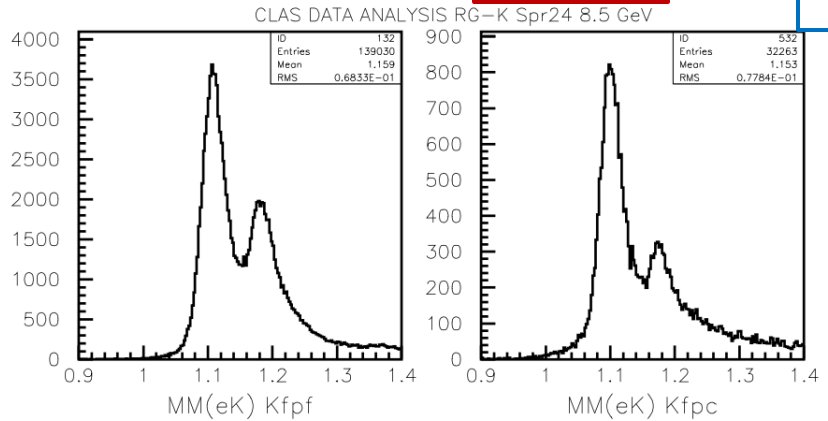
19706
19765
19833
19886

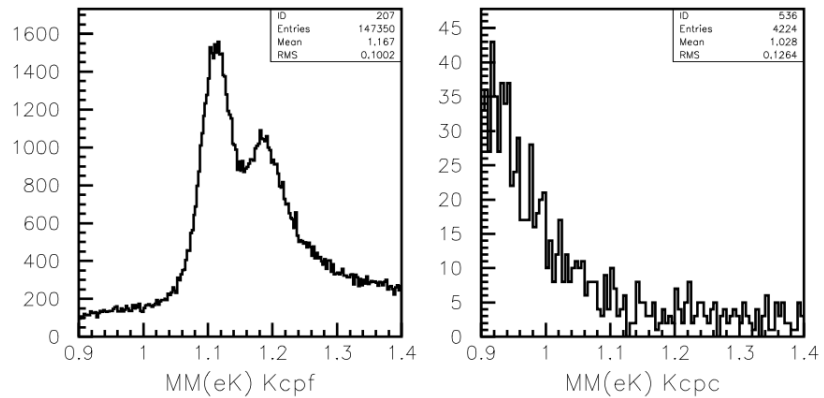
6.4 GeV





8.5 GeV

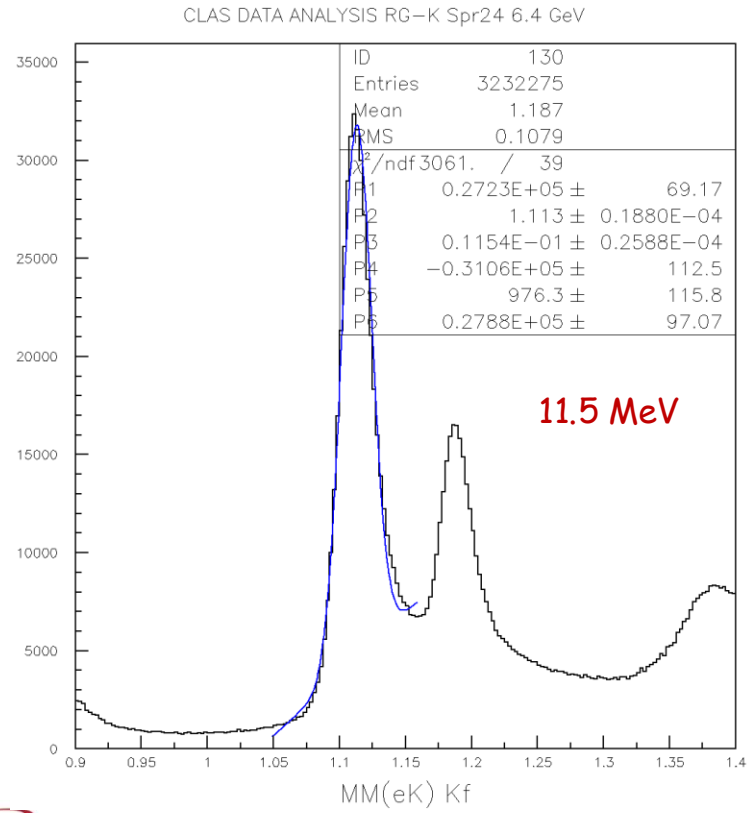




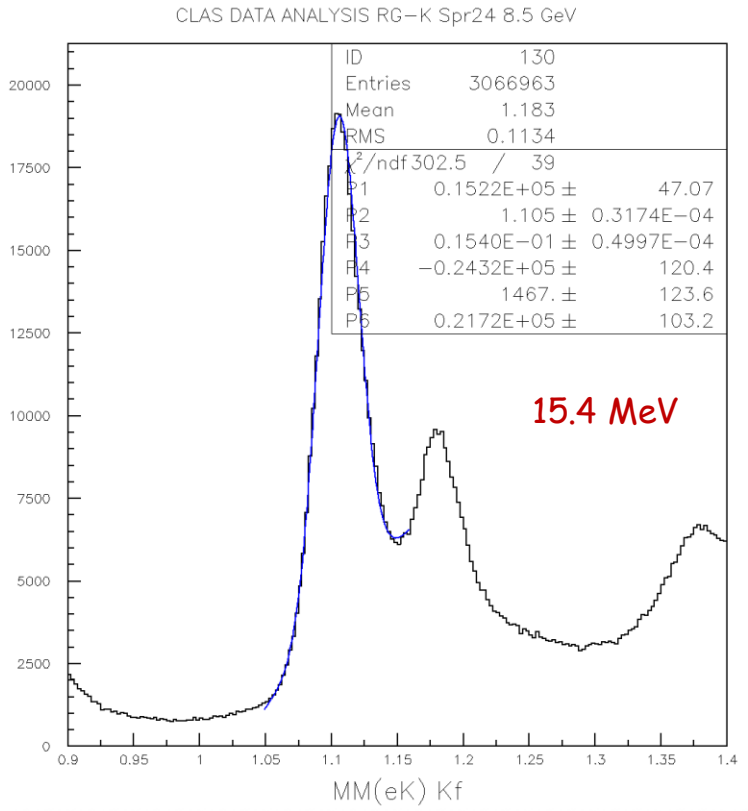
RG-K Spr24 KY Validation Studies

By: Daniel Carman

6.4 GeV



8.5 GeV



Warm/Cold empty target Alignment

Standard procedure: DC alignment done with empty target (cold) with torus & solenoid @ zero field

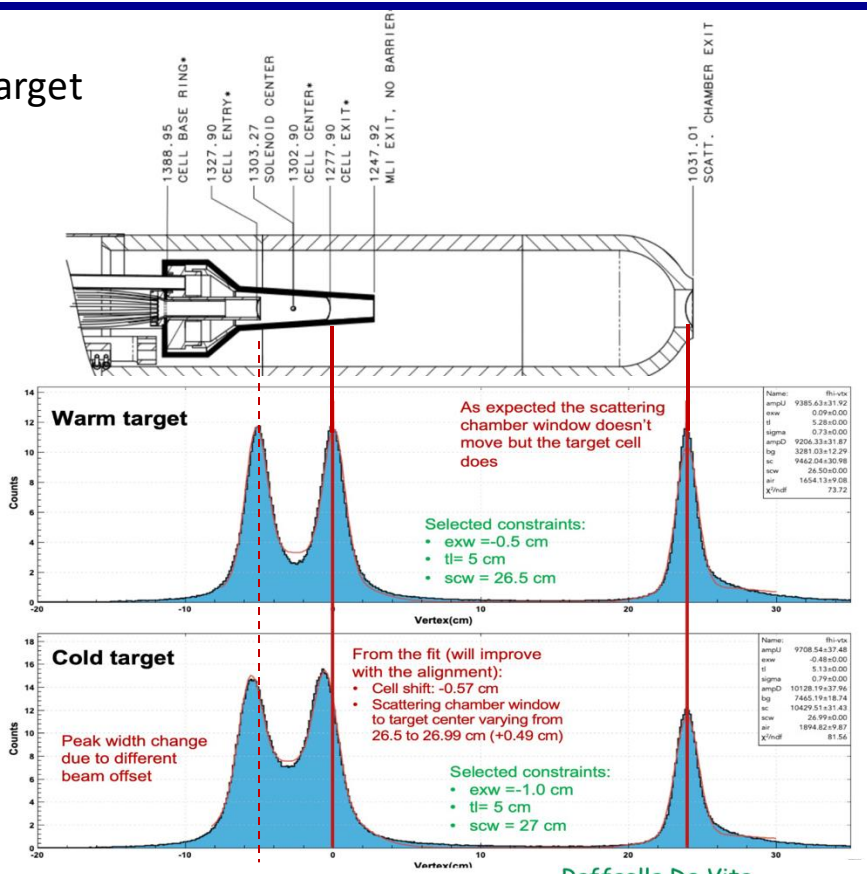
• **Target "foils":** cryo-target entrance + exit windows, scattering chamber exit window

At start of RG-K run, 1 full day was dedicated to alignment runs:

- 12 hr with empty/warm target (first time)
- 12 hr with empty/cold target

Alignments have not taken **thermal contraction of cryo-target system** into account

- FEA computed upstream shift of cell by 5 mm
- Data agree with engineering calculation and survey



