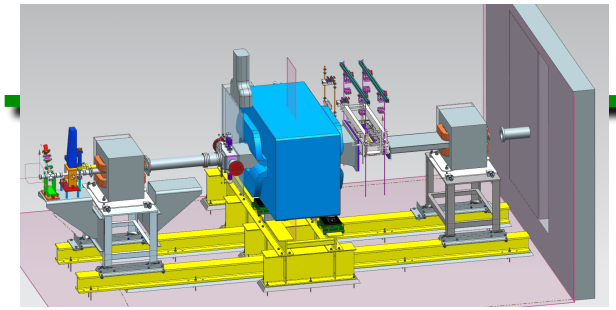
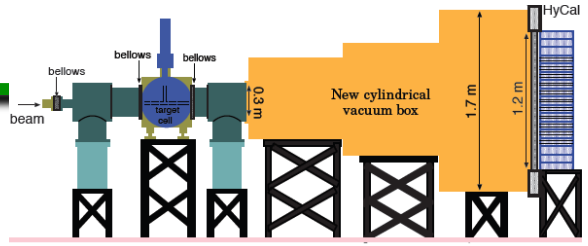
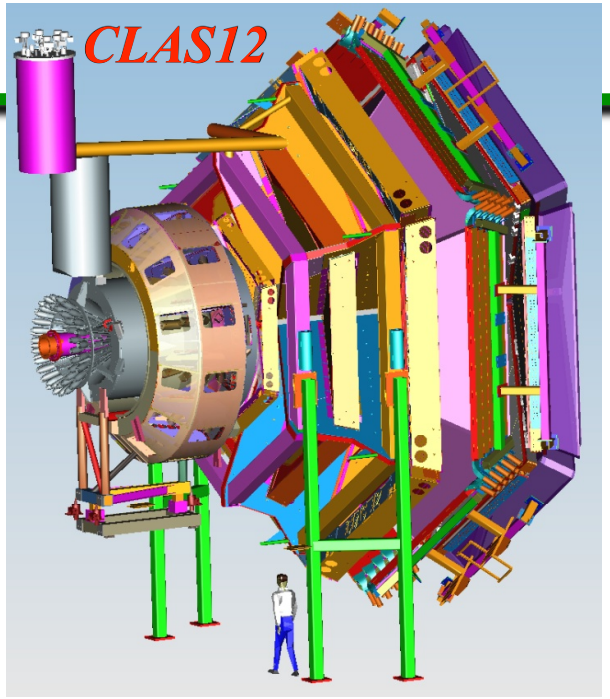






Status of Hall B

Volker D. Burkert

CLAS Collaboration Meeting
June 13 - 16 , 2017

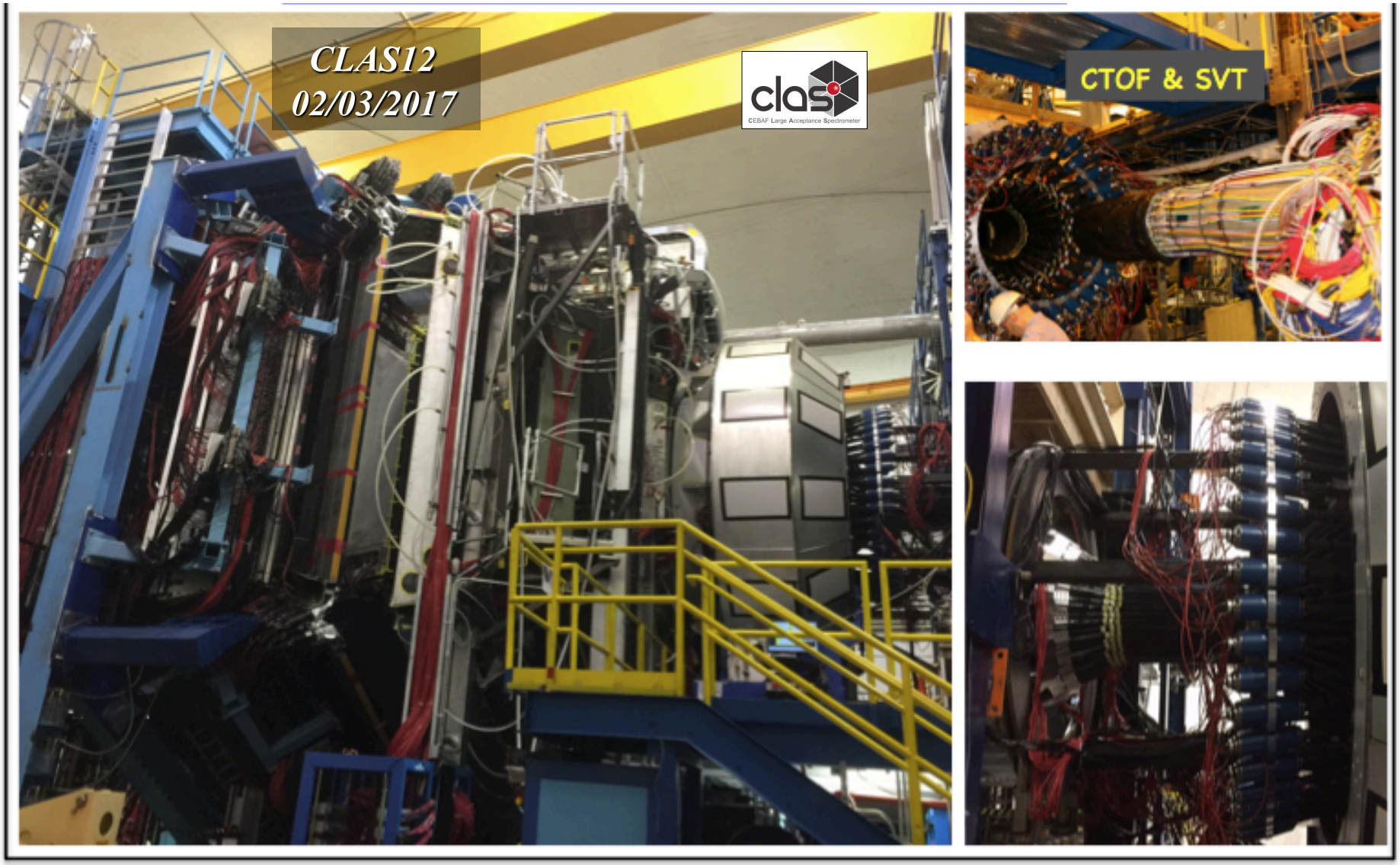
Jefferson Lab
Exploring the Nature of Matter

clas
CEBAF Large Acceptance Spectrometer

Hall B Overview

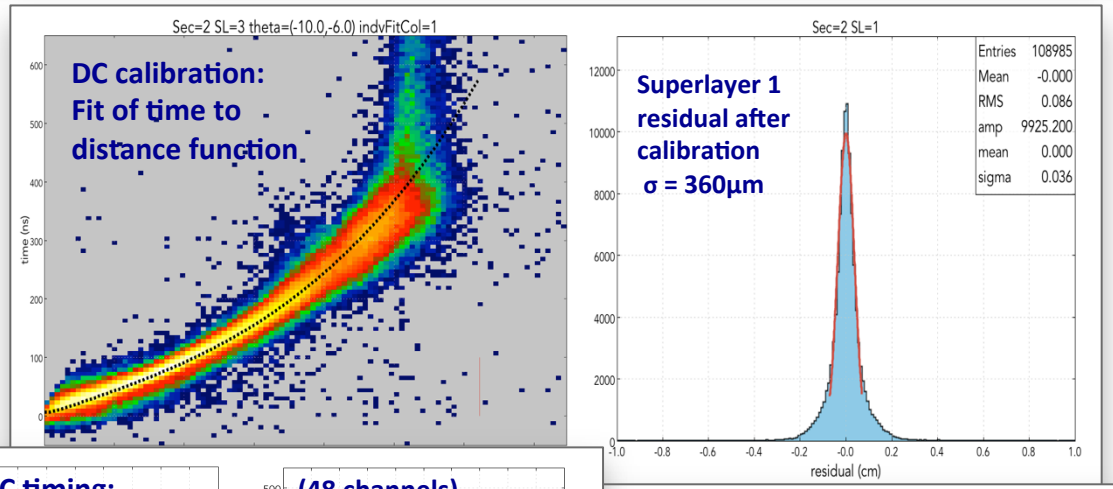
- **112 collaboration members registered, ~75% are on-site, ~25% remote links**
- **12 GeV upgrade project nearly complete, CD4B granted for all but solenoid magnet.**
  - Solenoid magnet – shipping to JLab scheduled for June 28.
- **The KPP run data afforded a vigorous detector calibration program**
  - Event reconstruction, calibration/commissioning effort making excellent progress using data from KPP and cosmic ray data
- **CLAS12 upgrades with collaboration driven equipment**
  - MicroMegas (BMT, FMT) trackers completed and integrated with SVT, Central Neutron Detector, Forward Tagger preparing installation, RICH in assembly stage
- **Solid flow of PhD theses, publications in refereed journals and conference talks**
  - The first **PRL** from the G14 run (HDIce) has been published
  - **189** science papers + **39** technical papers published in refereed journals
  - Many entrances in recent RPP (PDG) editions based on CLAS data (e.g. N*'s)
  - **>2,075** talks at conference (**>1250** invited)
  - **172** PhD theses completed on CLAS results (**37** in progress)
- **Non-CLAS experiments**
  - **Proton Radius experiment** – 2016 completed, analysis ongoing
  - **Heavy Photon Search** – 2015 bump hunt results presented in JLab seminar
- **CLAS12 engineering & physics runs** scheduled for October – December 2017
  - Internal "readiness for science" review planned for September
- **Division rules for publications, detector work, ERR**

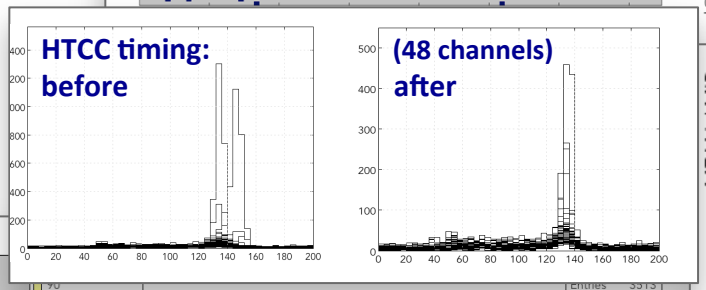
KPP-Equipment

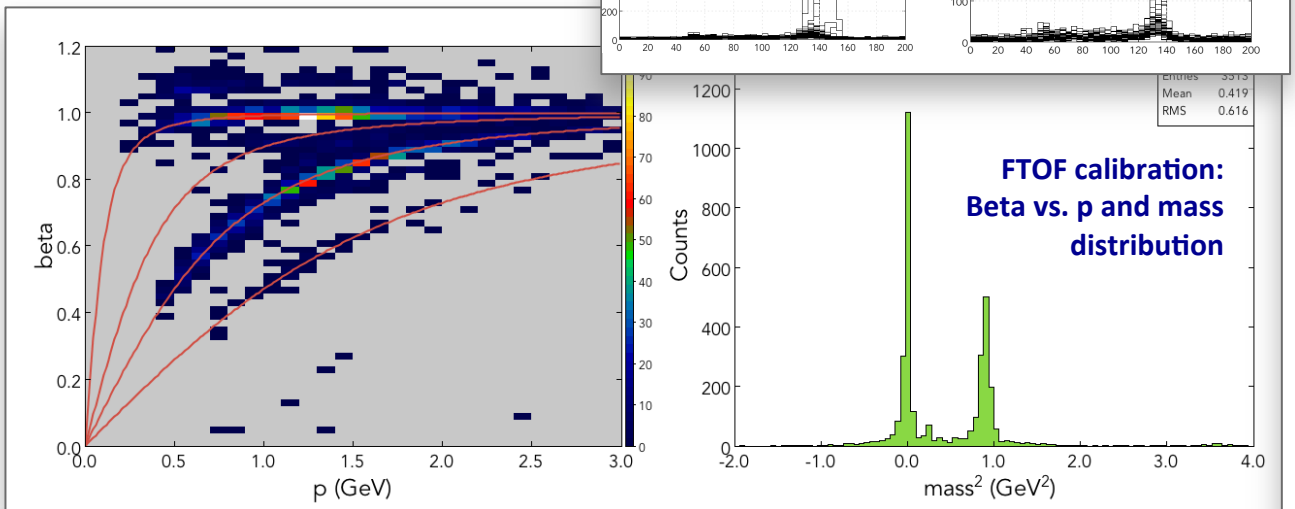


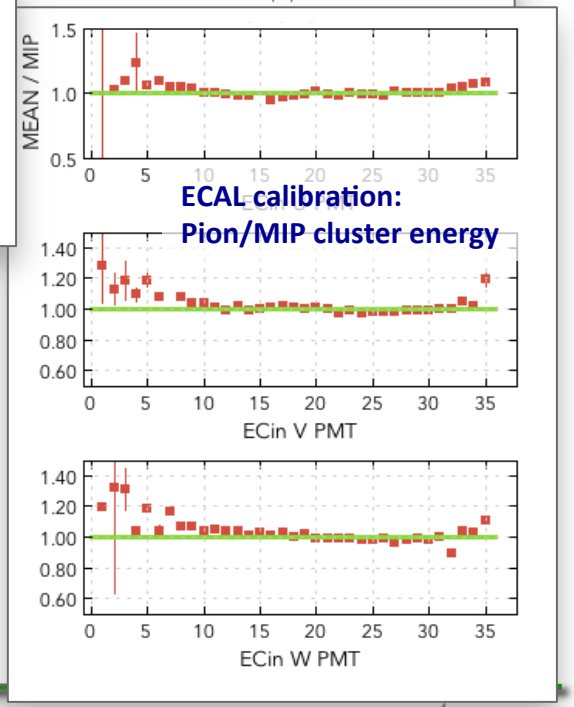
CLAS12 Calibration of KPP Data

- **Continuous progress on KPP data calibration for all detectors:**
  - **DC** calibration step sequence developed and implemented, now under test
  - **HTCC** calibration extended to include timing
  - **ECAL** cosmic gain calibration cross checked with pions, timing calibration started
  - Full calibration of **FTOF** done, improvements to reach ultimate resolution in progress