Raffaella De Vita

Spring 2024 data have been fully calibrated – in preparation for the PASS1 Review in December

Run Group K On-going analyses

Student/Scientist	Topic
Chiara Ammendola - Roma	$ep \rightarrow e'K^+Y$ $[\Lambda(1116), \Sigma(1193), \Lambda(1520)]$
Joshua Artem Tan - JLAB/ Sangbaek Lee	DVCS Beam Spin Asymmetry
Yijie Wang - MIT	DVCS Cross Section and Elastic Scattering xsec
Story Frantzen - MIT	DVπ^0p
Anastasya Pavlova – MSU	$ep \rightarrow e'\pi^0 p$
Stepan Savkin – MSU	$ep \rightarrow e'\pi^+\pi^- p$
Bianca Gualtieri - FIU	$ep \rightarrow e'K^+K^+\Xi^-$
Tatsuhiro Ishige	$ep \rightarrow e'K^+ \Lambda(1405)$
Dan Carman/Lucilla Lanza	$ep \rightarrow e'K^+Y$ $[\Lambda(1116), \Sigma(1193)]$
Krishna Neupane	DV K^+K^-p
Veronique Ziegler	$ep \rightarrow e'K^+\Lambda \rightarrow e'K^+p\,\pi^-$
Harut Avagyan	SIDIS

Talk on Friday

Most analyses profit from the availability of data at 3, 4 and 5 passes combining RGK and RGA data

Run Group K Trains

Skim Number	Wagon
1	elastic channel
2	sidis
3	Lambda Wagon
4	Jpsi TCS Wagon
7	K+ K- p (ϕ)
13	missing neutron

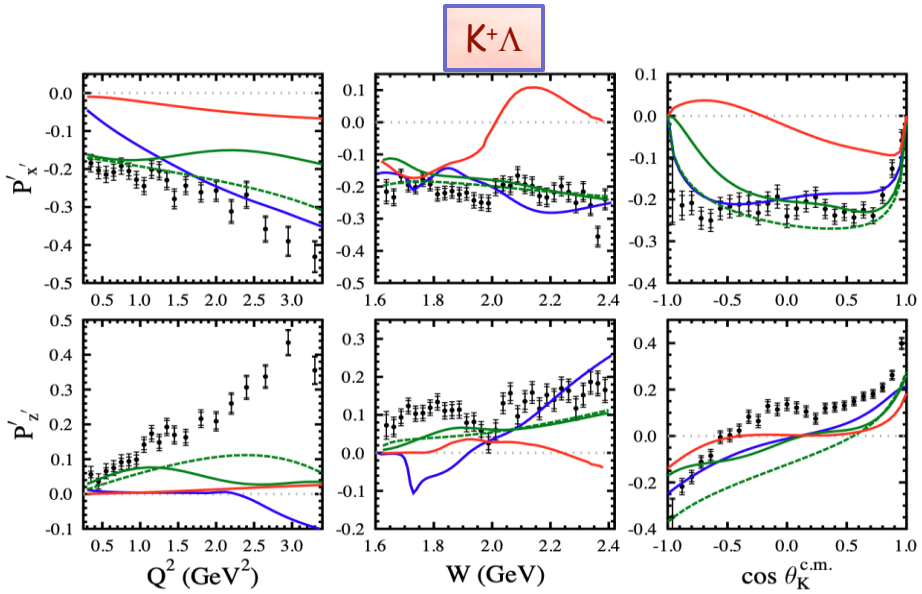
Skim Number	Wagon
16	DVCS
18	DV pi0 p
20	DV pi+ pi- pi0 p
21	e K+ (e in the FD)
29	two pions (with missing mass cuts)
30	two pions (by Neupane)

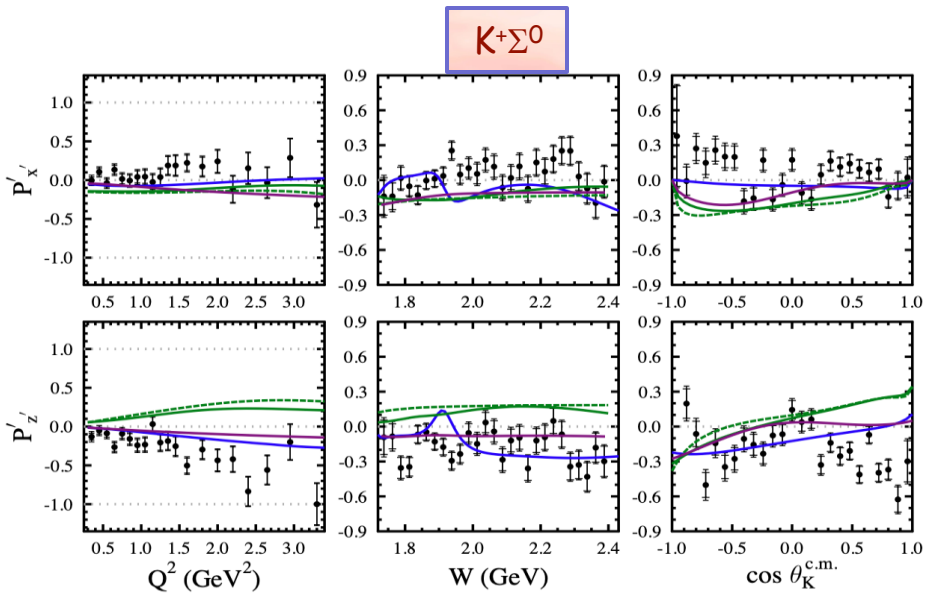
e K^+ K^+
e p γ

will be implemented shortly

CLAS12 KY Transferred Polarization

By Dan Carman

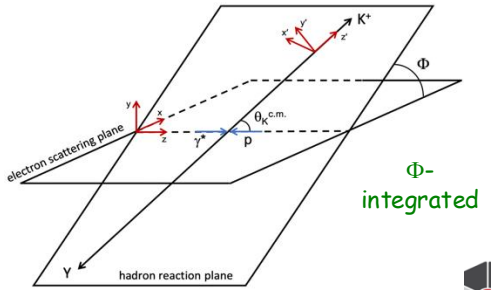




D.S. Carman et al. (CLAS), PRC 105, 065201 (2022)

Model	Year	Type	Fit Data	N* States
SL	1996	Isobar	none	1/2, 3/2
Kaon-MAID	2000	Isobar	none	1/2, 3/2, 5/2
RPR	2011	Isobar+Regge	CLAS γp	1/2, 3/2, 5/2
BS3	2018	Isobar	CLAS γp + ep	1/2, 3/2, 5/2