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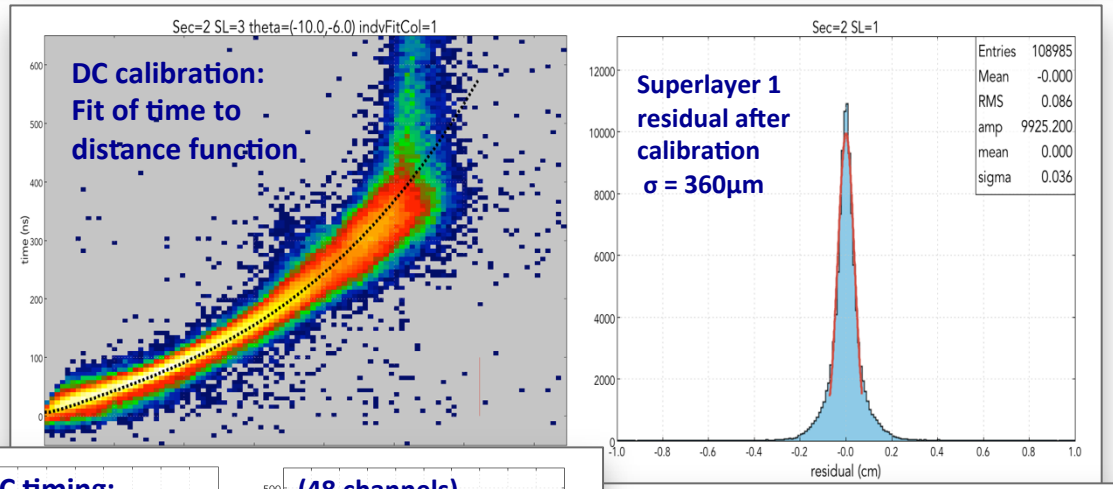
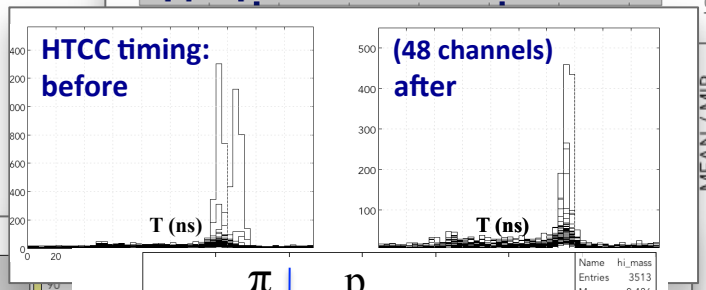
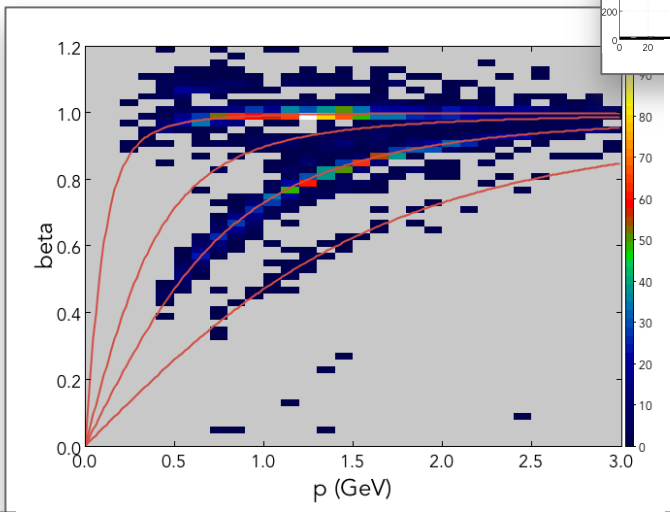
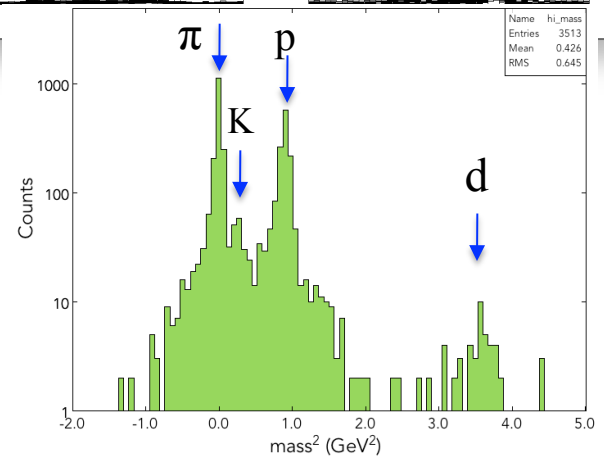
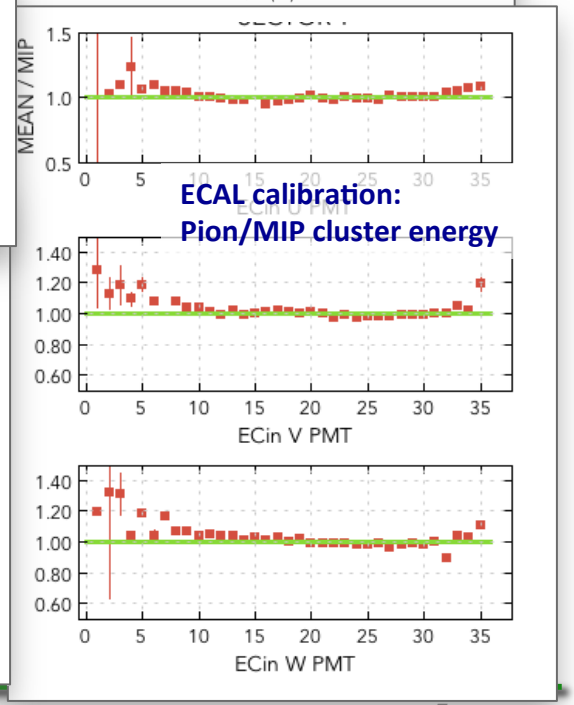








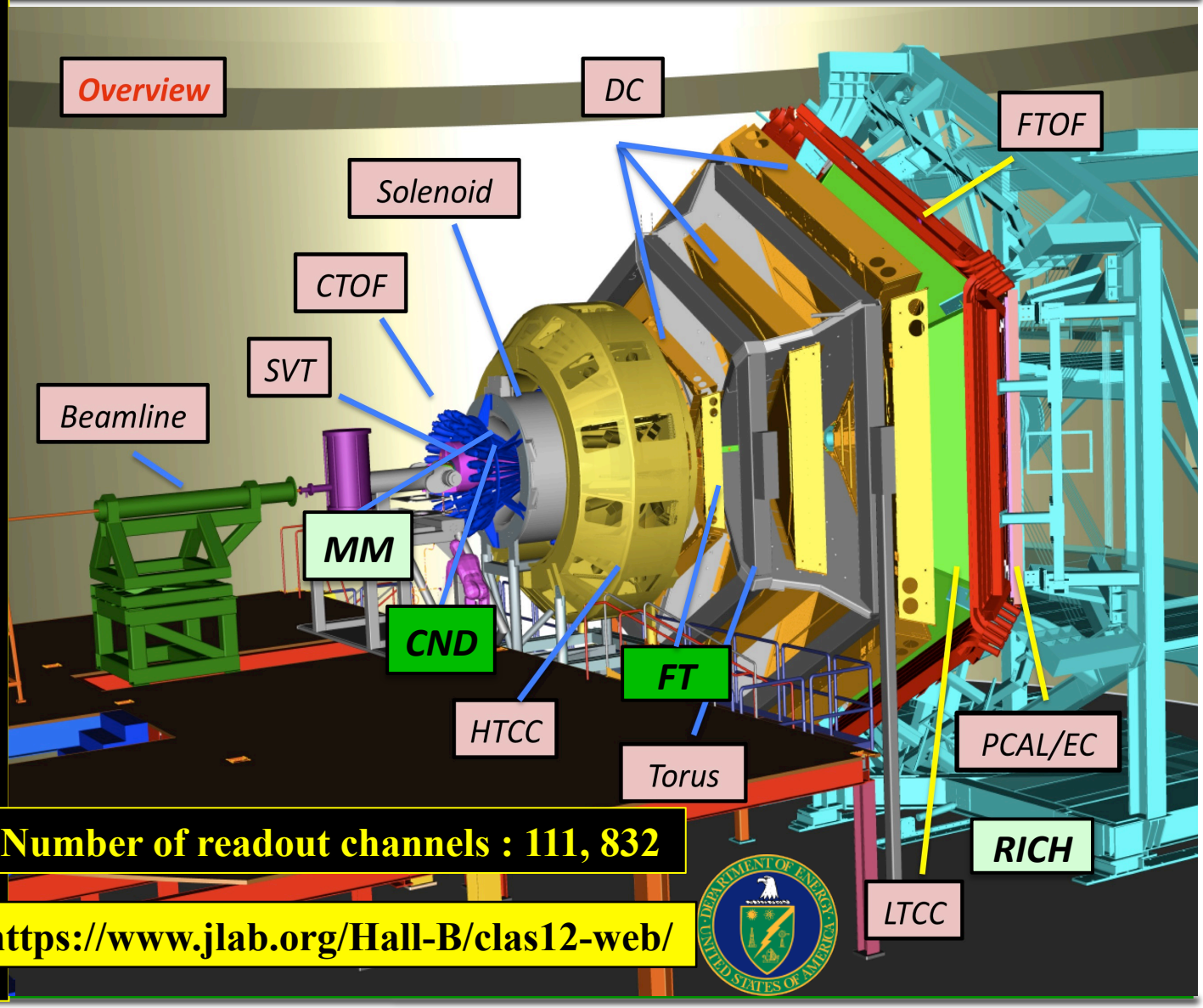


CLAS12 Equipment HALL B

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

Central Detector (CD)
- Solenoid magnet
- Silicon Vertex Tracker
- Central Time-of-Flight
- Central Neutron Det.
- MicroMegas

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



Number of readout channels : 111, 832

https://www.jlab.org/Hall-B/clas12-web/

CLAS12 Equipment HALL B

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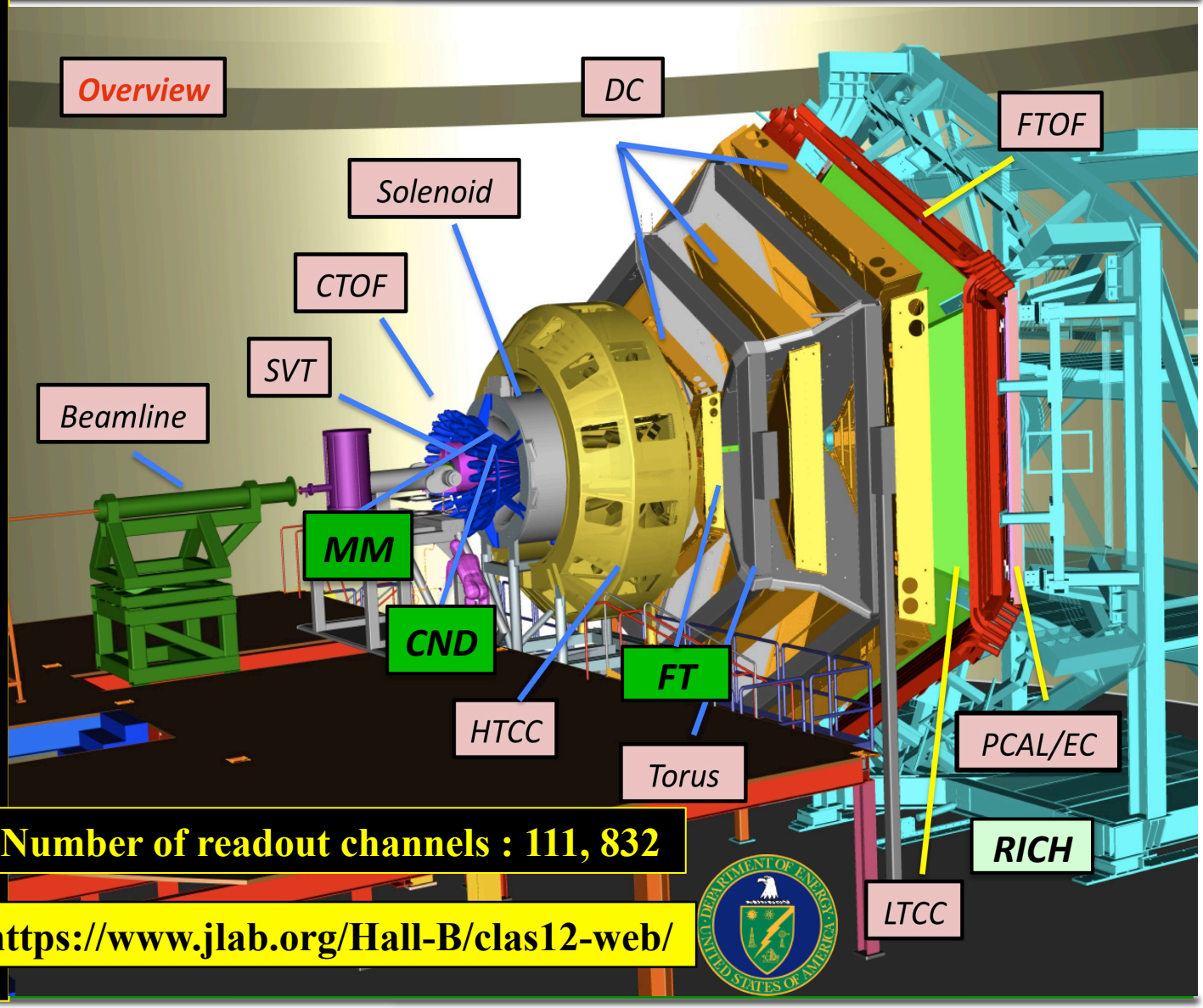

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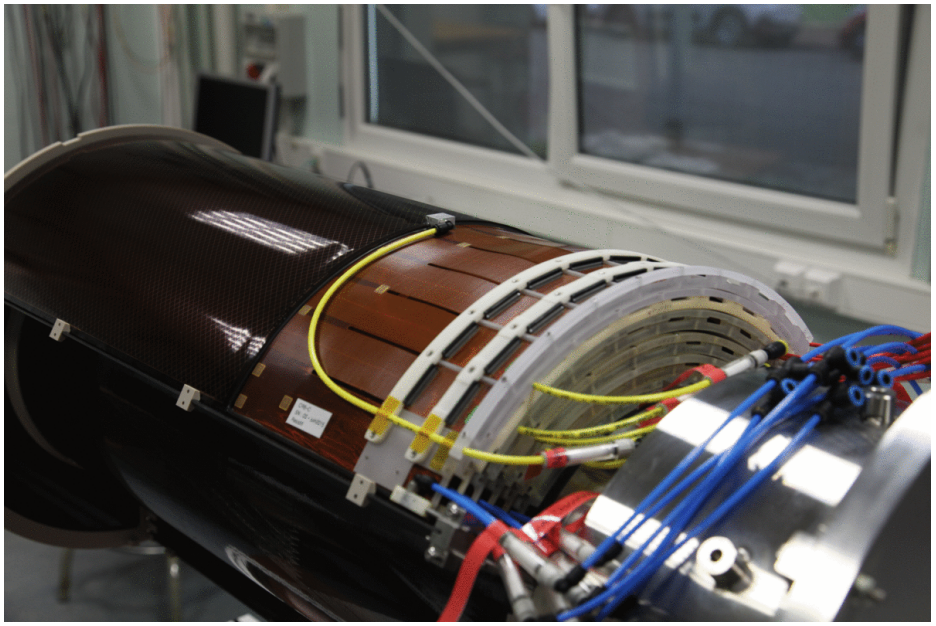
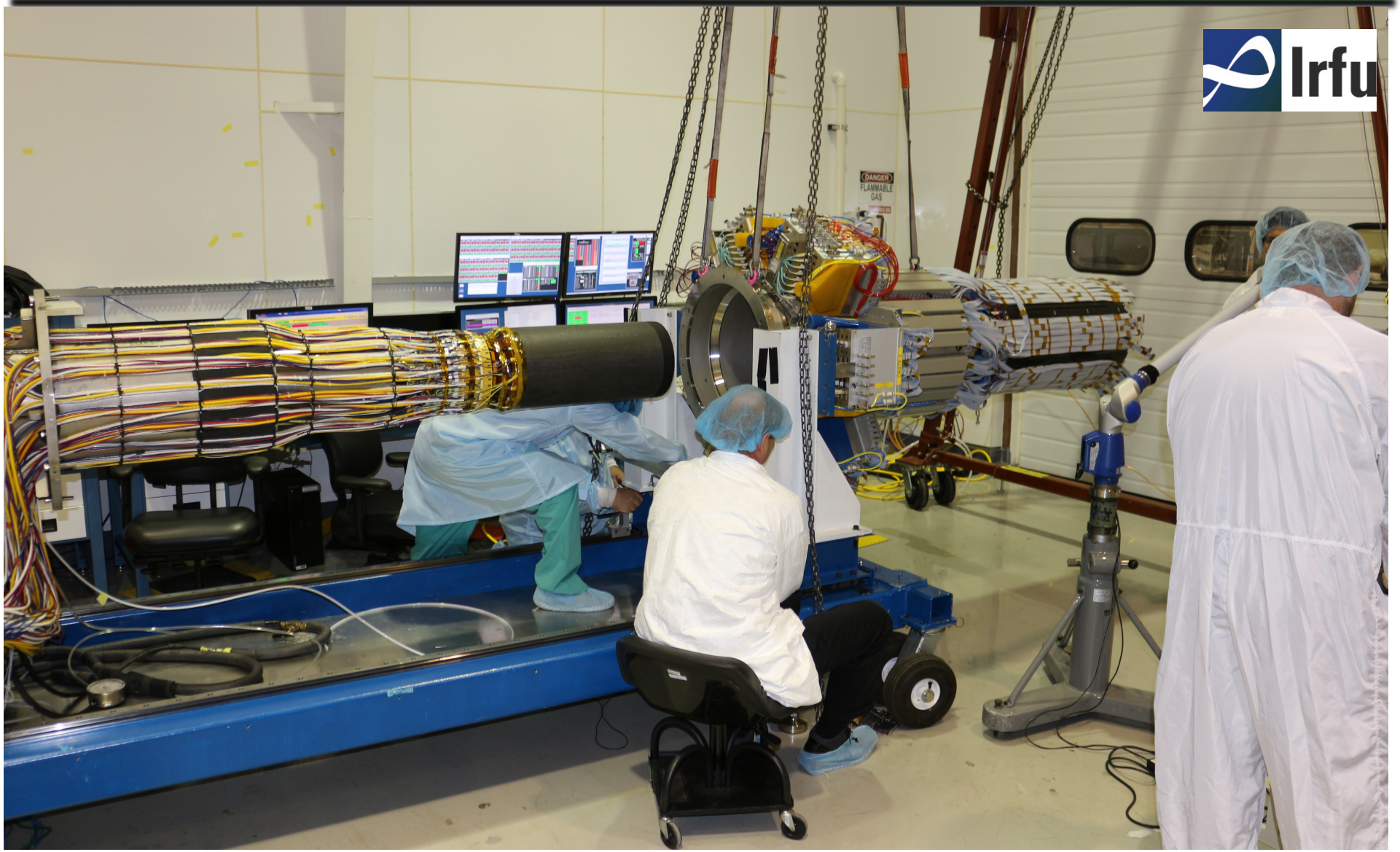
Micromegas Vertex Tracker