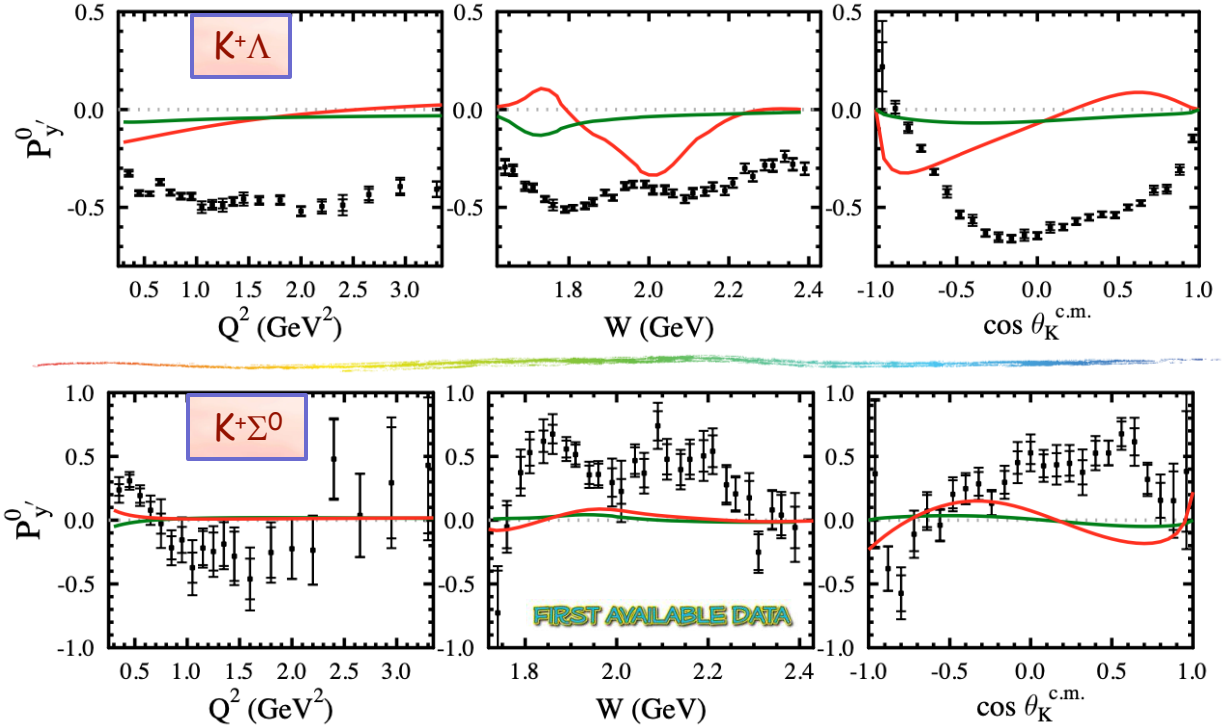
RG-K – W18
6.5 GEV

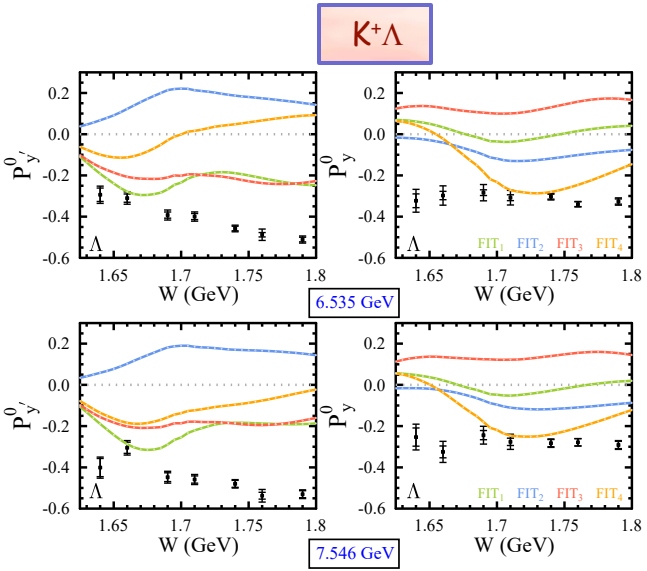


Φ-integrated

CLAS12 KY Recoil Polarization

By Dan Carman





JBW coupled-channel model

D. Rönchen, M. Döring, U.-G. Meißner, EPJA 54110 (2018)

M. Mai et al., EPJA 59286 (2023)

Isobar models:

BSΛ: D. Skoupil and P. Bydžovský, PRC 97, 025202 (2018)

BSΣ: D. Petrillis and D. Skoupil, PRC 110, 065204 (2024)

SL: J.C. David, C. Fayard, G.H. Lamont, and B. Saghai, PRC 53, 2613 (1996)

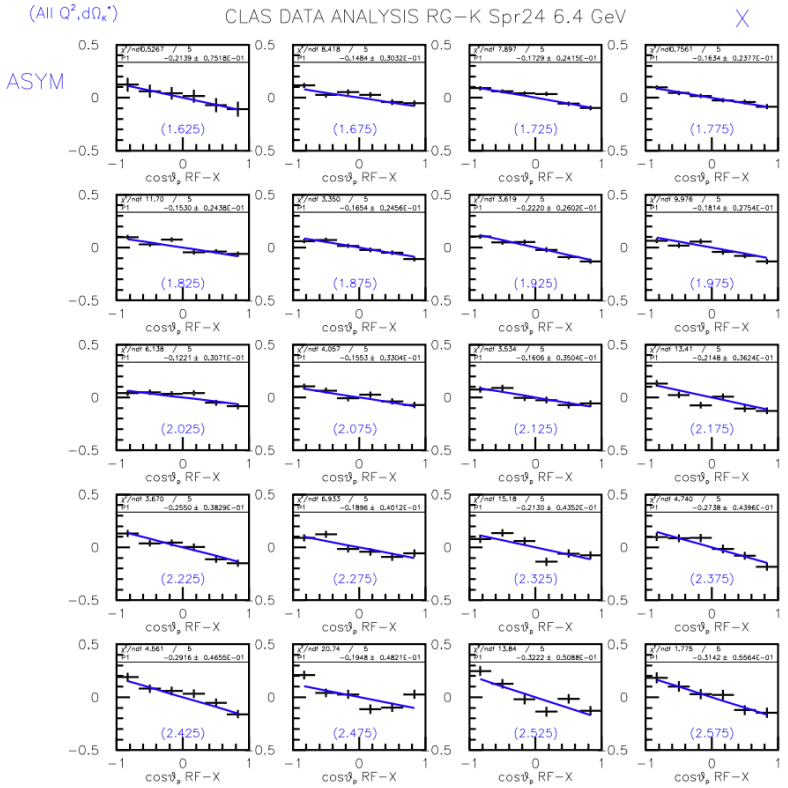
RG-K – W18

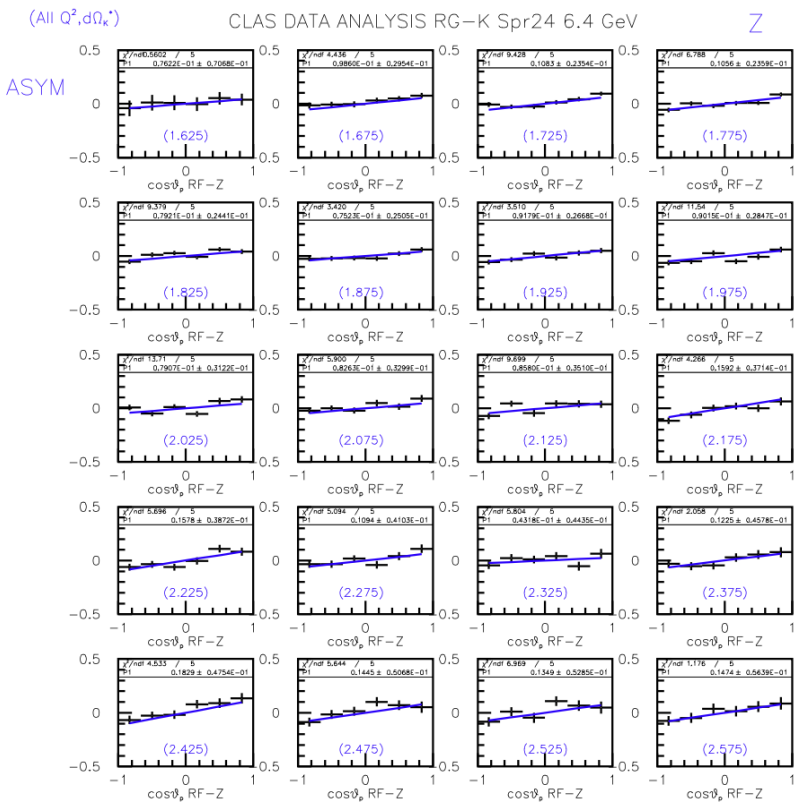
6.5 GEV

D.S. Carman et al. (CLAS), PRC 112, 035206 (2025)

RG-K Spr24 KY Validation Studies

By Dan Carman





Representative fits:
z' along K^+,
x' in hadronic plane perp to K^+

Only 4 runs!!

Helicity asymmetry fits : $A = \alpha P_b P' \cos\theta_p^{RF}$

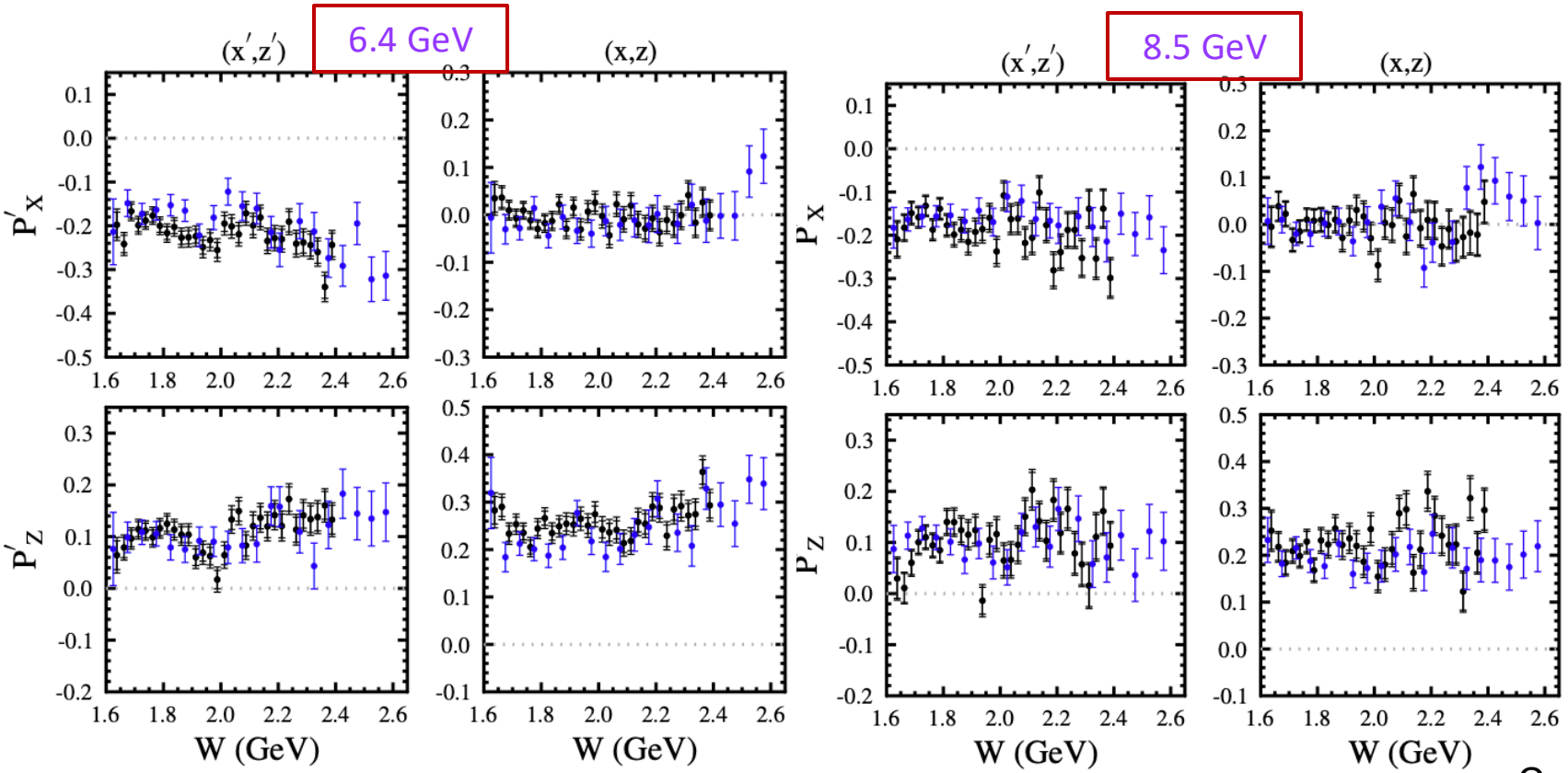
$P_b = 84.92\%$

Jefferson Lab

clas

RG-K Spr24 KY Validation Studies

By Dan Carman



RG-K 2018 – PRC 105, 065201 (2022) – Dec.18 pass-2 data

RG-K 2024 – validation cooking runs

Only 4 runs!!