BMT assembled in the EEL by CEA Saclay

MVT fully assembled in the EEL by CEA Saclay

CLAS12 Integration BMT + SVT



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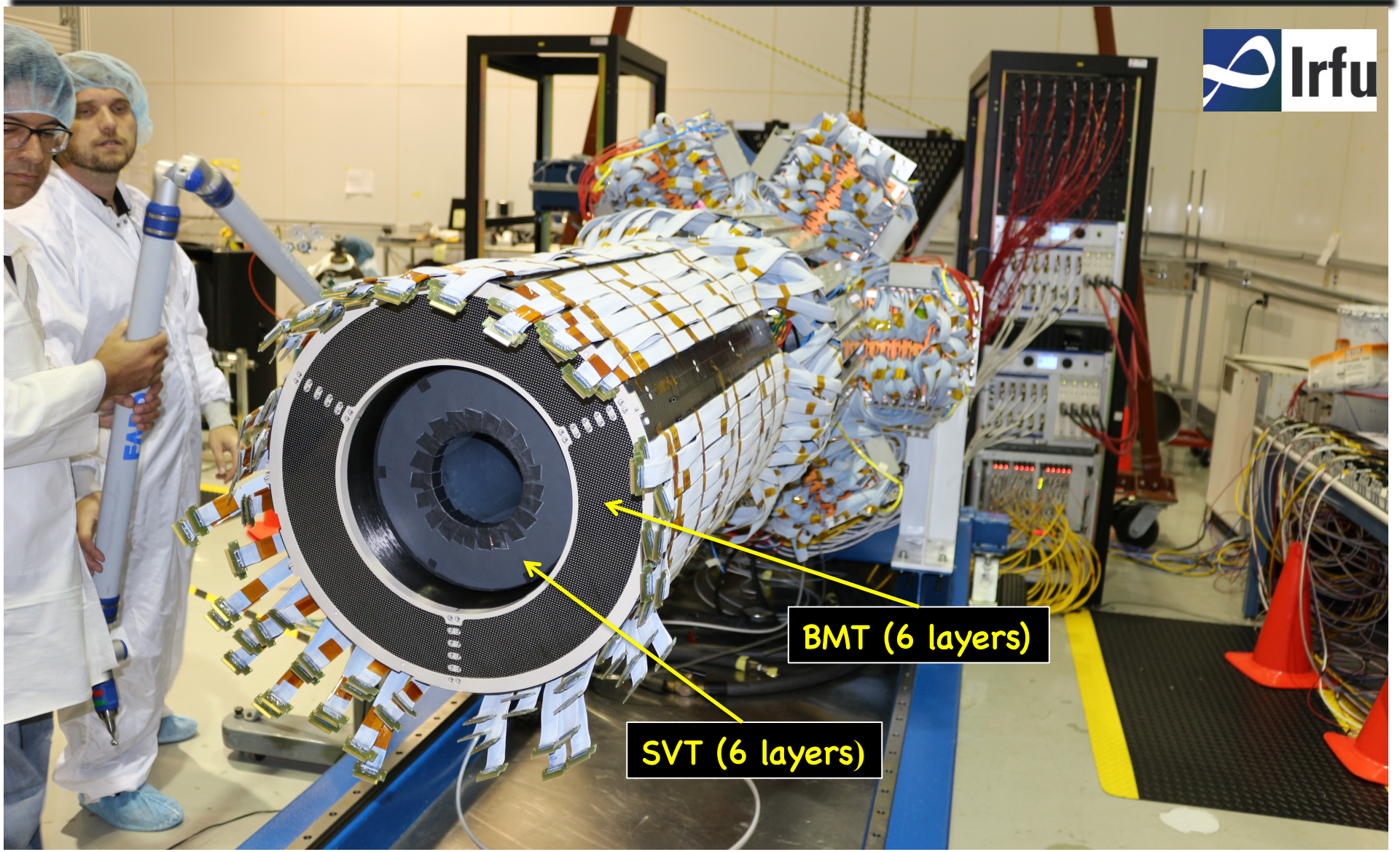
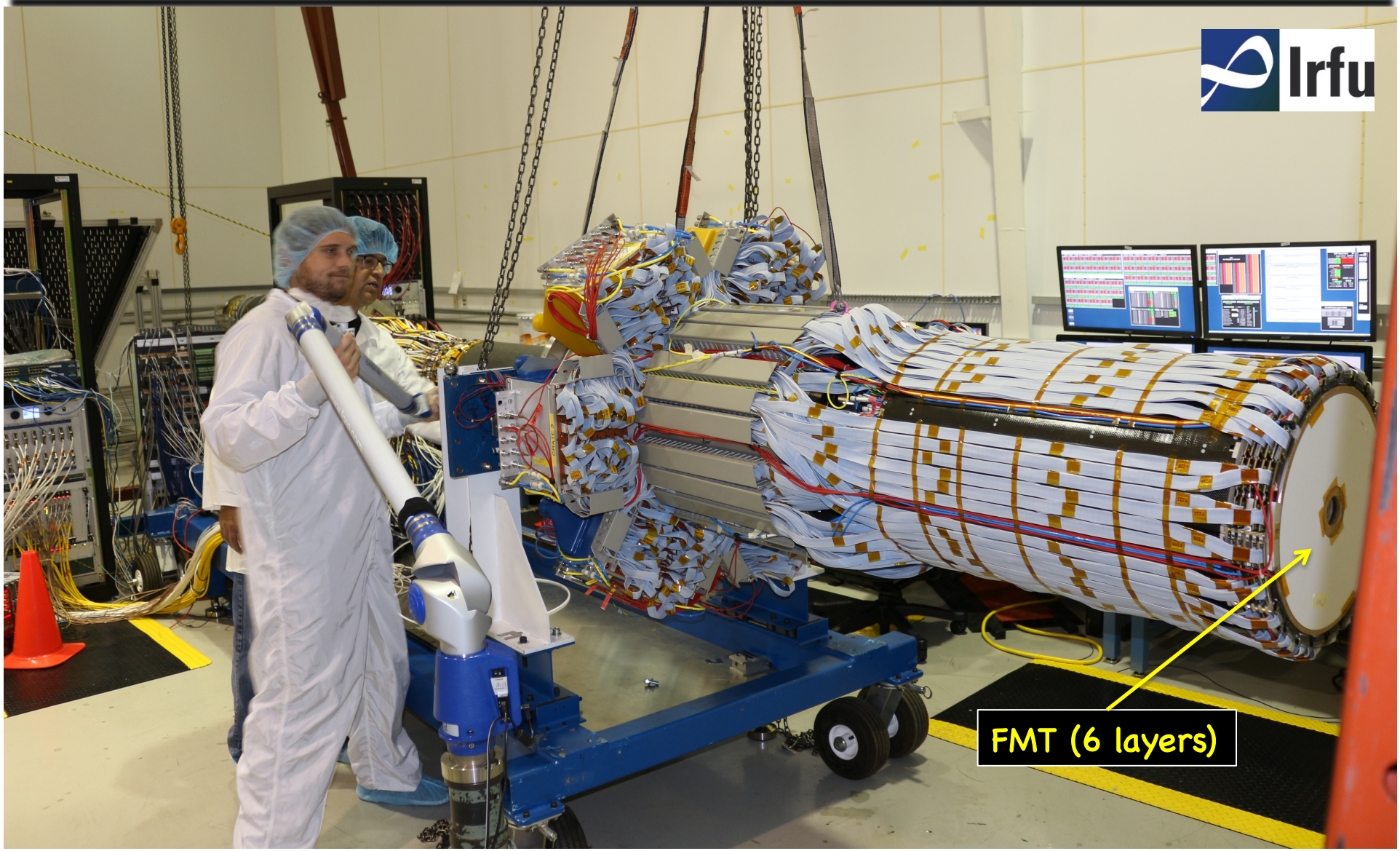
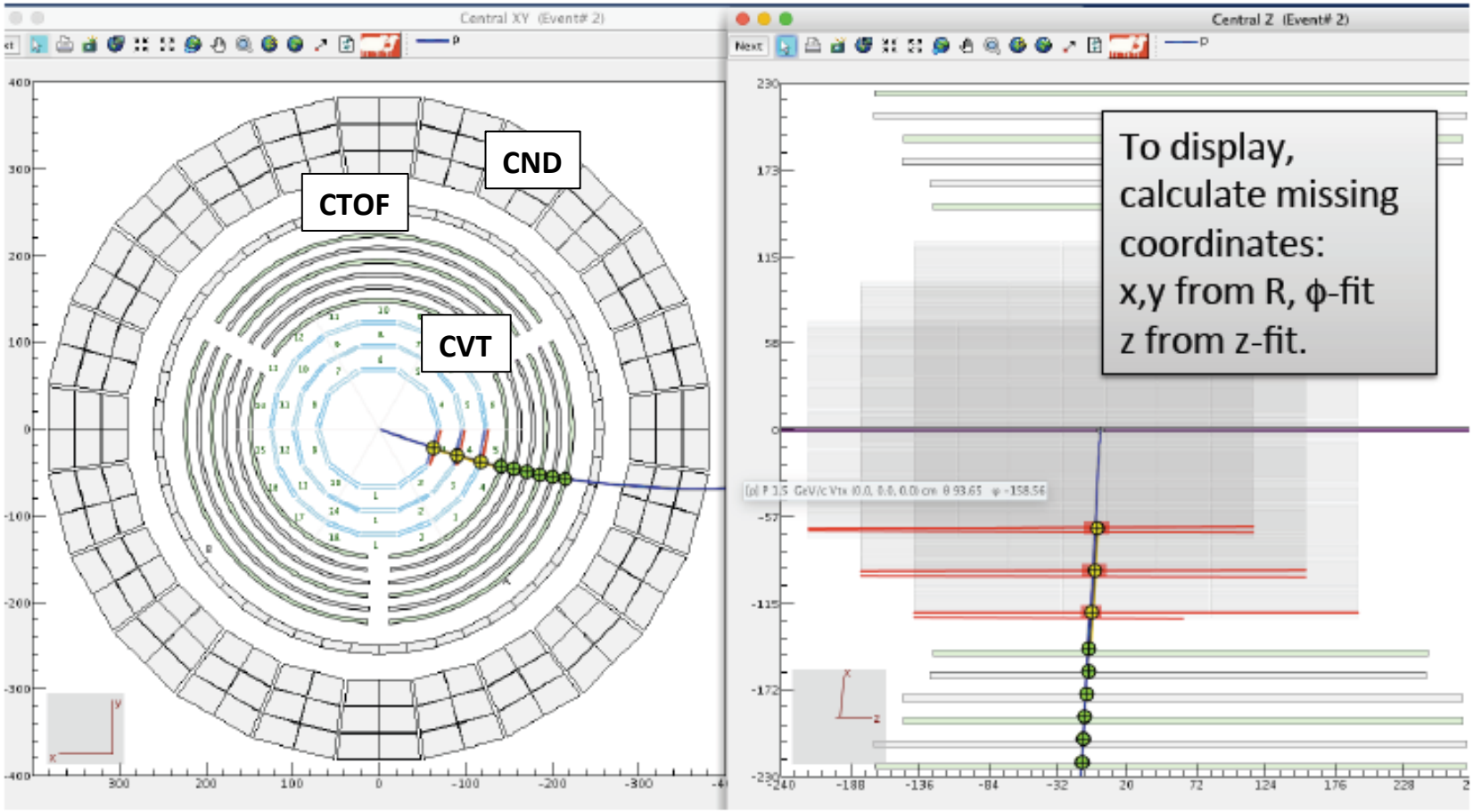


CLAS12 CVT (SVT + BMT + FMT)



Tracking in full CVT

Single Track within full acceptance of SVT & BMT



CLAS12 Central Neutron Detector

IPN ORSAY

Recent achievements:

- Construction completed
- Detector at JLab (ESB building) since 6/2015
- HV calibrations of PMTs completed
- Cosmic data analysis: σ_t ~150 ps for all blocks
- Assembly in mechanical structure done in Orsay
- Cosmic rays tests at JLab confirmed σ_t
- June 2016: Ancillary Equipment ERR

- Calibration, monitoring, simulation and reconstruction software 90% complete
- GEMC digitization undergoing improvements

Schedule for 2017:

- Installation in the CD after solenoid magnet commissioning (09 '17)

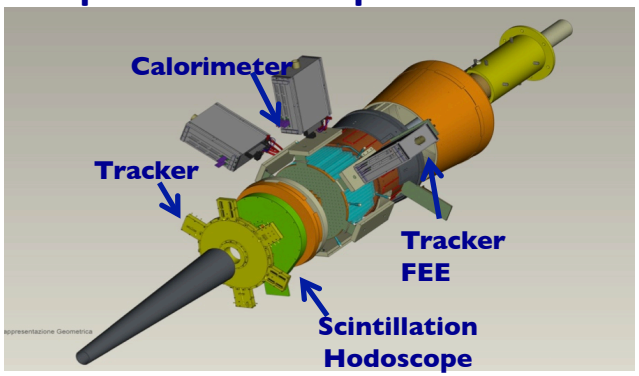
Forward Tagger (FT)

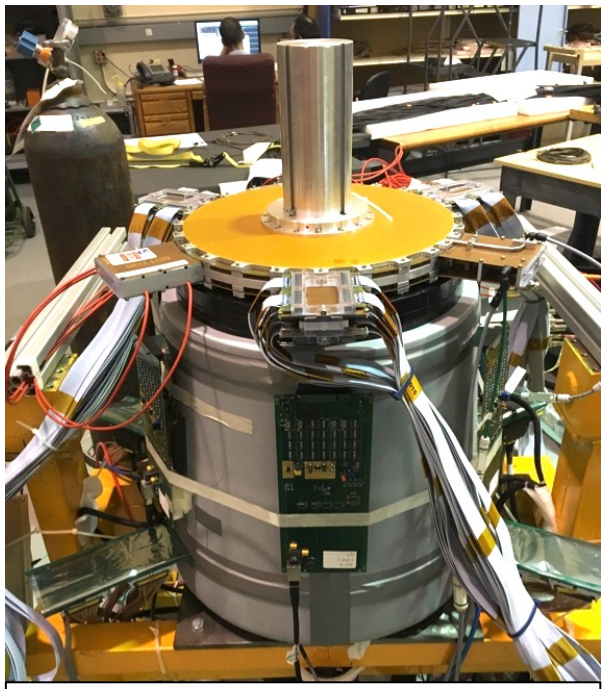
Detect electrons at small angle to perform quasi-real photo-production experiments.

Calorimeter: electron energy/momentum
- Photon energy (ν=E-E'), Polarization $\varepsilon^{-1} \approx 1 + \nu^2/2EE'$
- $PbWO_4$ crystals with APD/SiPM readout

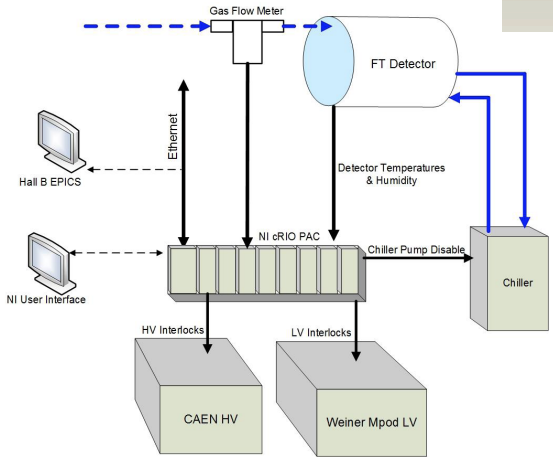
Scintillation Hodoscope: veto for photons, Scintillator tiles with WLS

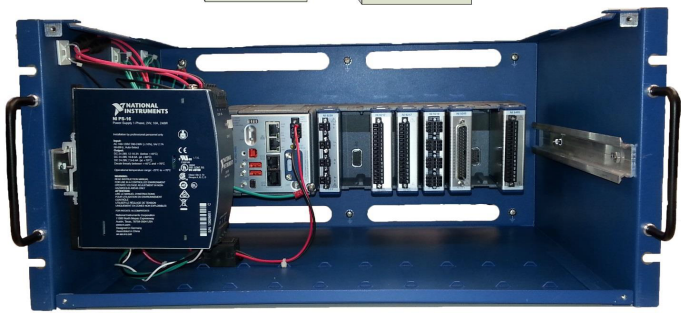
Tracker: electron angles, polarization plane, MicroMegas detectors





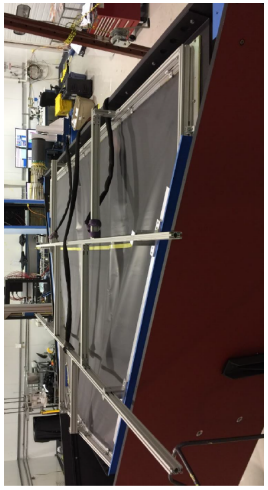
FT-Cal+FT-Hodo+FT-Trck cosmic test at JLab



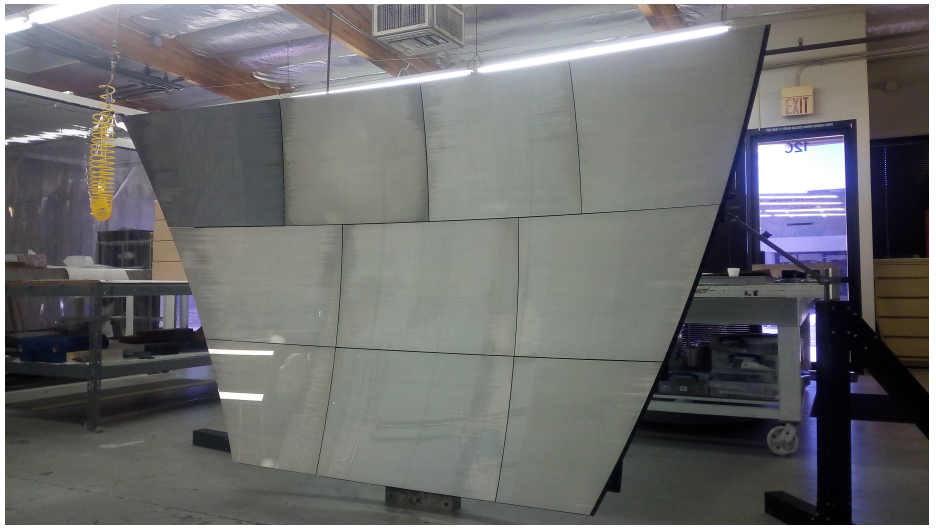


- Hardware interlocks installed and tested
- All ERR comments implemented
- FT-Cal final assembly and sealing in May
- FT checkout in June
- Installation in CLAS12 in July
- Implementation readout w/ CLAS12 DAQ in summer
- FT ready for CLAS12 fall engineering run

Mechanical structure
- Mechanical structure ready
- Exit panel completed and assembled

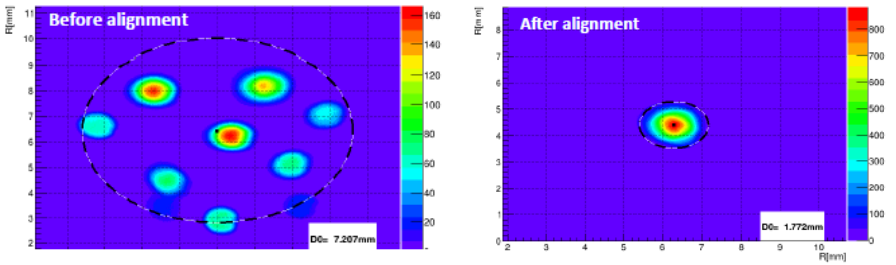


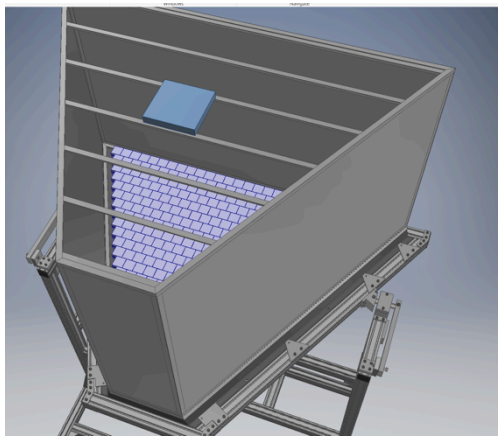
Spherical mirrors
- Support completed
- Alignment test successful
- Mirrors sent for coating

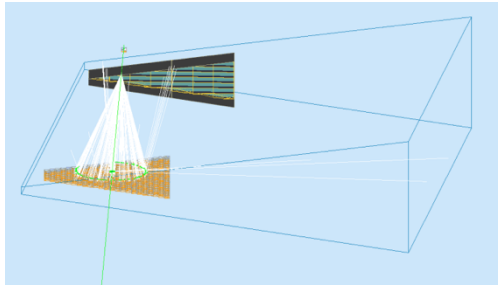


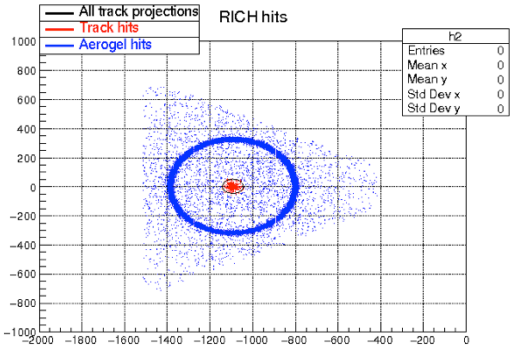
Aerogel
- Production of 3 cm: minimal quantity achieved
- Production of 2 cm: expect completion early August
- First assembly test performed Safe rotations up to 100°

On-line monitor of alignment procedure







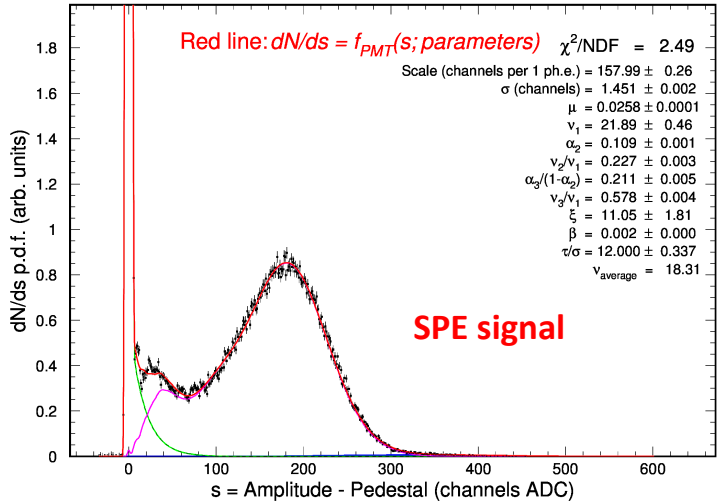


Cosmic runs (in preparation)

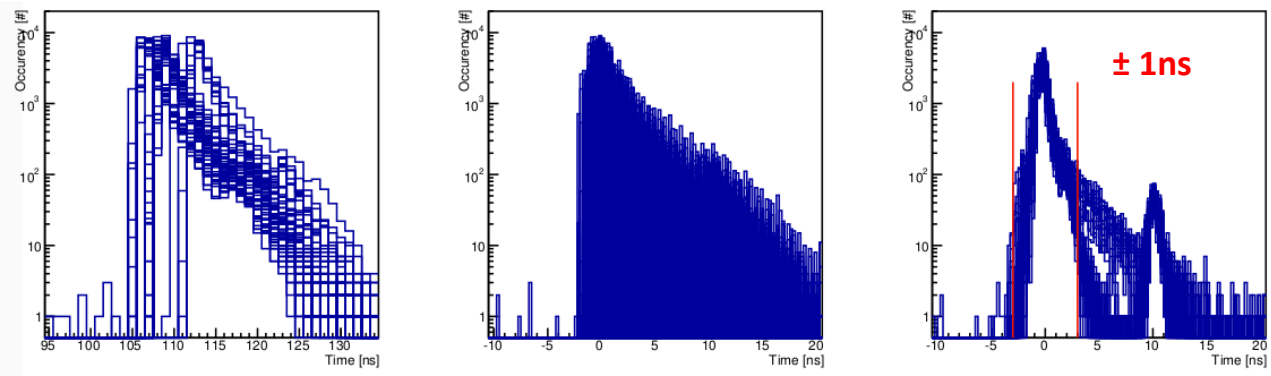
- Light tight box
- Full DAQ chain
- GEMC simulations
- Java reconstruction

Electronics:

- FE Electronics production done
- Characterization ongoing



Channel by channel time calibration

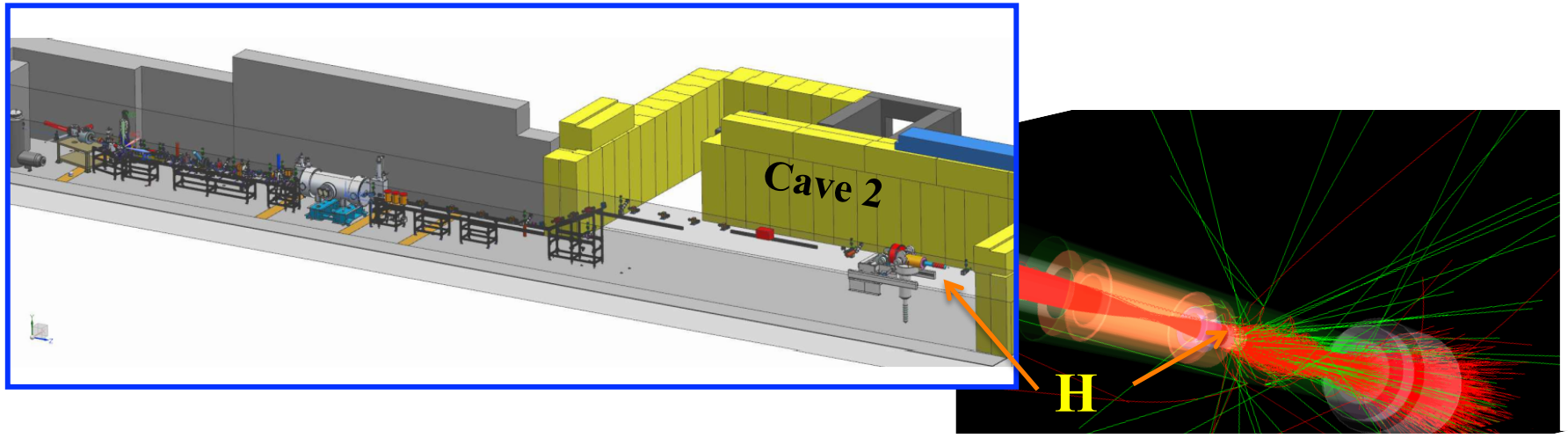


On schedule for the installation in Hall B in September 2017

e + transverse $\vec{H}$D

UITF ⇔ 10 MeV accelerator in the TestLab

- energy deposition in HD similar to 10 GeV
  ⇔ testbed for transverse e+HD
- progressing with budget-limited schedule
  - Cave 1 section nearly complete; keV beams ≈Sept/17
  - MeV beams in Cave 2 ≈Mar/18
  - HD tests with beam start ≈May/18



Preparations for Fall Runs

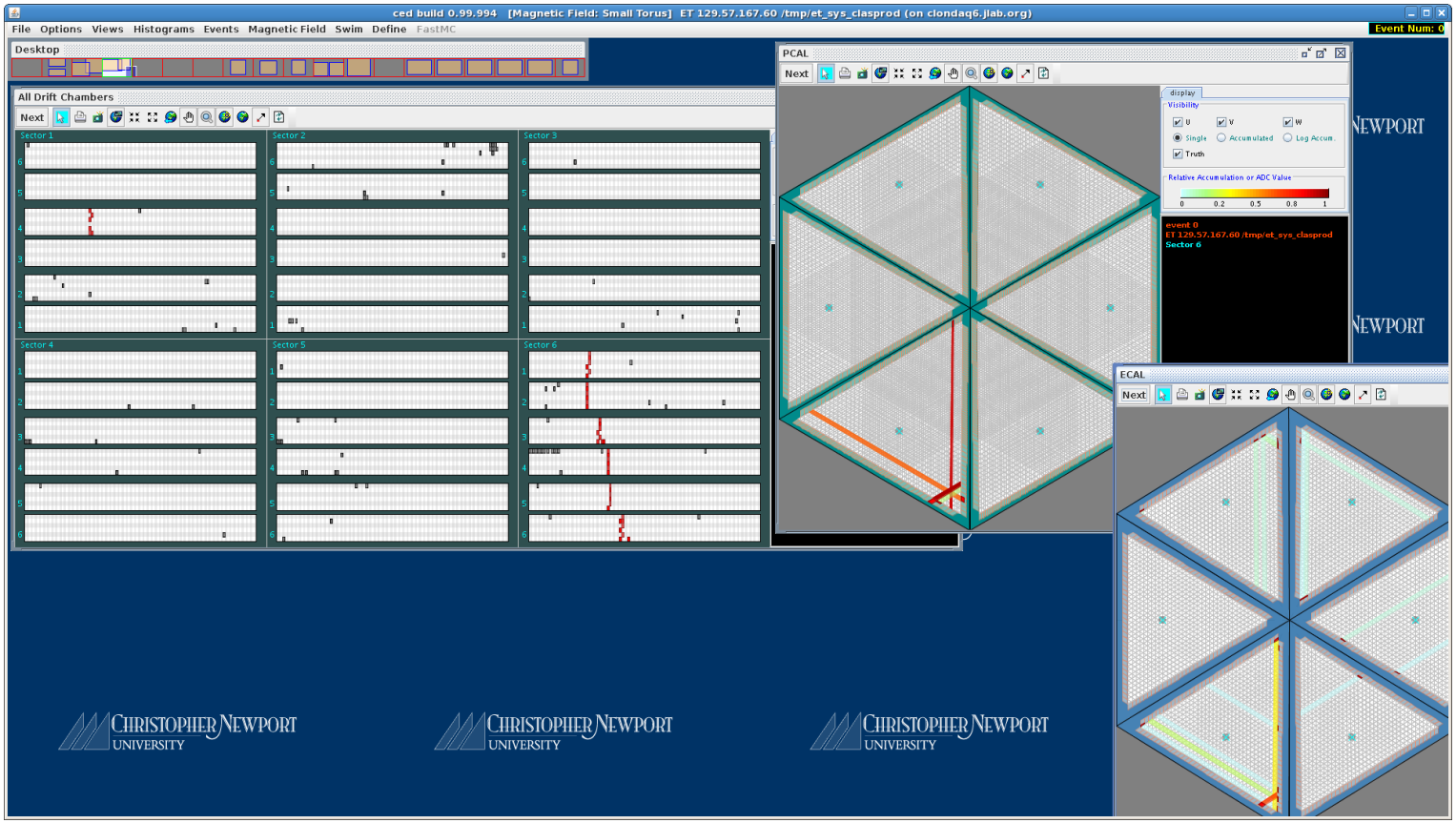
- Complete KPP data calibration

- Cosmic ray test with full complement of forward detectors
  - Checkout all 18 drift chambers (all 6 sectors) for noise levels
  - Measure tracking efficiencies for minimum ionizing particles
  - Test special triggers for engineering run and physics runs
    - Calorimeter pixel triggers for cosmic ray calibration of calorimeters and 6/5 superlayer reconstruction
    - Tracking triggers in DCs (DCRB) and hits in FTOF, PCAL and EC
  - Train reconstruction software on real events in all 6 sectors and 3 regions