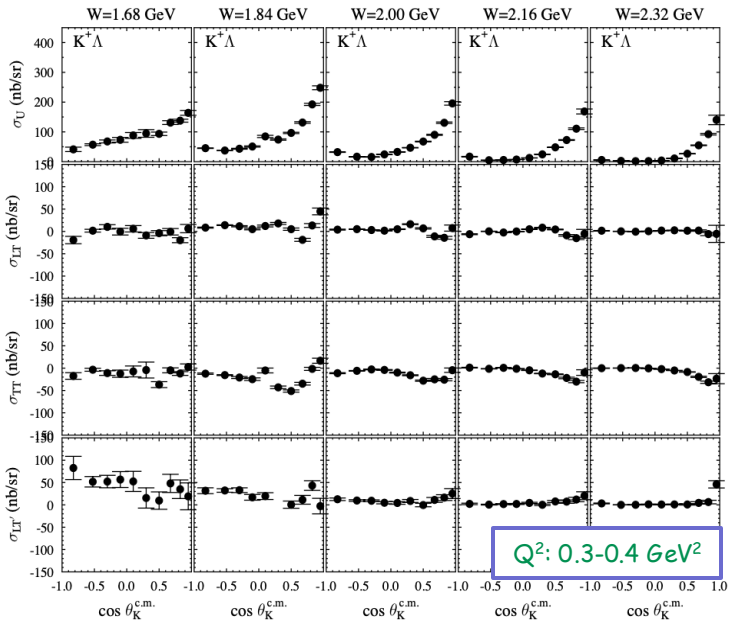
CLAS12 KY Cross Sections

By Dan Carman

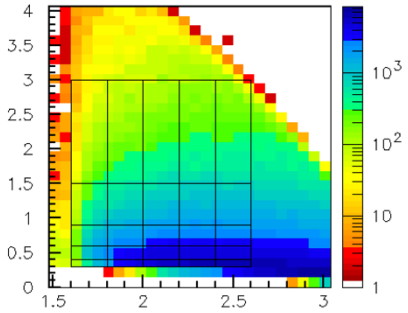
$ep \rightarrow e'K^+\Lambda$

$$\frac{d\sigma}{d\Omega_K^{c.m.}} = \sigma_T + \epsilon\sigma_L + \sqrt{\epsilon(1+\epsilon)}\sigma_{LT}\cos\Phi + \epsilon\sigma_{TT}\cos 2\Phi + h\sqrt{\epsilon(1-\epsilon)}\sigma_{LT'}\sin\Phi$$

$ep \rightarrow e'K^+\Sigma^0$

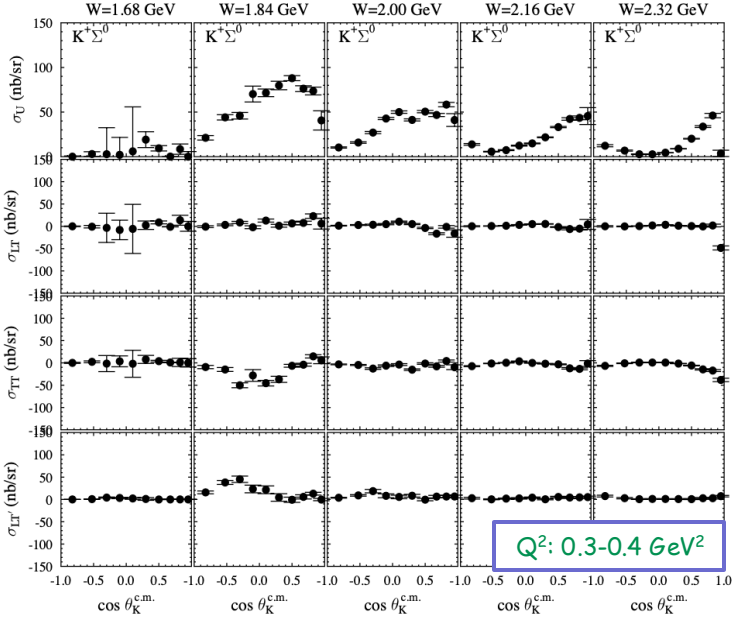


PRELIMINARY



JLab, JMU, Rome

RG-K - W18
6.5 GEV



$\sigma_{T,L,LT,TT} = f(Q^2, W, \cos\theta_K^*)$

Analysis of Spr24 RG-K dataset upcoming with 10x the statistics

Summary

By Dan Carman

- Analysis of the RG-K W18 datasets has still proven very valuable:
  - D.S. Carman *et al. (CLAS Collaboration)*, "Beam-Recoil Transferred Polarization in K^+Y Electroproduction in the Nucleon Resonance Region with CLAS12", Phys. Rev. C 105, 065201 (2022)
  - D.S. Carman *et al. (CLAS Collaboration)*, "Recoil Polarization in K^+Y Electroproduction in the Nucleon Resonance Region with CLAS12", Phys. Rev. C 112, 035206 (2025)
- Attention is now turning to the Spr24 dataset (100 mC @ 6.4 GeV, 100 mC @ 8.4 GeV)
  - New dataset requires improved techniques/tools to extract observables with minimized systematics:
    - New EG including radiation (EXCLURAD) + hyperon polarization
    - Improvements to forward tracking (algorithms+HV settings)
    - New corrections to minimize systematics from detached vertex
    - Improvements to central tracking algorithm (AI/ML methods)
    - Much improved statistics compared to CLAS, first RG-K run
- Analysis work in progress:
  - Lucilla Lanza, Chiara Ammendola (Rome) – cross sections, separated structure functions
  - Manav Bilakhia (UConn) – multi-dimensional polarization analysis

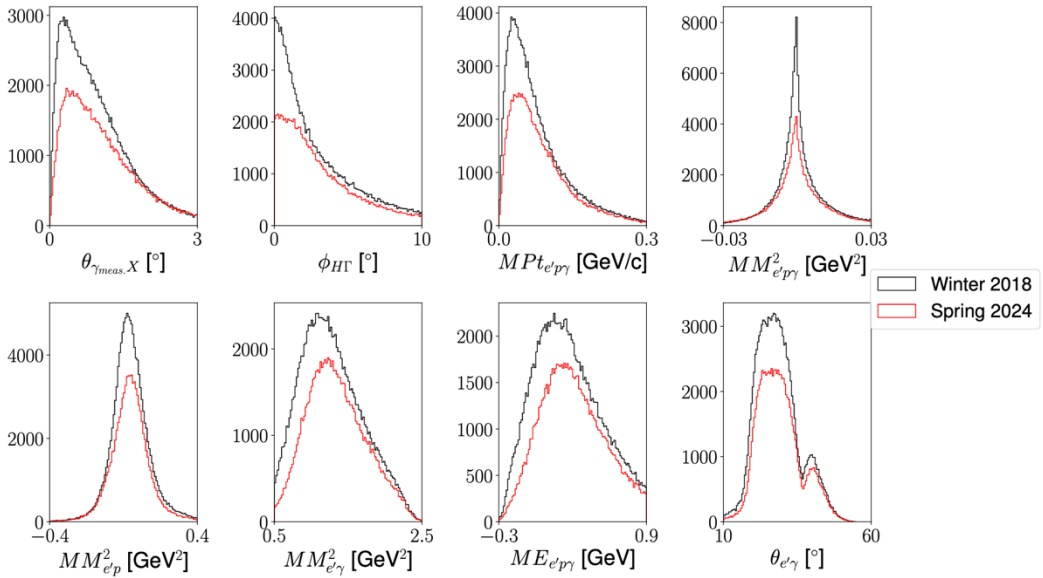
E_b (GeV)	W (GeV)	Q^2 (GeV^2)	Charge (mC)
CLAS e1f run: Apr. – Jun. 2003			
5.479 GeV	1.6-3.0	0.8-3.5	15.7
CLAS12 RG-K run #1: Dec. 2018			
6.535 GeV	1.6-2.4	0.3-3.5	18.2
7.546 GeV	1.6-2.4	0.4-4.5	10.8
CLAS12 RG-K run #2: Jan. – Mar. 2024			
6.4 GeV	1.6-2.4	0.3-3.5	91.4
8.4 GeV	1.6-2.4	0.4-4.5	81.8