- Plan on internal "Ready for Science" review in September
  - Status of all detectors, calibrations, reconstruction, particle ID, …
  - Full event reconstruction in FD and CD and correlations
  - Acceptances for several reactions, impact of background occupancies
  - "Online" calibration procedures
  - Documentation
  - Identified lead teams

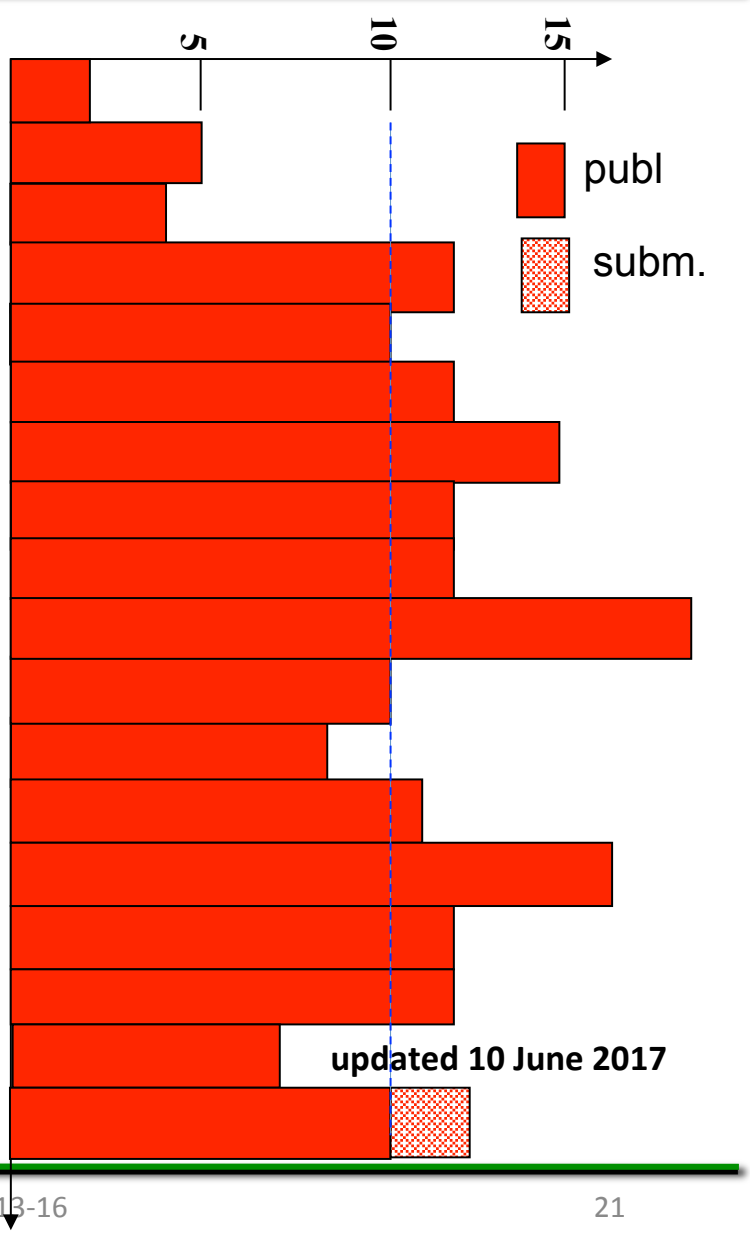
Cosmic Ray in DCs

- Cosmic ray commissioning of drift chamber system
  - Develop suitable trigger with EC & PCAL to select cosmic rays pointing towards (virtual) target & tracking trigger
  - Test DC & DCRB performance in quasi realistic conditions (w/o beam)



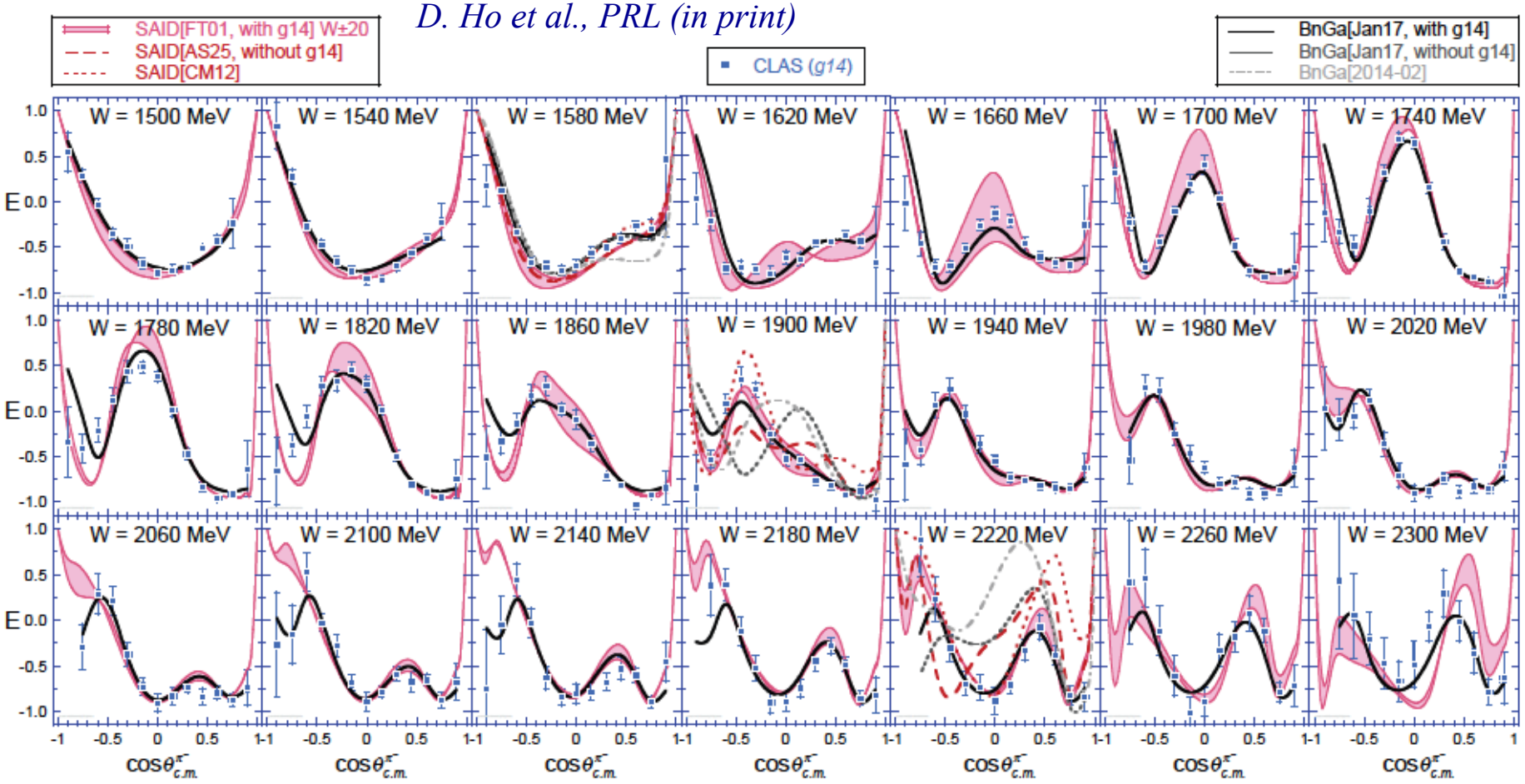
Hall B Physics Publications in refereed Journals

	HSWG	DPWG	NPWG	ALL
2000	-	1	1	2
2001	2	3	-	5
2002	3	-	1	4
2003	7	4	1	12
2004	3	3	4	10
2005	7	3	2	12
2006	8	4	3	15
2007	7	2	3	12
2008	4	6	2	12
2009	8	7	4	19
2010	4	2	4	10
2011	3	1	4	8
2012	6	3	2	11
2013	8	6	2	16
2014	5	6	1	12
2015	4	5	3	12
2016	7	-	-	7
2017	4+2	6		10+2
SUM	90+2	62	37	189+2



First E asymmetry on neutrons

D. Ho et al., PRL (in print)



Neutron asymmetry data led to revision of photocoupling amplitudes, and indication of a 1* state N(2040)3/2⁺.

PRad Analysis Status

HALL B

ep elastic scattering cross section

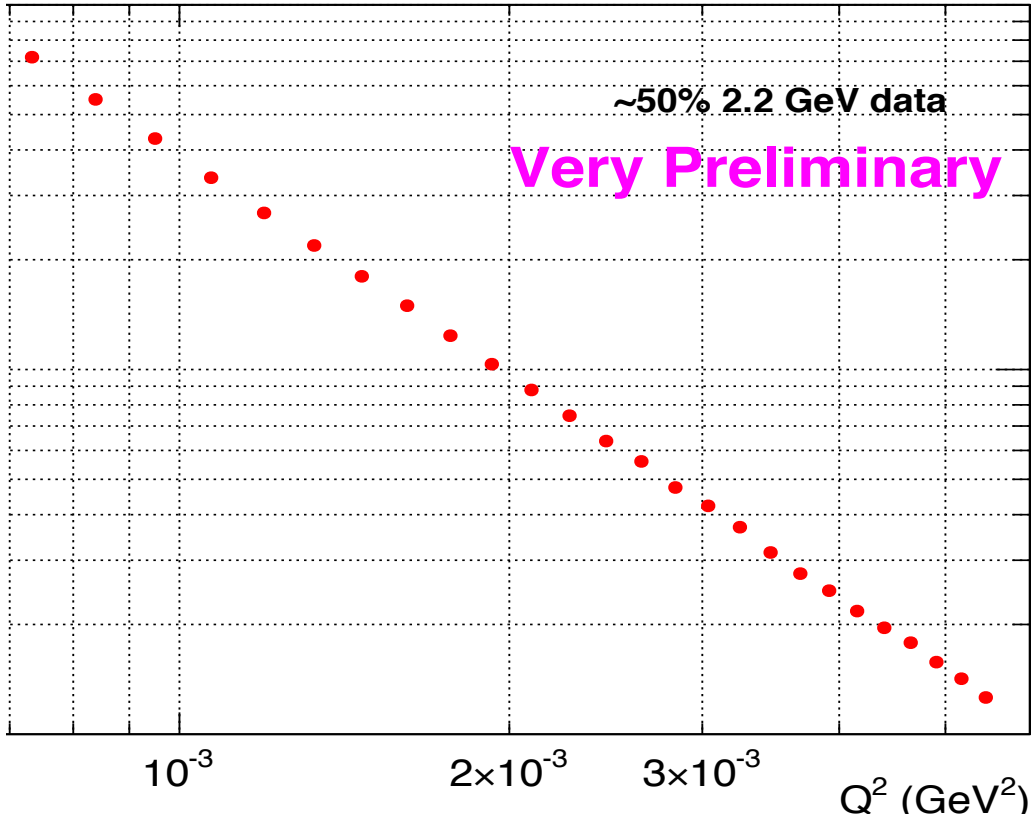
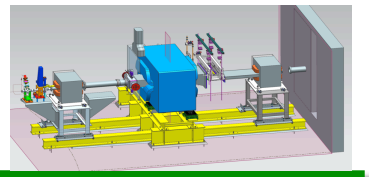


Fig. 1 Extracted diff. cross section vs. scattered angle, for 2.2 GeV incident beam energy (Very Preliminary). Statistical errors are ~ 0.2% per point. Systematic errors at this stage are estimated to be on 4 % level.

Heavy Photon Search

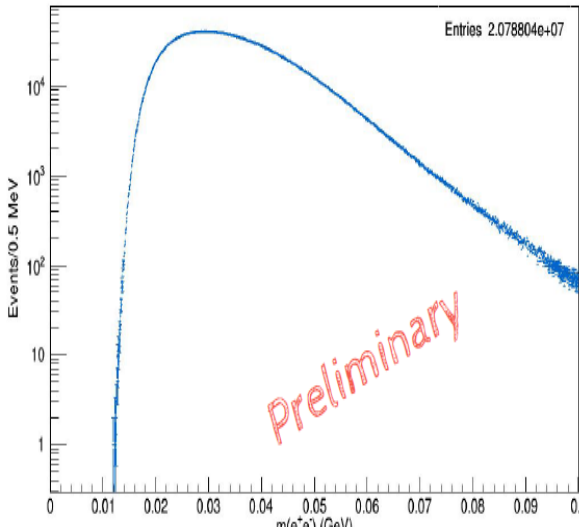


- HPS searches for an electro-produced hidden sector photon (A') decaying to e^+e^- pairs
- A's could mediate dark matter annihilations and interactions with *our* matter
- HPS identifies A's with invariant mass and separated vertices

Data Taken: Engineering runs at 1.05 (1.7 days) and 2.3 (5 days) GeV

First Results from 2015 Engineering Run at 1.05 GeV

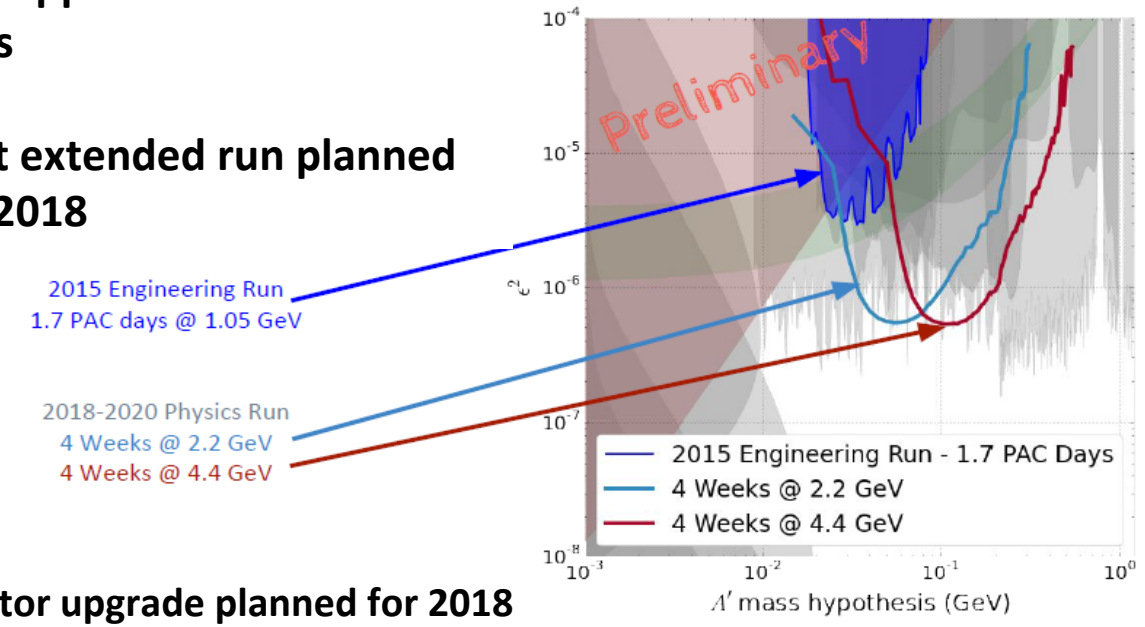
- Bump Hunt Results announced at JLAB Seminar : No signal; region excluded
- e+e- Invariant Mass



HPS approved for 180 PAC days

First extended run planned for 2018

Exclusion Region



Detector upgrade planned for 2018

PAC45 – Hall B Proposed Experiments

Proposals	Physics Topic	Contact	Days
PR12-17-006	Critical Neutrino-Nucleus Issues	Hen	**41**
PR12-17-009	Deuteron Charge Radius with Elastic eD Scattering	Gasparian	**39**
New RG Proposal RG-L			
PR12-17-012	Partonic Structure of Light Nuclei	Meziani	35
PR12-17-012A	Tagged EMC measurements on Light Nuclei	Dupre	45
PR12-17-012B	Spectator-Tagged DVCS on Light Nuclei	Armstrong	45
PR12-17-012C	Other Physics Opportunities w/ ALERT	Hafidi	55
Total Beam Time Requested			**55**
RG Experiment RG-A			
E12-12-001A	Near threshold J/ψ production – LHCb pentaquark	Stepanyan	
Letters of Intent			
LOI12-17-001	Study of J/ψ Photoproduction off Deuteron	Ilieva	
LOI12-17-002	Search for a ϕN bound state at Hall B	Gao	
New beam time request for Hall B Proposals:			**135**

Summary

- Data from KPP run currently employed for detector calibration & event reconstruction
- Ongoing cosmic ray tests of full 6 sector complement critical
- Ancillary detector construction finished or well advanced – on track for use in engineering run
- Preparations for the fall run are underway
- Internal "Ready for Science" review planned for September.

• CLAS data continue to deliver important science in many areas – first results from G14 run published in PRL.
• HPS experiment presents first results from 2015 low energy run. Prad presents update analysis of their 2.2GeV data (talks this afternoon).

Users: collaboration publications procedure

- Journal articles:
  - Include all collaboration members in author list
  - Include DOE acknowledgement
  - Notify kindrew@jlab.org and attach preprint

- Conference proceedings:
  - "On behalf of collaboration" – all members not required
  - DOE acknowledgement not required
  - Notify kindrew@jlab.org of proceedings

Physics Division Work Planning Requirements

- Physics Division requirements related to work planning, control and authorization for projects and test set ups in all Physics division work areas **have been updated** (https://www.jlab.org/div_dept/physics_division/phys-div-wpr.html)

- What is new?
  - Description how to write an OSP and related Task Hazard Analysis
  - OSP examples
  - List of additional resources for guidance (names/ phone numbers)

Experiment Readiness Review in a nutshell

The ERR request has to come through the Hall Leader

ERR # /When?	Need	Requirements/Outcome	What to do
N. 1: Before construction phase starts **or** existing equipment with high risk	• If the experiment includes one-of-a-kind equipment with potential novel safety implications (examples: SC magnets, tritium or high-power cryogenic targets).	• Fabrication of the equipment can start or it is deemed to be acceptable for use at the lab.	• Provide the complete conceptual design of the full equipment. Decommissioning plans for target and activated components must also be developed as appropriate. • Carry out a safety analysis of the proposed equipment design, identify safety issues and incorporate mitigating measures necessary to be operated in planned experiment. • Provide manpower and resource requirements for equipment fabrication
N. 2: Before a scheduling request can be submitted	• If the experiment requires items in the category above and/or equipment beyond the declared base equipment.	• At this stage: – Fabrication of the equipment is completed or near-completed, **or** – Design of the equipment is finalized and manpower and resource requirements for equipment fabrication and installation are identified. • After this review, the experiment layout and components are considered frozen, and any design modifications will require approval by the Division Management. • This review will generate the list of recommendations to be answered prior to issuance of the Experiment Readiness Clearance.	• This review includes an experiment installation plan, timeline and resource requirements. Things that must be presented or available for this ERR include: **Experiment** – Who is assigned as Physics Division Liaison for the experiment – Installation schedule – Preliminary commissioning and run plans – System ownership and responsibility – Preliminary data analysis plan **Equipment** – Existing equipment requirements finalized – New equipment design and requirements including cost finalized (if applicable) – Timeline for equipment fabrication & installation (if applicable) – Manuals for new equipment available – UL or equivalent certification for new equipment available **Manpower** – Manpower and resource requirements for equipment fabrication (if applicable) and installation **Documentation** – Preliminary OSPs for new systems – Flammable gas analysis if applicable – Preliminary: RSAD, ESAD, COO, ERG, Operations Manual
N. 3: Before running the experiment	• Every experiment needs this review. • If the experiment only includes base equipment **and** only in operation modes already executed, or only additional equipment that is a direct clone of base equipment, it ONLY needs this review.	• The experiment is ready to be safely and effectively executed. • The experiment is ready for expedient data analysis towards publication. • The experiment is ready for the issuance of the Experiment Readiness Clearance.	• Provide: – Final documentation: ESAD, RSAD, COO, ERG, Operational Manual – Safety Check lists – Experimental procedures both for shift leaders and shift takers and for experts – Proof of readiness for expedient data analysis towards publication.

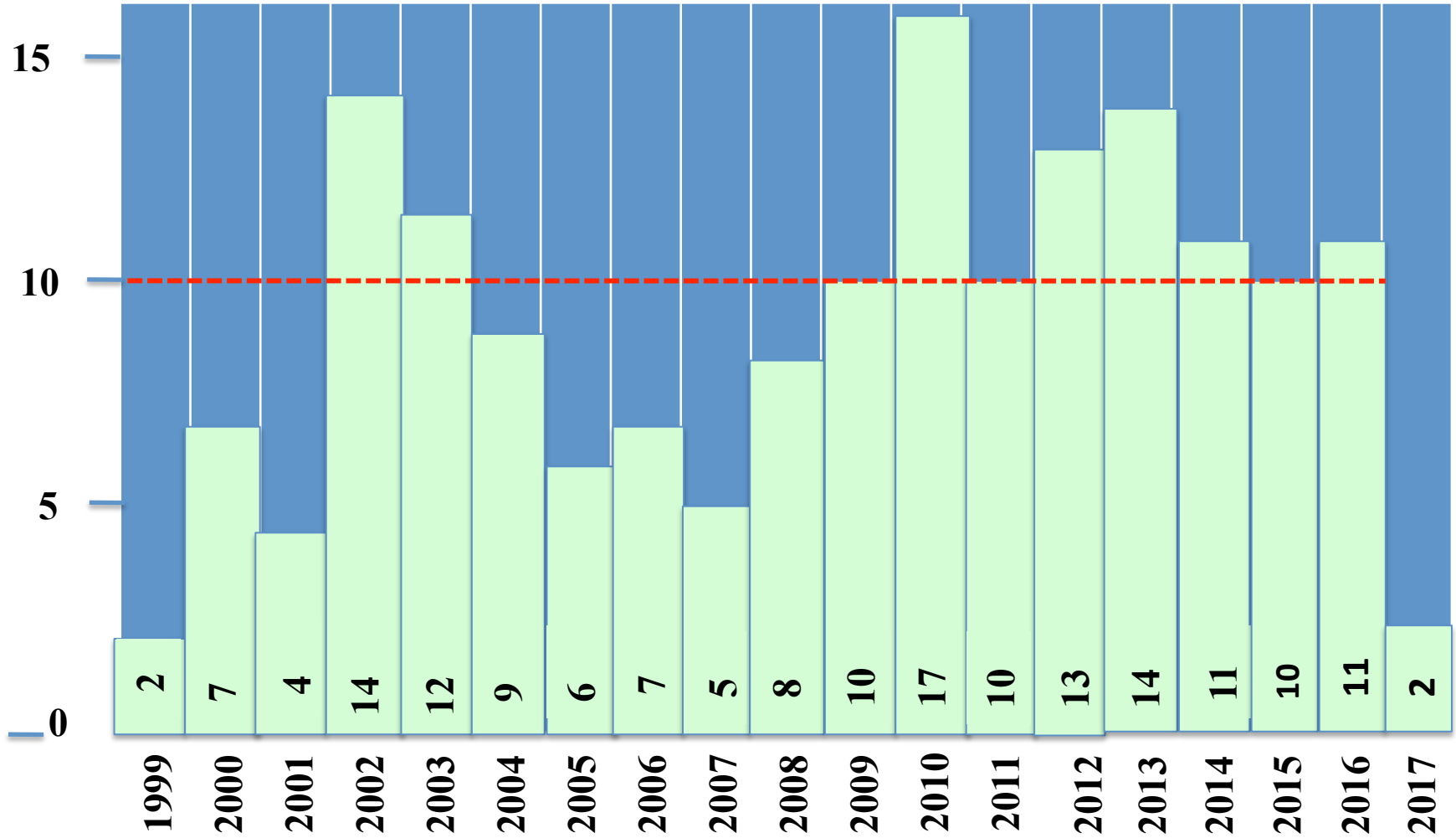
Additional slides

CLAS PhD Theses

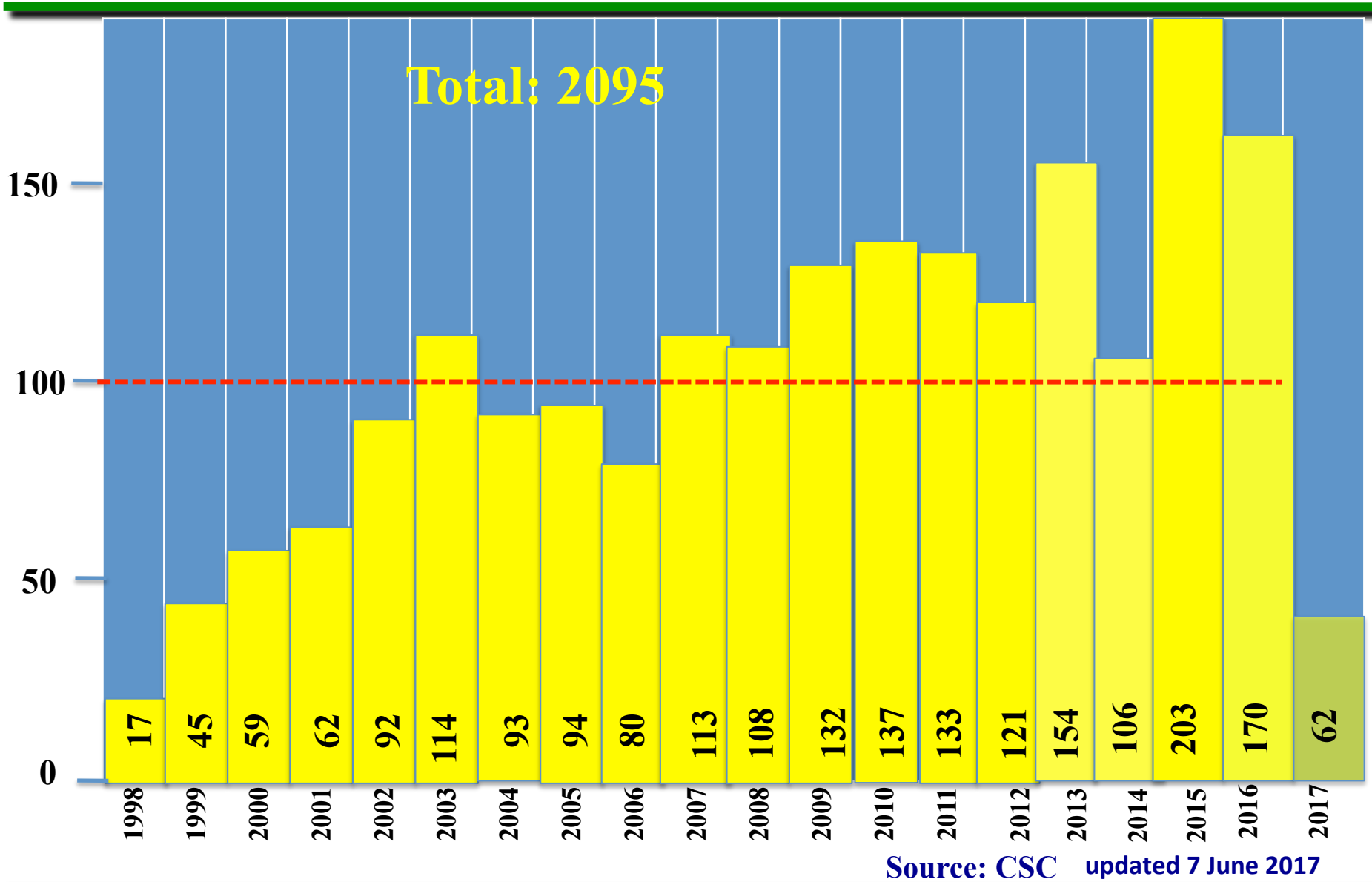
CEBAF Large Acceptance Spectrometer

Completed: 172 In progress: 37

updated 11 Jun 2017



Conference Presentations



Hall B – Run Groups

HALL B

Proposal	Physics	Contact	Rating	Days	Group	New equipment	Energy	Run Group	Target
E12-06-108	Hard exclusive electro-production of π^0, η	Stoler	B	80	139	RICH (1 sector) Forward tagger	11	A F. Sabatié	liquid H_2
E12-06-108A	Exclusive N*->KY Studies with CLAS12	Carman		(60)					
E12-06-108B	Transition Form Factor of the η' Meson with CLAS12	Kunkel		(80)					
E12-06-112	Proton's quark dynamics in SIDIS pion production	Avakian	A	60					
E12-06-112A	Semi-inclusive Λ productiuon in target fragmentation region	Mirazita		(60)					
E12-06-112B	Colinear nucleon structure at twist-3	Pisano		(60)					
E12-06-119(a)	Deeply Virtual Compton Scattering	Sabatie	A	80					
E12-09-003	Excitation of nucleon resonances at high Q^2	Gothe	B+	40					
E12-11-005	Hadron spectroscopy with forward tagger	Battaglieri	A-	119					
E12-11-005A	Photoproduction of the very strangest baryon	Guo		(120)					
E12-12-001	Timelike Compton Scatt. & J/ψ production in e+e-	Nadel-Turonski	A-	120					
E12-12-007	Exclusive φ meson electroproduction with CLAS12	Stoler, Weiss	B+	60					
E12-07-104	Neutron magnetic form factor	Gilfoyle	A-	30	90	Neutron detector RICH (1 sector) Forward tagger	11	B K. Hafidi	liquid D_2 target
E12-09-007(a)	Study of partonic distributions in SIDIS kaon production	Hafidi	A-	30					
E12-09-008	Boer-Mulders asymmetry in K SIDIS w/ H and D targets	Contalbrigo	A-	56					
E12-09-008A	Hadron production in target fragmentation region	Mirazita		(60)					
E12-09-008B	Colinear nucleon structuer at twist-3	Pisano		(60)					
E12-11-003	DVCS on neutron target	Niccolai	A	90					
E12-11-003A	In medium structure functions, SRC, and the EMC effect	Hen		(90)					
Beam time partial sum				**765 (1355)**	**229**				

Experiment ending with A or B are run group experiments approved by the CLAS collaboration. They are running parallel to the experiments with same experiment number. Experiments ending with (a) and (b) take data with both run groups.