RG-K Production – DVCS Data analysis

Comparison of data analysis: 16 runs from Fall 2018 10 runs from Spring 2024

E=6.5 GeV
E=6.4 GeV

Narrower cuts for the BSA



1. $\theta_{\gamma_{meas.}X} < 3°$
2. $\phi_{H\Gamma} < 10°$
3. $MPt_{e'p\gamma} < 0.3$ GeV/c
4. $|MM^2_{e'p\gamma}| < 0.03$ GeV^2
5. $|MM^2_{e'p}| < 0.4$ GeV^2
6. 0.5 GeV^2 $< MM^2_{e'\gamma} < 2.5$ GeV^2
7. -0.3 GeV $< ME_{e'p\gamma} < 0.9$ GeV
8. $\theta_{e'\gamma} > 10°$

Cut ranges are also visualized on the x-axis.
After this cut, statistics:

	FD proton	CD proton	Total
16 runs winter 2018	14k	77k	91k
10 runs spring 2024	18k	106k	124k

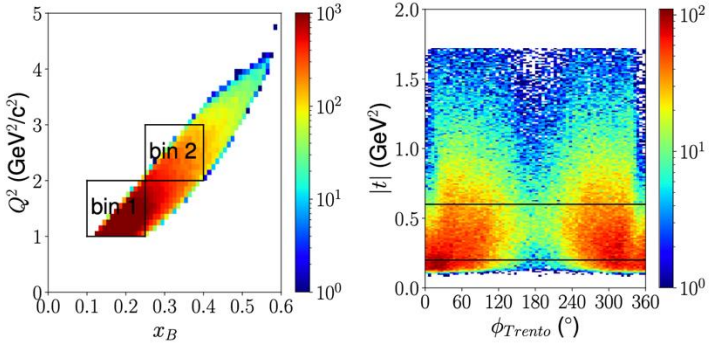
By: Sangbaek Lee

RG-K Production – DVCS Data analysis

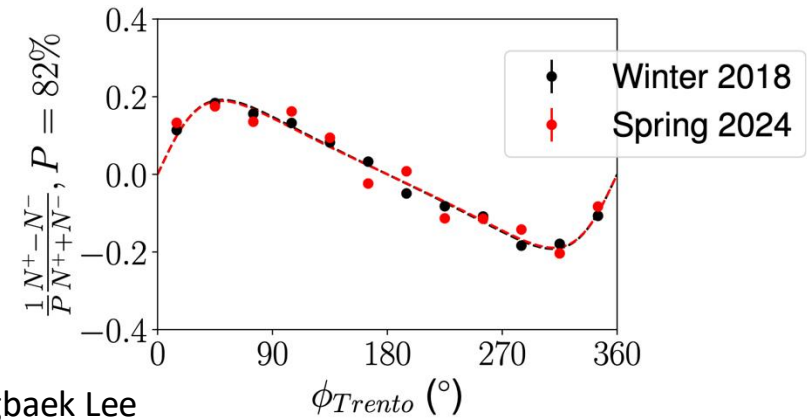
BSA preliminary results

$$BSA(\phi_{Trento}) = \frac{A \sin \phi_{Trento}}{1 + B \cos \phi_{Trento}}$$

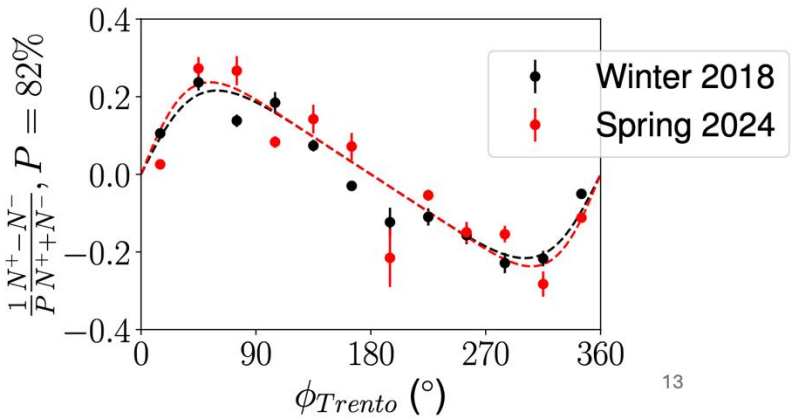
	A, bin 1	B, bin 1	A, bin 2	B, bin 2
16 runs winter 2018	0.148	0.635	0.186	-0.509
10 runs spring 2024	0.145	-0.644	0.192	-0.585



1. 0.1< x_B <0.25, 1< Q^2[GeV^2/c^2] <2, 0.2< $|t|$[GeV^2] <0.6



2. 0.25< x_B <0.4, 2< Q^2[GeV^2/c^2] <3, 0.2< $|t|$[GeV^2] <0.6



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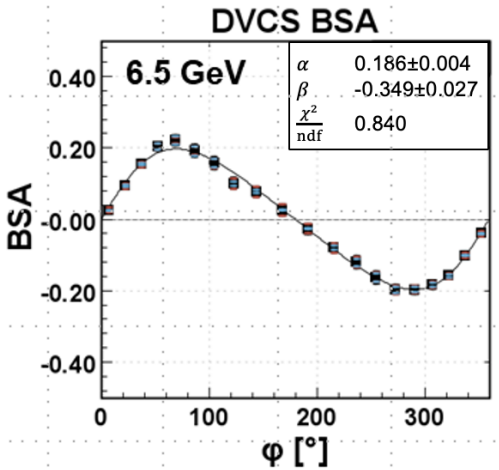
By: Sangbaek Lee

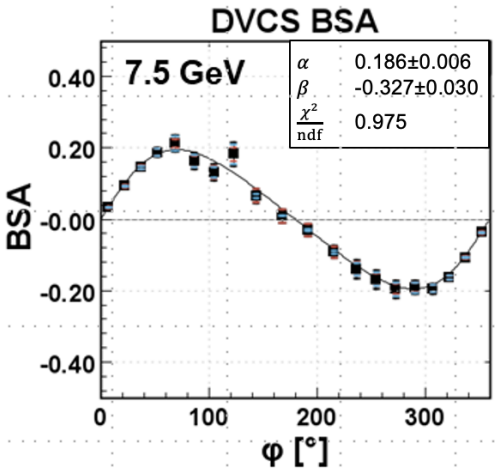
RG-K Production – DVπ^0p Data analysis

Fall 2018 data only

$$A = \frac{\alpha \sin\phi}{1 + \beta \cos\phi}$$



$$A = \frac{\alpha \sin\phi}{1 + \beta \cos\phi}$$



E_{beam} [GeV]	Fit	Parameters	σ_{syst}
6.535	$\frac{\alpha \sin\phi}{1 + \beta \cos\phi}$	$\alpha = 0.185 \pm 0.00503$	0.00235
		$\beta = -0.348 \pm 0.0306$	0.000135
7.546	$\frac{\alpha \sin\phi}{1 + \beta \cos\phi}$	$\alpha = 0.184 \pm 0.00748$	0.00284
		$\beta = -0.336 \pm 0.0369$	0.00939

By:Josh Artam Tan

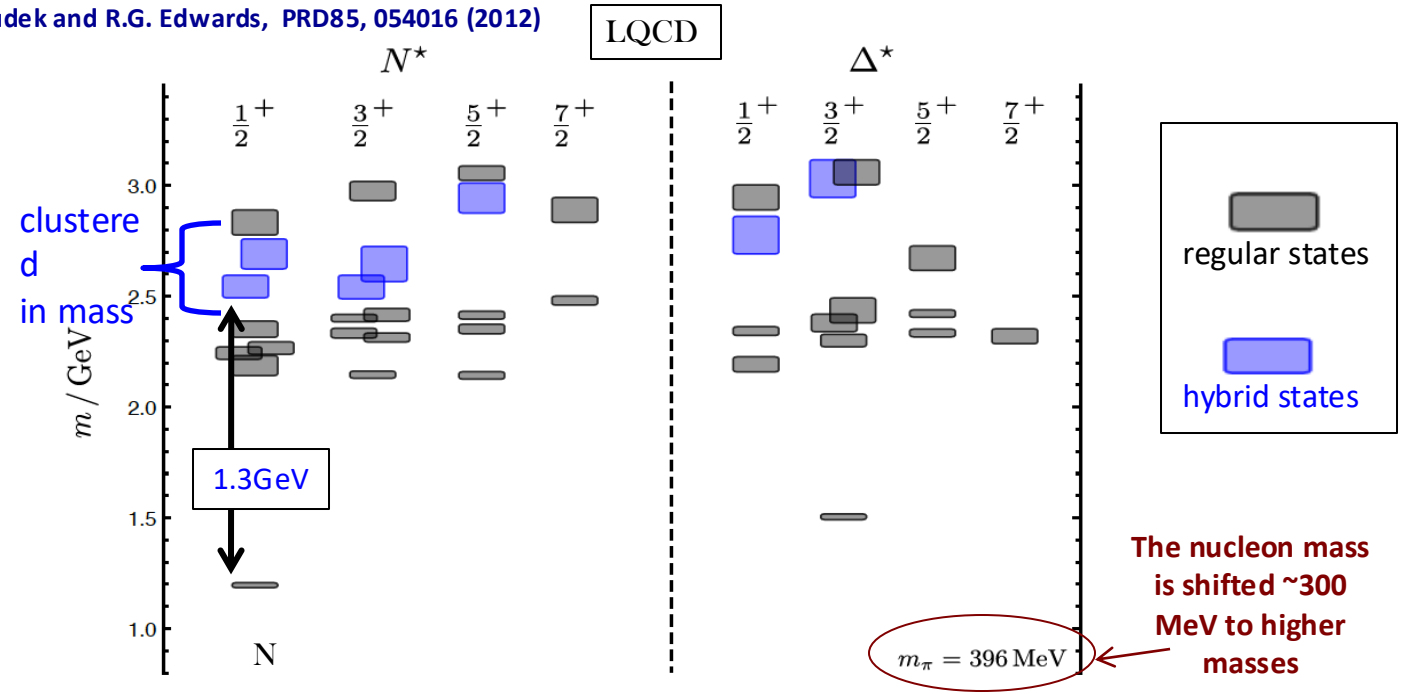
Conclusions

- ✓ Run group K has successfully collected 50 % of the data at 3 and 4 passes
- ✓ Full luminosity has been reached at 8.5 GeV with FT - OFF
- ✓ Spring 2024 calibration is complete and preliminary data analysis shows very high-quality data – Pass1 Readiness Review is planned for December 2025
- ✓ Data analysis on several channels, in addition to the flagship proposals, is on-going in synergy