Hall B – Run Groups

HALL B

E12-06-109	Longitudinal Spin Structure of the Nucleon	Kuhn	A	80	185	Polarized target RICH (1 sector) Forward tagger	11	C S. Kuhn	NH_3 ND_3
E12-06-109A	DVCS on the neutron with polarized deuterium target	Niccolai		(60)					
E12-06- 119(b)	DVCS on longitudinally polarized proton target	Sabatie	A	120					
E12-07-107	Spin-Orbit Correl. with Longitudinally polarized target	Avakian	A-	103					
E12-09-007(b)	Study of partonic distributions using SIDIS K production	Hafidi	A-	80					
E12-09-009	Spin-Orbit correlations in K production w/ pol. targets	Avakian	B+	103					
E12-06-106	Color transparency in exclusive vector meson production	Hafidi	B+	60	60		11	D	
E12-06-117	Quark propagation and hadron formation	Brooks	A-	60	60		11	E	Nuclear
E12-06-113	Free Neutron structure at large x	Bueltman	A	42	42	Radial TPC	11	F	Gas D_2
E12-14-001	EMC effect in spin structure functions	Brooks	B+	55	55	Pol. LiH target	11	G	LiH
TOTAL CLAS12 run time (approved experiments)				**1466 (2118)**	**631**				

Proposal	Physics	Contact	Rating	Days	Group	Equipment	Energy	Group	Target
C12-11-111	SIDIS on transverse polarized target	Contalbrigo	A	110	110	Transverse target	11	H	HD
C12-12-009	Transversity w/ di-hadron on transvere target	Avakian	A	110					
C12-12-010	DVCS with transverse polarized target in CLAS12	Elouadrhriri	A	110					
All CLAS12 transverse target proposals				330	110				
E12-11-006	Heavy Photon Search at Jefferson Lab (HPS)	Jaros	A	180	180	Setup in alcove	2.2, 6.6	I	Nuclear
E12-11-106	High Precision Measurement of the Proton Charge Radius	Gasparian	A	15	15	Primex	1.1, 2.2	J	H2 gas
Beam time request from CLAS12 C1 experiments + non-CLAS12 experiments				**525**	**305**				
Beam time from approved CLAS12 experiments (from previous table)				**1466 (2118)**	**631**				
Beam time for Hall B experiments table 1 + table 2 (incl. 110 days of C1 approved exp.)				**1991 (2643)**	**936**				

Hall B – Run Groups

HALL B

Proposal	Physics	Contact	Rating	Days	Group	Equipment	Energy	Group	Target
E12-16-010	A search for Hybrid Baryons in Hall B with CLAS12	D'Angelo	A-	(100)	100	Forward Tagger	6.6, 8.8	K Confinement & Strong QCD	IH2
E12-16-010A	Nucleon Resonances in exc. KY electroproduction	Carman	A-	(100)					
E12-16-010B	DVCS with CLAS12 at 6.6 and 8.8 GeV	Elouadrhiri	A-	(100)					
Total Beam time of Run Group K				**100 (300)**	**100**				
Beam time of approved & C1 approved CLAS12 experiments from table 1 + table 2				**1991 (2643)**	**936**				
Beam time for Hall B experiments table 1 + table 2 + table 3				**2091 (2943)**	**1036**				

Proposal Count	Experiment Days	Run Groups	RG days	Compression
37	**2943**	**11**	**1036**	**0.35**

In the BOAW we expect experiment schedule:

- 35 weeks per year ≈ 35/2 = 17.5 PAC weeks = 122.5 PAC days
- With 0.8 Hall multiplicity => 122.5 x 0.8 = 98 PAC days

- To run 2943 PAC days of individual experiments = 30 years
- Run 2943 PAC days as run groups = 1036/98 = **10.5 years**

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

E1 (a-g) (26):

▪ K. Park et al.,	Measurement of p(e,e'π^+)n at 1.6<W<2.0GeV & N* coupl.	PRC 91 045203, 2015
▪ M. Mestayer et al.,	Flavor Dep. of qq-bar Creation Observed in the Exclusive Limit	PRL 113, 152004, 2014
▪ M. Gabrielyan et al.	Induced polarization of Λ(1116) in kaon electroproduction,	PRC 90, 035203, 2014
▪ W. Gohn et al.,	Beam-spin asymmetries from semi-incl. pion elecvtrproduction	PRD89 072011, 2014
▪ H. Lu et al.,	First Observation of the Λ(1405) Line Shape in Electroproduction	PRC 88, 045202, 2013
▪ D. Carman et al.	Structure functions in $K^+\Lambda$ and $K^+\Sigma$ electroprod. at 5.5 GeV	PRC87, 025204, 2013
▪ V. Mokeev et al.,	Study of P11(1440) and D13(1520) in p(e,ep$\pi^+\pi^-$)	PRC86, 035203, 2012
▪ G. Gavalian et al.	Beam Spin Asymmetries in DVCS with CLAS at 4.8 GeV	PRC79, 015204, 2009
▪ G. Fedotov et al.,	Electroproduction of pπ+π- at 0.2<Q2<0.6, 1.3<W<1.57Ge	PRC79, 015204, 2009
▪ R. Nasseripour et al.,	Polarized structure function σ_{LT}' for p(e,e'K^+)Λ in N* region	PRC77, 065208, 2008
▪ H. Denizli et al.,	Q^2-dependence of S_{11}(1535) & Evidence for P-wave resonance	PRC76, 015204, 2007
▪ P. Ambrozewicz et al.,	Separated Structure Functions for ep→eKΛ/KΣ Final States	PRC75, 045203, 2007
▪ H. Egiyan et al.,	Electroproduction of single π^+ in ep -> eπ^+n	PRC73, 025204, 2006
▪ K. Joo et al.,	σ_{LT}' for pion electroproduction in the Roper resonance	PRC72, 058202, 2005
▪ C. Hadjidakis et al.,	Exclusive ρ^0 electroproduction from hydrogen	PL B 605, 256, 2005
▪ K. Joo, et al.,	Measurement of $\sigma_{LT'}$ for p(e,e'π^+)n in Δ region	PRC70, 042201, 2004
▪ H. Avakian et al.,	Beam spin asymmetry for p(e,e'π^+)X in DIS region	PRD69, 112004, 2004

continues on next page

Hall B Run Group Publications

▪ published / accepted ▪ submitted

E1(a-g) (26) cont'd:

▪ K. Joo et al.,	Polarized structure function σ_{LT}' in $\Delta(1232)$ region	PRC68, 032201, 2003
▪ M. Osipenko et al.,	Kinematically complete measurement of F_2 in N* region	PRD67, 092001, 2003
▪ D. Carman et al.,	First measurement of transferred polarization in $p(e,e'K^+)\Lambda$	PRL90, 131804, 2003
▪ M. Ripani et al.,	Measurement of $p(e,e'p\pi^+\pi^-)$ and baryon resonance analysis	PRL91, 022002, 2003
▪ K. Joo et al.,	Q^2 dependence of quadrupole strength in $\Delta(1232)$ excitation	PRL88, 122001, 2002
▪ S. Barrow et al.,	Electroproduction of the $\Lambda(1520)$ hyperon	PRC64, 044601, 2001
▪ S. Stepanyan et al.,	First observation of exclusive DVCS in beam asymmetry	PRL87, 182002, 2001
▪ K. Lukashin et al.,	Exclusive electroproduction of ϕ mesons at 4.2 GeV	PRC63, 065205, 2001
▪ R. Thompson et al.,	The $p(e,e'p)\eta$ reaction at and above the $S_{11}(1535)$	PRL86, 1702, 2001

E1-6 (12):

▪ E.L. Isupov et al.	Cross section of ep->eppi+pi- at W < 2 GeV, 2 < Q2 5 GeV2	arXiv:1705.01901
▪ P. Khetarpal	Near threshold π^0 production at high Q^2 and generalized ff	PRC87, 045205, 2013
▪ K. Park et al.,	Exclusive $n\pi+$ production in the deep inelastic region	EPJA49, 16, 2013
▪ K. Park et al.,	Generalized form factors at high Q^2 in $\gamma p->n\pi+$ near threshold	PRC85, 035208, 2012
▪ I. Aznauryan et al.,	Electroexcitation of N* in CLAS in pion electroproduction	PRC80, 055203,2009
▪ D. Carman et al.,	B-R Polarization Transfer in N* Region for $ep\rightarrow e'K^+\Lambda/\Sigma$	PRC79, 065205,2009
▪ M. Osipenko et al.,	Measurement of semi-inclusive π^+ electroproduction off protons	PRD 80, 032004,2009
▪ S.A. Morrow et al.,	Exclusive $\rho 0$ electroproduction on the proton at CLAS	EPJ A39, 5-31, 2009
▪ J. Santoro et al.,	Electroproduction of $\phi(1020)$ Mesons at High Q^2 with CLAS	PRC78:025210,2008
▪ I. Aznauryan et al.,	Electroexitation of the Roper resonance in $ep\rightarrow en\pi+$ at $Q^2<4.5$	PRC78, 045209,2008
▪ K. Park et al.,	Cross section and beam asymmetries for $ep\rightarrow en\pi+$ at $Q^2<4.5$	PRC77, 015208,2008
▪ M. Ungaro et al.,	$N\Delta(1232)$ Transition at high Momentum Transfer	PRL97,112003,2006
▪ L. Morand et al.,	Deeply virtual and exclusive electroproduction of ω mesons	EPJ A24, 445, 2005

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

E2 (8):

▪ H. Baghdasaryan et al.	Comparison forward/backward pp pair knockout in 3He(e,e'pp)n	PRC 85, 064318, 2012
▪ H. Baghdasaryan et al.	Tensor correlations measured in 3He(e,epp)n	PRL105, 222501, 2010
▪ M. Osipenko et al.	Nucleon structure function F2 in nuclear medium and moments	NPA 845, 1, 2010
▪ K. Egiyan et al.,	Measurement of 2-N and 3-N SRC Probabilities in Nuclei	PRL 96,082501,2006
▪ D. Protopopescu et al.,	A_{LT}' in electron scattering on He-4 and C-12	NPA748,357,2005
▪ A.V. Stavinsky et al.,	Proton source size measurements in A(e,e'pp)X	PRL93,192301,2004
▪ R. A. Niyazov, et al.,	Two-nucleon momentum distribution in ^{3}He(e,e'pp)n	PRL92,052303,2004
▪ K. Egiyan et al.,	Observation of nuclear scaling in A(e,e') at $x_B > 1$	PRC68,014313,2003

E1-DVCS (7):

▪ I. Bedlintsky et al.,	Exclusive η production at W>2 GeV and transversity GPDs	PRC 95, 035202, 2017
▪ H.S. Jo et al.,	Exclusive Photon Electroproduction and GPDs	PRL 115, 212003, 2015
▪ I. Bedlintsky et al.,	Exclusive pi0 electroproduction at W>2 GeV with CLAS	PRC 90, 025205, 2014
▪ I. Bedlintsky et al.,	Exclusive pi0 electroproduction str. funct. and transversity GPDs	PRL 109, 112001, 2012
▪ M. Aghasyan et al.,	Precise measurements of beam spin asymmetries in π^0 SIDIS	PL B 704, 397, 2011
▪ F. X. Girod, et al.,	Deeply Virtual Compton Scattering Beam Asymmetries	PRL100,162002,2008
▪ R. De Masi et al.,	Beam Asymmetries in Deeply Virtual π^0 Production	PRC77, 042201,2008

E5 (1):

▪ J. Lachniet et al.	Precise measurement of the neutron magnetic form factor	PRL102,192001,2009

E6 (3):

▪ K. Egiyan et al.	Study of Exclusive d(e,e'p)n Reaction Mechanism at High Q^2,	PRL98,261502,2007
▪ A. Klimenko et al.,	Deuteron s.f. with fast backward proton	PRC73,035212,2006
▪ M. Osipenko et al,	Deuteron s.f. F2 in the resonance region & its moments	PRC73, 045205,2006

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

E8-BoNuS (2):

▪ S. Tkachenko et al.,	Measurement of nearly free neutron structure functions from ..	PRC 89, 045206, 2014
▪ N. Baillie et al.,	Neutron F_2 structure function via spectator tagging	PRL 108, 142001, 2012

EG1 (14):

▪ M. Mayer et al.	Double spin asymmetry in q.e. scattering off the deuteron	PRC95 024005,2017
▪ P. Bosted et al.,	Spin Asymmetries in $\pi+/\pi-$ production with 1.6-5.7 GeV electrons	PRC94 055201,2016
▪ N. Guler, et al.,	Deuteron Spin Structure and the Neutron Contribution	PRC 92, 055201,2015
▪ H. Avakian et al.,	Spin asymmetries in SIDIS of pion prod. off long. pol. target	PRL105,262002,2010
▪ Y. Prok et al.,	Moments of spin s.f. g_1^p and g_1^d for $0.05 < Q^2 < 3.0$ GeV^2	PLB 673:12, 2009
▪ A. Biselli et al.,	First measurement of target asymmetry .. In the ep->eppi0	PRC78:045204,2008
▪ P. Bosted et al.,	N15/C12 Cross section ratios`	PRC78:015202,2008
▪ P. Bosted et al.,	Quark-Hadron Duality in Spin structure functions g1p and g1d	PRC75,035203,2007
▪ V. Dharmawardane	Measurement of x-and Q^2 dependence of Asymmetry A1	PLB641:11-17, 2006
▪ S. Chen, et al.,	Deeply Virtual Compton Scattering on Polarized Protons	PRL97,072002,2006
▪ R. Fatemi et al,	Proton spin structure function g1(x, Q^2) for Q^2=0.15-1.6 GeV^2	PRL91,222002,2003
▪ J. Yun et al.,	Measurement of inclusive spin S.F.'s of the deuteron	PRC67,055204,2003
▪ A. Biselli et al.,	Polarized beam asymmetry for p(e,ep)π^0 in Δ(1232) region	PRC68,035202,2003
▪ R. De Vita et al.,	First measurement of double spin asymmetry in p(e,e'π+)n	PRL88,082001,2002

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

EG1-DVCS (6):

▪ P. Bosted et al.	Target/ beam-target Spin asymmetries in π^0p electroproduction	PRC 95, 036206 (2017)
▪ P. Bosted et al.	Target/ beam-target Spin asymmetries in π^+n electroproduction	PRC 95, 035206 (2017)
▪ A. Kim et al.,	Target and Double Spin Asymmetries for DVπ^0P on pol. target	PL B768, 168 (2017)
▪ S. Pisano et al.,	Single and Double spin asymmetries for DVCS on pol. target	PRD 91 5, 052014, 2015
▪ E. Seder et al.,	Longitudinal target-spin asymmetries for DVCS	PRL 114, 032001, 2015
▪ Y. Prok	Precision measurement of g1 of the proton and deuteron at 6 GeV	PRC 90, 025212, 2014

EG2 (4):

▪ O. Hen et al.,	Momentum sharing in imbalanced Fermi systems	Science 346, 614, 2014
▪ O. Hen, et al.,	Transparency ratios from short-range correlated pairs	PLB 722, 63, 2013
▪ El Fassi, et al.,	Onset of Color Transparency in ρ^0 production off nuclei	PLB 712, 326, 2012
▪ A. Daniel, et al.	Nuclear multiplicity ratio for K^0_s hadronization at CLAS	PLB 706, 26, 2011

EG3 (1):

▪ H. Egiyan et al.,	Upper limits for the ϕ(1860) production off the deuteron	PRC85,015205, 2012

EG4 (1):

▪ X. Zheng	Spin asymmetries for the ep-.eπ^+n in the N* region at low Q^2	PRC.94.045206, 2016

EG5 (3):

▪ D. Rimal et al.,	Measurement of 2-γ effects in e+/e- cross sections.	PRC 95, 065201 (2017)
▪ K.P. Adhikari et al.,	Towards resolving the proton FF problem w/ new e^+e^- data	PRL 114 6, 062003, 2015
▪ M. Moteabbed, et al.,	Novel Technique to measure 2-gamma effects in elastic e+p/e-p	PRC 88 025210, 2013

EG6 :

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

G1 (14):

▪ M. Dugger et al.,	π^+ Photoproduction on protons at energies from 0.675 – 2.875	PRC 79, 065206,2009
▪ M. Dugger et al.,	π^0 Photoproduction on protons at energies from 0.675 – 2.875	PRC 76, 025211,2007
▪ I. Hleiqawi et al,	Cross sections for $\gamma p \rightarrow K^{*0}\Sigma^+$ at E=1.7-3 GeV	PRC 75,042201,2007
▪ R. Bradford et al,	Measurement of beam-recoil polarization in KΛ, KΣ	PRC 75, 035205,2007
▪ M. Dugger et al.,	η' photoproduction on the proton	PRL 96,062001,2006
▪ R. Bradford et al.,	Diff. cross sections of γp--> K^+Y for Λ and Σ hyperons	PR C73, 035202. 2006
▪ S. Strauch et al.,	Beam helicity asymmetry in photoproduction of $p\pi^+\pi^-$	PRL 95,162003,2005
▪ S. Taylor et al.,	Radiative decays of the $\Sigma^o(1385)$ and Λ(1520) hyperons	PRC 71 054609,2005
▪ K. McCormick et al.,	Tensor polarization of φ in high-t photoproductio	PRC 69,032203,2004
▪ J.W. McNabb et al.,	Hyperon photoproduction in the nucleon resonance region	PRC 69, 042201,2004
▪ M. Dugger et al.,	η photoproduction on proton for energies 0.75-1.95G	PRL 89, 222002,2002
▪ M. Battaglieri et al.,	Photoproduction of ω mesons at large momentum transfer	PRL90, 022002,2003
▪ M. Battaglieri et al.,	Photoproduction of ρ0 on proton at large momentum transfer	PRL87, 172002,2001
▪ E. Anciant et al.,	Photoproduction of φ at large momentum transfer	PRL85, 4862 (2000)

G2 (5):

▪ X. Qian et al,	Near-threshold Photoproduction of φ mesons on Deuterium.	PL B696, 338, 2011
▪ Y. Ilieva, et al.,	Observation of backward peak in $\gamma D \rightarrow D\pi^0$ near η threshold	EPJA 43, 261, 2010
▪ P. Rossi et al,	Onset of asymptotic scaling in deuteron photo-distintegration	PRL94, 012301,2005
▪ M. Mirazita et al.,	Complete angular distributions in d(γ,p)n from 0.5-3 GeV	PRC70, 014005,2004
▪ S. Stepanyan et al.,	Observation of S=+1 baryon in $D(\gamma,K^+K^-p)n$	PRL91, 252001,2003