Thank you

Hybrid Baryons in LQCD

J.J. Dudek and R.G. Edwards, PRD85, 054016 (2012)

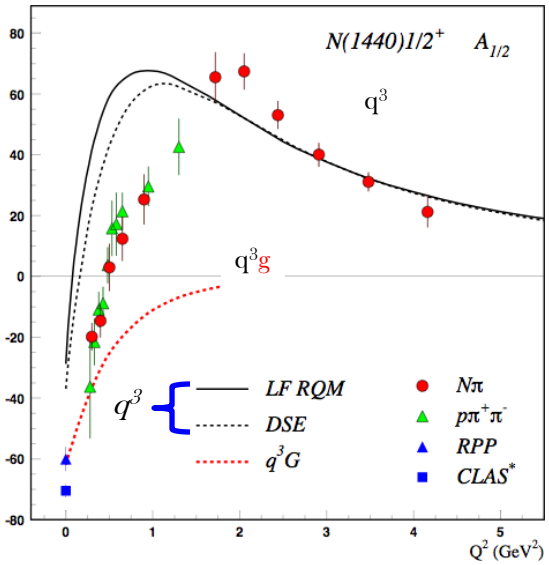


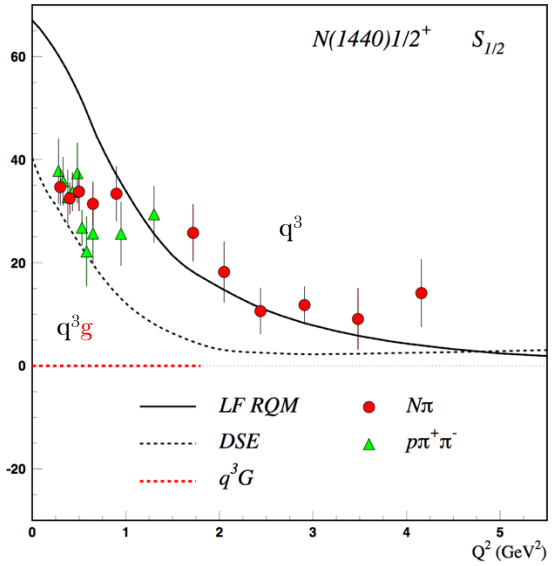
Hybrid states have same J^P values as qqq baryons. How to identify them?

- Overpopulation of N $1/2^+$ and N $3/2^+$ states compared to QM projections.
- **$A_{1/2}$ ($A_{3/2}$) and $S_{1/2}$ show different Q^2 evolution. Can we do it?**

Separating q^3g from q^3 States?

Precise CLAS results on electrocouplings clarified nature of the Roper

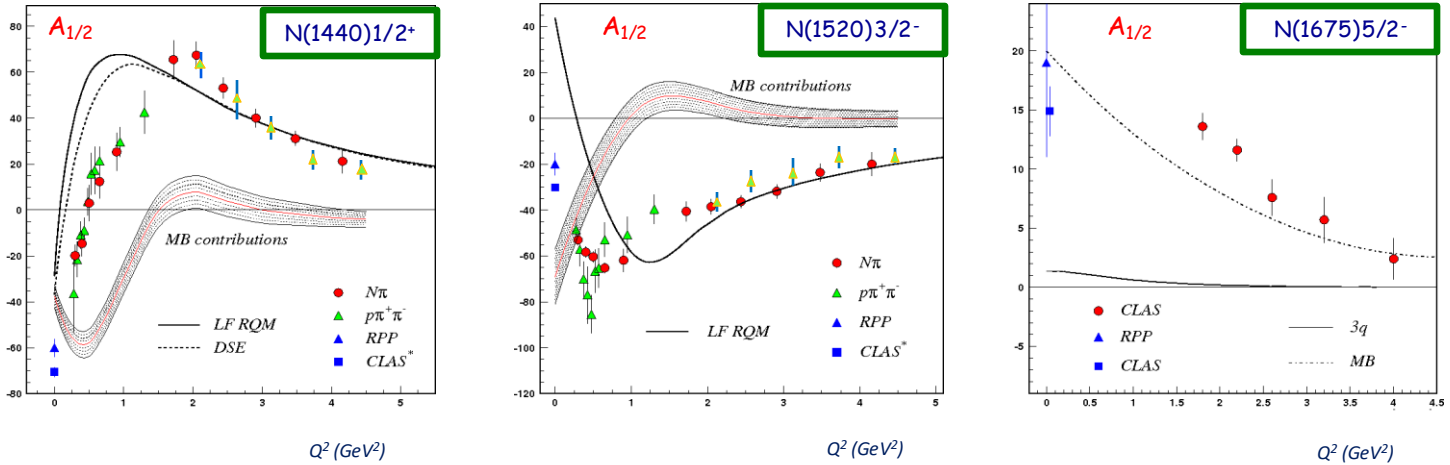




- $A_{1/2}$ and $S_{1/2}$ amplitudes at high Q^2 indicate 1st radial q^3 excitation
- Significant meson-baryon coupling at small Q^2

For hybrid "Roper", $A_{1/2}(Q^2)$ drops off faster with Q^2 and $S_{1/2}(Q^2) \sim 0$.

Q^2 Evolution of N* Electrocouplings



- Electrocouplings reveal different interplay between meson cloud and quark core:
  - -Important to study different N* states vs. distance scale
- Good agreement of the extracted N* electrocouplings from Nπ and Nππ:
  - -Compelling evidence for the reliability of the results
  - -Channels have very different mechanisms for the non-resonant background

Data from the KY channels is critical to provide an independent extraction of the electrocoupling amplitudes for the higher-lying N* states

Accessing the Forces & Pressure on Quarks

Nucleon matrix element of EMT contains:

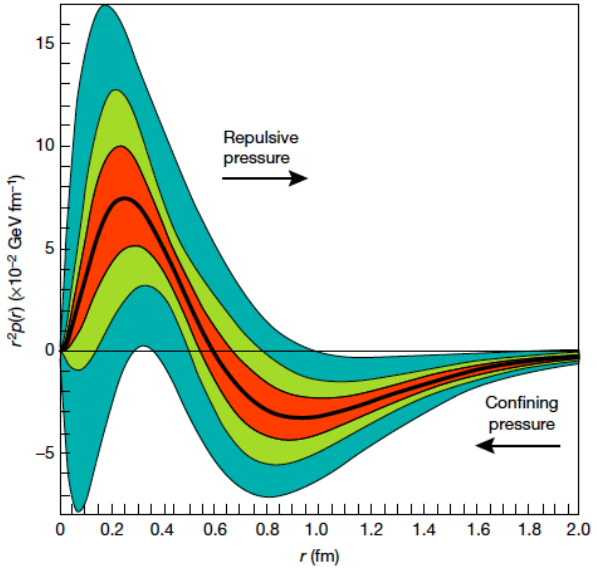
$M_2(t)$: Mass distribution inside the nucleon

$J(t)$: Angular momentum distribution

$d_1(t)$: Shear forces and pressure distribution

$$\int xH(x,\xi,t)\mathrm{d}x = M_2(t) + \frac{4}{5}\xi^2 d_1(t)$$

Separate $M_2(t)$ and $d_1(t)$ through measurements at small/large ξ.



V. D. Burkert, L. Elouadrhiri & F. X. Girod
Nature, 557 396-399 (2018)

Measuring these form factors, we learn about confinement forces.

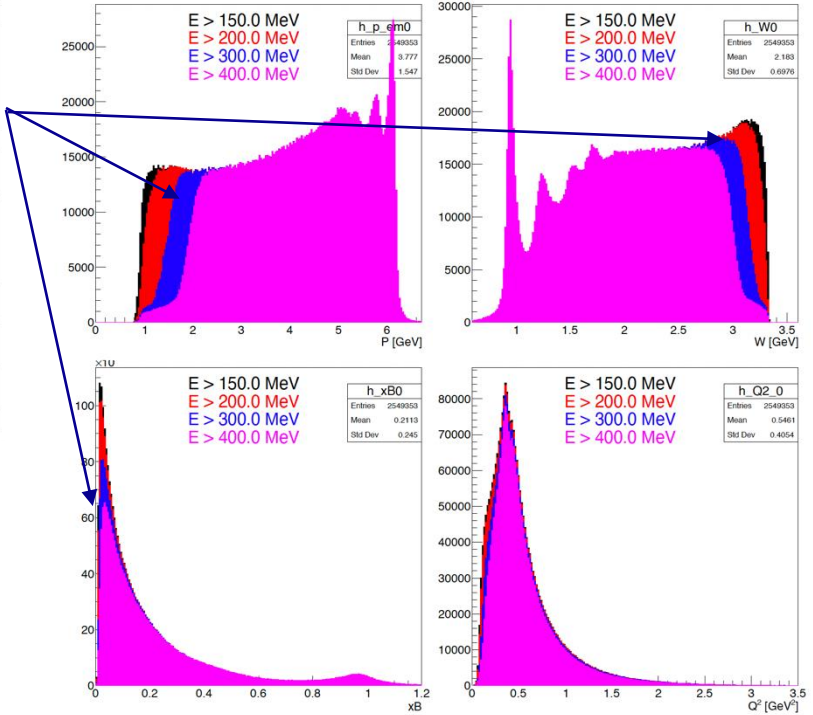
Trigger Validation Studies

TABLE I. RGK trigger files

Trigger File	Description	PCAL+ECAL	TORUS	Comments
rgk_noDC_v1.0_150MeV	No DC roads	150 MeV	Any	Production
rgk_noDC_v1.0_200MeV		200 MeV		
rgk_noDC_v1.0_300MeV		300 MeV		Production, HOLDOFF=3 us
rgk_noDC_v1.1_300MeV		300 MeV		Production, HOLDOFF=2 us
rgk_noDC_v1.2_300MeV		300 MeV		Production, HOLDOFF=1 us
rgk_noDC_empty_v1.1_300MeV		300 MeV		Empty target
rgk_noHTCC_noDC_v1.1_300MeV	no HTCC	300 MeV		wrong trigger delay
rgk_noHTCC_noDC_v2.0_300MeV	no HTCC	300 MeV		trigger delay 84 ns
rgk_out_v1.0_150MeV	With DC roads	150 MeV	Outbending	Production
rgk_out_v1.0_200MeV		200 MeV		
rgk_out_v1.0_300MeV		300 MeV		
rgk_out_v1.1_300MeV		300 MeV		Production, HOLDOFF=2 us
rgk_inb_v1.0_150MeV	With DC roads	150 MeV	Inbending	Production
rgk_inb_v1.0_200MeV		200 MeV		
rgk_v1.0_zero_150MeV	No DC roads	150 MeV	Zero	Alignment run
rgk_v1.0_zero_200MeV		200 MeV		
rgk_v1.0_30kHz_150MeV	Random 30 kHz	150 MeV	Any	Trigger Validation
rgk_v1.0_30kHz_200MeV		200 MeV		
rgk_noDC_v1.0_validation.trg		150 MeV	Any	Includes 150,200,250 and 300 MeV

TABLE II. Electron Trigger Rates

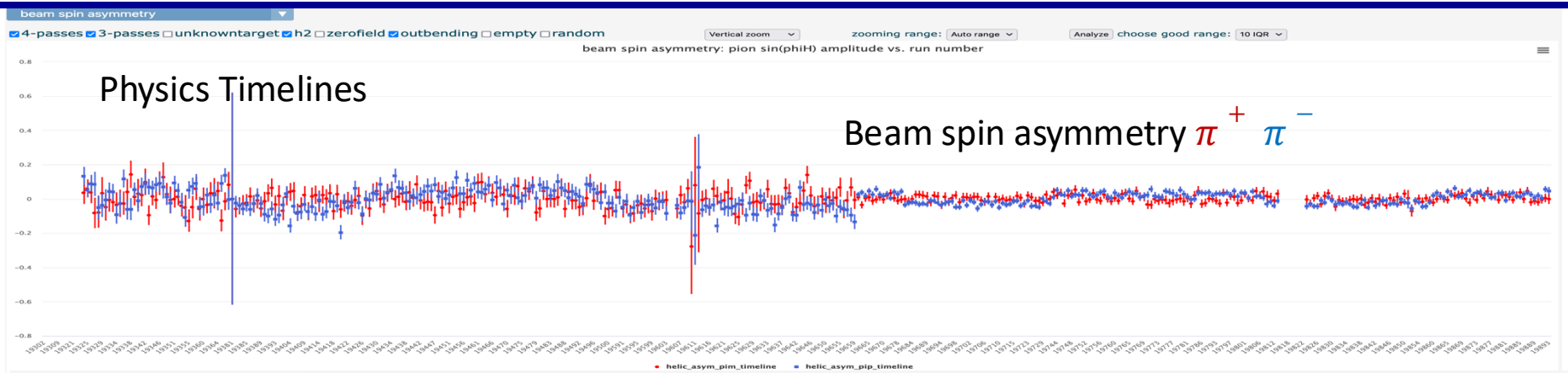
Beam Energy Trigger file	6.4 GeV rgk_noDC_v1.1_300MeV.trg	8.5 GeV rgk_noDC_v1.1_300MeV.trg
Beam current	67 nA	79.9 nA
Electron trigger rate	29.2 kHz	21.5 kHz
Faraday cup trigger rate (no prescale)	57.0 kHz	68.6 kHz
FC prescale	129	129
Faraday trigger rate	0.23 kHz	0.53 kHz
Total trigger rate (with prescale)	29.4 kHz	22.0 kHz
Data rate	620 MB/s	520 MB/s
Live time	90.9%	93.4%

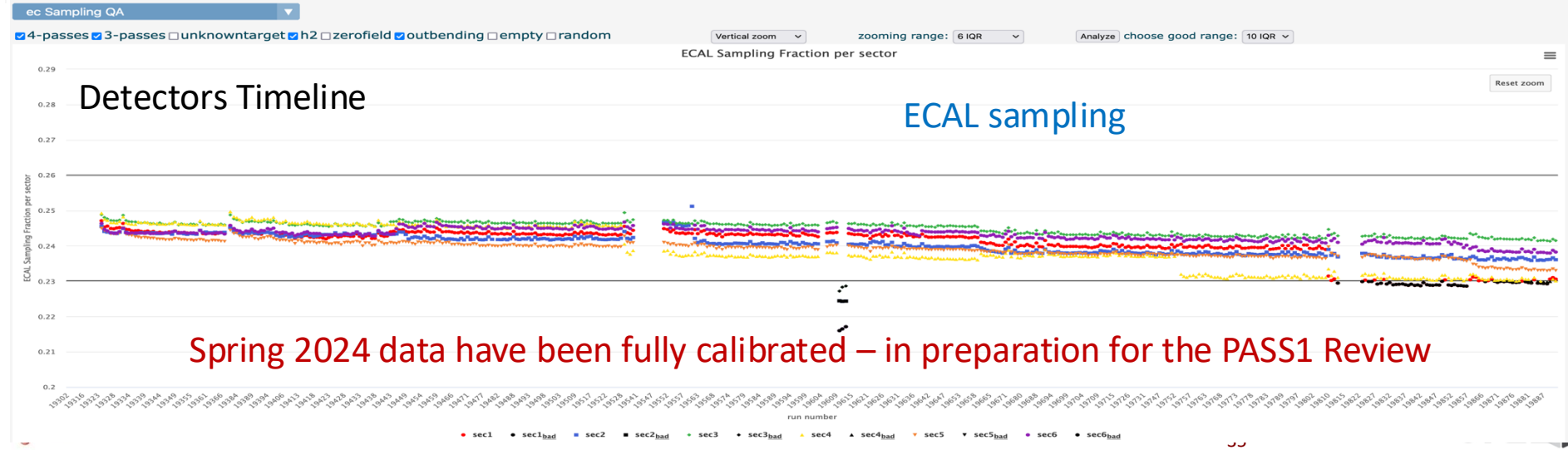


Optimized trigger was chosen: no DC roads, PCAL+ECAL threshold at 300 MeV, 2 μs holdoff time

Trigger rates: 30 kHz @ 6.4 GeV and 20 kHz @8.5 GeV – Live times > 90%

RG-K Production – on-line timelines

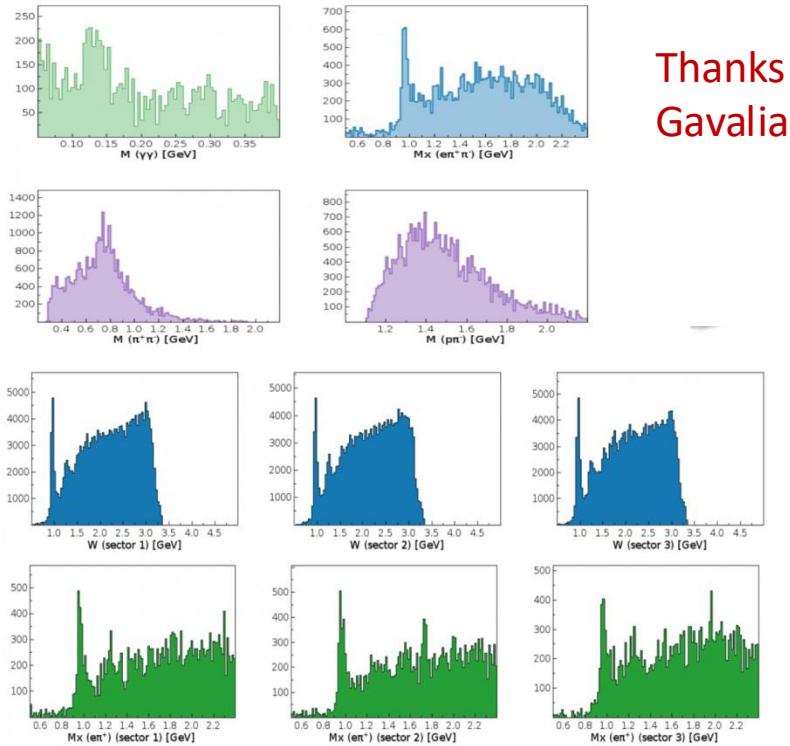




Spring 2024 data have been fully calibrated – in preparation for the PASS1 Review

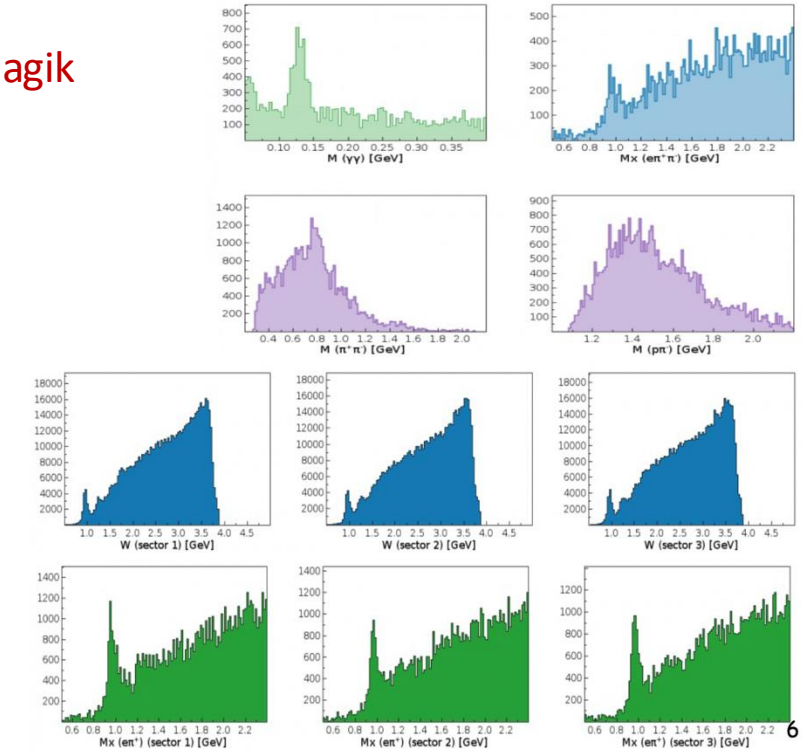
RG-K Production – on-line reconstruction

6394.63 MeV



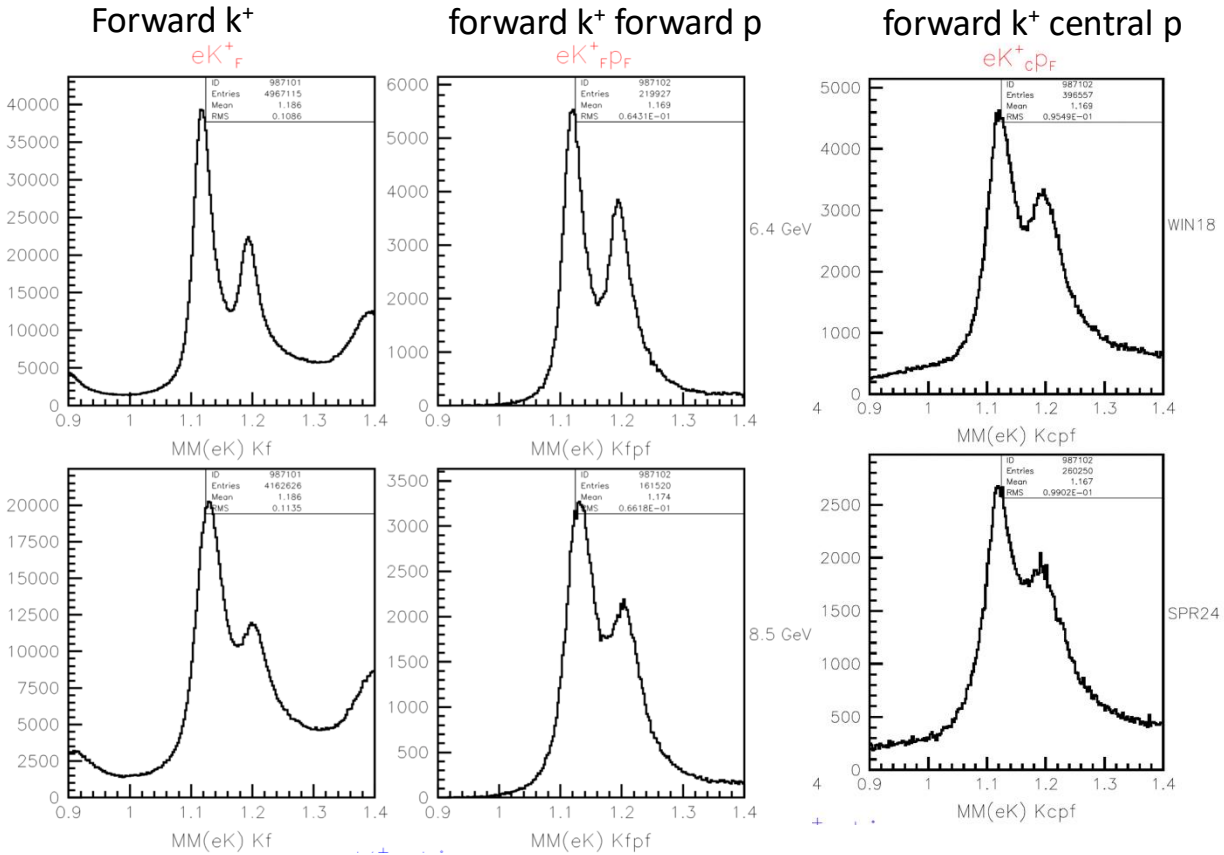
Thanks to Gagik Gavalian !

8477.57 MeV



6

RG-K Production – KY Data analysis



Comparison of 10 cooked files

E= 6.4 GeV

E= 8.5 GeV

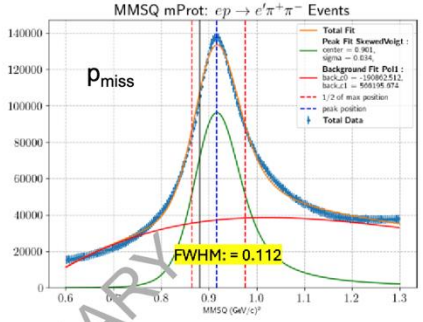
By: Dan Carman

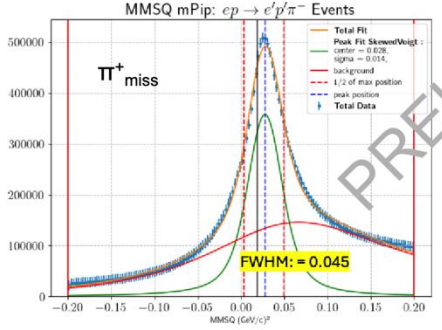
RG-K Production – on-line Data analysis

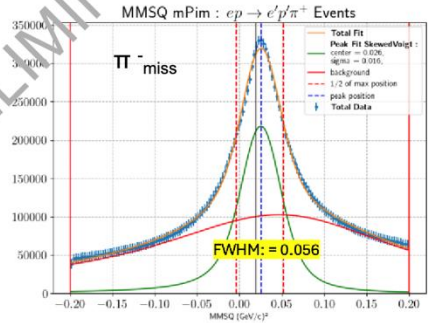
- 6.394 GeV
- 10 runs
- online calib/align

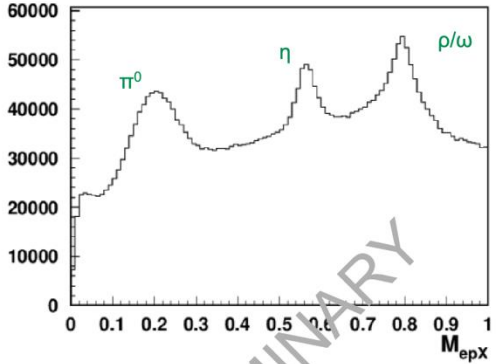
2π Analysis

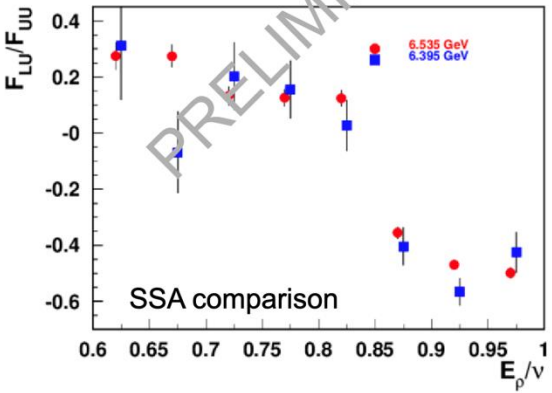
[Krishna Neupane]











Harut Havakian

RG-K Workforce

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Data Chef:
Lucilla Lanza

Run Coordinators:
Bill Briscoe
Dan Carman
Axel Schmidt
Susan Schadmand

Thanks to the Hall-B scientific staff
Thanks to all the Hall-B Engineers and Technicians
Thanks to all the Shift Takers

Thanks to the PD: Daniel Carman