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

G3 (4):

▪ I.Pomerantz,Y. Ilieva,..	Hard 2-body photodisintegration on ^{3}He	PRL 110, 24301, 2013
▪ R. Nasseripour et al.,	Coherent Photoproduction of π^+ from ^{3}He.	PRC 83, 034001, 2011
▪ R. Nasseripour et al.,	Photodisintegration of ^{4}He into p+t,	PRC 80, 044603,2009
▪ S. Niccolai, et al.,	3-body photodisintegration of He-3 for 0.55 - 3 GeV	PRC 70 064003,2004

G6 (3):

▪ M. Nozar et al.,	Search for exotic mesons in the photoproduction of $\pi+\pi+\pi-$	PRL102,102002,2009
▪ J. Price, et al.,	Photoproduction of cascades from proton targets	PRC71, 0518201,2005
▪ V. Kubarovsky et al.,	Observation of baryon with S=+1 in $p(\gamma,K^+K^-\pi^+)n$	PRL92, 032001,2004

G7 (3):

▪ M. Wood et al.	Absorption of omega and phi mesons in nuclei	PRL105:112301,2010
▪ M. Wood et al.,	Light Vector Mesons in the Nuclear Medium	PRC78:015201,2008
▪ R. Nasseripour et al.	Search for medium modifications of the ρ^0	PRL 99, 262302,2007

G8 (2):

▪ P. Collins, et al.,	Beam asymmetry Σ for η and η' photoproduction on proton	PRL, 213-221, 2017
▪ C.A. Paterson et al.,	Photoproduction of Λ/Σ^0 using linearly polarized photons	PRC93 065201, 2016
▪ M. Dugger et al.	Beam asymmetry Σ in pi+ and pi0 photoproduction	PRC 88, 065203, 2013

G9 (2):

▪ I. Senderovich et al.	Helicity asymmetry E in η photoproduction on the proton	PLB 755, 64, 2016
▪ S. Strauch et al.	First Measurement of E asymmetry in $p(g,\pi+)n$ up to 2.25GeV	PLB 750, 53, 2015

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

G10 (7):

▪ S. Pereira et al.,	K-Σ^- photoproduction on neutrons in deuterium	PLB 688, 289, 2010
▪ X. Qian et al.,	The extraction of φ−N total cross section from d(γ,pK+K^-)n	PLB 680, 417, 2009
▪ W. Chen at al.,	Differential cross section for $\gamma n \rightarrow \pi^- p$	PRL 103:012301,2009
▪ D. Ireland et al.,	Bayesian analysis of pentaquark signals from CLAS data	PRL 100:052001,2008
▪ T. Mibe, et al.,	First measurement of coherent phi production off ^{2}H..	PRC76:052202,2007
▪ S. Niccolai et al.,	Search for Θ^+ Pentaquark in $\gamma D \rightarrow \Lambda K^+ n$	PRL97:032001,2006
▪ B. McKinnon et al.,	Search for Θ^+ Pentaquark in $\gamma D \rightarrow p K^- K^+ n$	PRL96:212001,2006

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▪ V. Anisovich et al.,	K* photoproduction and the search for new N* states	PL B, 2017
▪ R. Dickson, et al.,	Photoproduction of the $f_1(1285)$ Meson	PRC93.065202, 2016
▪ M. McCracken et al.	Search for baryon- and lepton-number violating decays of Λ	PRD92, 072002, 2015
▪ B. Dey et al.,	Exclusive phi photoproduction and SMDE	PRC89, 055208, 2014
▪ H. Seraydaryan et al.	phi meson photoproduction on H2 in the neutral decay mode	PRC89, 055206, 2014
▪ K. Moriya et al,	Spin and Parity measurement of the Λ(1405) baryon	PRL112, 082004, 2014
▪ K. Moriya et al.,	Diff. photo. cross sections for Σ^0(1385), Λ(1405), Λ(1520)	PRC 88 045201, 2013
▪ C.S. Nepali et al.,	Transverse polarization of Σ+(1189) in photoproduction on H_2	PRC 87, 045206, 2013
▪ W. Tang et al,	Cross sections for $\gamma p \rightarrow K^{*+}\Lambda$ and $\gamma p \rightarrow K^{*+}\Sigma^0$ at CLAS	PRC 87, 065204, 2013
▪ K. Moriya et al.,	Measurement of Σπ line shapes near the Λ(1405)	PRC87, 035206, 2013
▪ M. Anghinolfi et al.	Comment on 'Observation of a narrow structure in p(g,Ks)X'	PRC86, 069801, 2012
▪ D. Keller et al.,	Branching Ratio of the Electromagnetic Decay of the Σ^+(1385)	PRD 85, 052004, 2012
▪ D. Keller et al.,	Electromagnetic Decay of the Σ^0(1385) to Λγ	PRD 83, 072004,2011

Hall B Run Group Publications

▪ **published / accepted** ▪ **submitted**

G11 (24) cont.

▪ B. Dey et al.,	Diff. crs. and recoil polarizations for $\gamma p \rightarrow K^+\Sigma^0$	PRC82, 025202,2010
▪ M. Mc Cracken et al.,	σ and P_Λ measurements for the $\gamma p \rightarrow K^+\Lambda$	PRC81, 025201,2010
▪ M. Battaglieri et al.,	Photoproduction of $\pi^+\pi^-$ meson pairs on the proton.	PRD 80, 072005,2009
▪ M. Williams et al.,	Diff. cross section for $\gamma p \rightarrow p\eta$ and $\gamma p \rightarrow p\eta'$	PRC80, 045213,2009
▪ M. Williams, et al.,	Partial wave analysis of the reaction $\gamma p \rightarrow \omega p$ and search for N*	PRC 80, 065209, 2009
▪ M. Williams, et al.,	Diff. cross section and spin density matrix for $\gamma p \rightarrow \omega p$	PRC 80, 065208, 2009
▪ M. Battaglieri et al.,	1st measurement of direct f0(980) photoproduction on protons	PRL102:102001,2009
▪ L. Guo et al.,	Cascade production from protons	PRC76:025211, 2007
▪ R. De Vita et al.,	Search for Θ^+ in $\gamma p \rightarrow K^0K^+n$, and K^0K^0p	PRD74:032001, 2006
▪ V. Koubarovsky et al.,	Search for Θ^+ pentaquarks in $\gamma p \rightarrow K^+K^-p$	PRL97:102001, 2006
▪ M. Battaglieri et al.,	Search for Θ^+ pentaquark baryon in $\gamma p \rightarrow K^0K^+n$	PRL96:042001, 2006

G13 (1):

▪ P. Mattione et al.,	Cross section measurements for $\gamma n \rightarrow \pi^- p$ above the Δ region	arXiv:1706.01963
▪ N. Zachariou et al.,	Σ for Deuteron Photodisintegration for $Eg =1.1-2.3$ GeV	PRC 91 (2015) 055202

G14 (1):

▪ D. Ho et al.,	p-π^- helicity asymmetry measured on polarized H-D target	PRL (2017)

G5 (2):

▪ C. Cetina et al.,	Photofission of Heavy Nuclei from 0.2 to 3.8 GeV	PRC65, 044622, 2002
▪ C. Cetina et al.,	Photofission of Heavy Nuclei at energies up to 4 GeV	PRL84, 5740, 2000

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▪ I. Larin et al.,	A new measurement of the π^0 radiative decay width	PRL 106, 162303, 2011

Hall B Advanced Analysis Papers

❖ **non-collaboration paper**

E1 - Physics Analysis groups (7):

❖ V. Mokeev et al.,	New results from N* studies from ep-> eppi+pi-	PRC93, 025206, 2016
❖ I. Aznauryan, Burkert	Extracting meson-baryon contributions to N(1675)5/2$^-$ excitation	PRC92:015203, 2015
❖ V. Mokeev, et al.,	Model analysis of ep→epπ+π- at Q^2 = 0.2 – 0.6 GeV^2	PRC80:045212,2009
❖ H. Avakian, et al.,	Effect of OAM on Valence-Quark Helicity Distributions	PRL99:082001,2007
❖ I. Aznauryan et al.,	Electroexcitation of N* at Q^2=0.65 GeV2 in Nπ and Nππ	PRC72, 045201,2005
❖ D. Carman, B. Raue	σ_L/σ_T for p(e,e'K)Λ from polarization transfer	PRC71, 065209,2005
❖ I. Aznauryan et al.;	Electroexcitation of Δ(1232), P_{11}, S_{11}, D_{13} at Q^2=0.4, 0.65 GeV^2	PRC71, 015201,2005

E2 Physics Analysis groups (1)

❖ L. Weinstein, et al.	Short range correlations and the EMC effect	PRL106, 052301, 2011

E8-BONUS - Physics Analysis groups (1):

❖ I. Niculescu et al.,	Direct observation of q-h duality in the F2n structure function	PRC 91, 055206, 2015

EG2 Physics Analysis groups (2):

❖ Or Hen, et al.,	Symmetry energy of nucleonic matter with tensor correlations	PRC 91, 025803, 2015
❖ C. Colle et al.	Mass dep. and Q.N. of SRC pairs from A(e,e'p) and A(e,e'pp)	PRC92, 024604, 2015

EG1 Physics Analysis groups (6):

❖ A. Deur et al.,	The effective strong coupling constant from CLAS spin str. Data	PLB 665:349,2008
❖ A. Deur et al.,	Experimental Study of isovector spin sum rules	PRD78:032001,2008
❖ A. Deur et al.,	Determination of an effective α_s from the Bjorken sum	PLB 650, 244,200
❖ M. Osipenko et al.,	Global Analysis of Proton Structure Function g1 and Moments	PRD71, 054007,2005
❖ M. Osipenko et al.,	Higher twist analysis of the proton g_1 structure function	PLB 609, 259,2005
❖ A. Deur et al.,	Experimental determination of the Bjorken Integral at low Q2	PRL93, 212001,2004

Hall B Advanced Analysis Papers

❖ **non-collaboration paper**

E1-DVCS Physics Analysis groups (3)

❖ I. Akushevich, et al.	Rad. effects in excl. electroproduction from polarized protons.	PRD 85 053008, 2012
❖ M. Guidal	GPDs from Deeply Virtual Compton Scattering at CLAS.	PLB 689, 2010, 2010
❖ H. Moutarde	Extraction of the CFF H from JLab DVCS measurements.	PRD 79, 094021, 2009

EG1-DVCS - Physics Analysis groups (1):

❖ A. Deur, Y. Prok et al.	High precision determination of the Bjorken Sum vs (Q^2)	PRD 90, 012009, 2014

G1-G11 - Physics Analysis groups (8):

❖ V. Anisovich et al.,	Evidence for $\Delta(2200)(7/2^-)$ and consequence for high mass χSR	PLB 765,1 , 2017
❖ B. Dey	Scaling behavior in exclusive meson photoproduction	PRD 90, 014013, 2014
❖ A.V. Anisovich et al.,	Helicity amplitudes for photoexcitation of neutron resonances	EPJ A 49: 67, 2013
❖ D. Keller, K. Hicks	U-Spin predictions of transition moments for decays of $\Sigma(1385)$	EPJ A 49: 53, 2013
❖ W. Chen, et al.	Amplitude analysis of $\gamma n \rightarrow \pi^- p$ data above 1 GeV	PRC86:015206,2012
❖ R. Schumacher et al.,	Scaling and resonances in elementary $K^+\Lambda$ photoproduction	PRC83:025207,2011
❖ A. Szczepaniak et al..,	P-wave $\pi^+\pi^-$ amplitude from dispersion relations	PRD82:036006,2010
❖ A. Puente, ..,B. Raue	New fits to the process $\gamma p \rightarrow K^+\Lambda$	PRC80, 065205,2009

Hall B Other Refereed Journal Publications

❖ **non-collaboration paper**

Hall B scientists & others (25)

❖ I.G. Aznauryan, V.B.	Electroprod. of Resonances in [70,1-] multiplet in LF RQM	PRC 2017
❖ A.V. Anisovich, V.B,....	Scrutinizing the evidence for N(1685)	PRC 95 035211 (2017)
❖ H. Matevosyan et al.	Sivers SSA in 1 and 2 hadron e-production for CLAS12 and EIC	PRD 92 (2015) 5, 054028
❖ I. Aznauryan, V.B.	Electroexcitation of $\Delta(1232)$ and $\Delta(1600)$ in LC RQM	PR C92 (2015) 3, 035211
❖ A.V. Anisovich et al.,	Energy-independent PWA of the reaction $\gamma p \rightarrow K^+\Lambda$	EPJ A50 (2014) 129
❖ M. Guidal et al.,	GPDs in the valence quark region from DVCS	RPP 76, 066202, 2013
❖ I. Aznauryan et al,	Studies on Nucleon Structure in Exclusive Electroproduction	IJMP E22,1333, 2013
❖ I Aznauryan, Burkert	Nucleon em ff and N* in a light-front relativistic quark model	PRC 85 055202, 2012
❖ I Aznauryan, Burkert	Electroexcitation of nucleon resonances (Review)	PPNP 7:1, 2012
❖ A. Sandorfi et al	Photoproduction amplitudes from complete experiments	J.Phys.G38, 053001, 2011
❖ S. Pereira	Hyperon production and polarization w/ CLAS and CLAS12	IJMP E19, 1021, 2010
❖ S. Brodsky, A. Deur,	Non-perturbative QCD coupl. And β function in LF holography	PRD 81, 096010, 2010
❖ S. Brodsky, A. Deur	AdS/QCD holography and non-pert. strong running coupling	IJMP A25, 5009, 2010
❖ H. Avakian et al.,	The trans. mom. dependent distr. functions in the bag model.	PRD 81, 074035, 2010
❖ H. Avakian et al.	Insights on non-perturbative aspects of TMDs from models	MPLA24:2995,2009.
❖ H. Avakian et al,	Transverse momentum dependent distribution function h1	PRD78:114024,2008.
❖ H. Avakian, et al.	Are there approximate relations among TMDs?	PRD77,014023,2008.
❖ H. Avakian et al.,	Effect of OAM on Valence-Quark Helicity Distributions.	PRL99:082001,2007
❖ V. Burkert et al.,	Single Quark Transition analysis of N* in [70,1-] multiplet	PRC67, 035204,2003
❖ V. Burkert, H. Lee	Electromag. meson production in N* region	IJMP E13, 1035, 2004
❖ A. Afanasev et al.,	QED radiative corrections for exclusive pion production	PRD66, 022002,2003
❖ V. Burkert	Generalized GDH sum rule for p-n in chiral perturbation theory	PRD63,097904,2001.
❖ V. Burkert, B. Ioffe	Polarized str. funct. and GDH and Bjorken sum rules	JETP78, 619, 1994
❖ V. Burkert and Zh. Li	What do we know about the Q^2 evolution of GDH S.R.?	PRD47, 46, 1993
❖ V. Burkert, B. Ioffe	Q^2 variation of spin-dependent DIS from protons	PLB 296, 223, 1992

Hall B Technical Publications (36)

CLAS

• Torus Magnet		IEEE Mag.25 (1989) 1902
• Drift Chambers		
– construction	M. Mestayer	NIM A323 (1992) 191
– update	M. Mestayer	NIM A367 (1995) 316
– Region I	D. Carman	NIM A419 (1998) 315
– Region II	L.M. Qin	NIM A411 (1998) 265
– Summary	D. Carman	NIM A449 (2000) 81
• Cerenkov Counter	P. Stoler	NIM A465 (2001) 414
• TOF Counters	E. Smith	NIM 432 (1999) 265
• Start Counters	S. Taylor	NIM A462 (2001) 484
• Forward Cal.	C. Smith	NIM A460 (2001) 239
• Large Angle Cal.	M. Anghinolfi	NIM A447 (2000) 431
– Response	M. Anghinolfi	NIM A537 (2005) 562
• Tagging System		
– window	S.K. Mathews	NIM 421 (1999) 23
– tagger	D. Sober	NIM 440/2 (2000) 263
• Polarized target	C. Keith	NIM A501 (2003) 327
• FROST coil	O. Dzyubak	NIM A526 (2004) 132
• CLAS Overview	B. Mecking	NIM A503 (2003) 513
• Start Counter #2	Y. Sharabian	NIM A556 (2005) 246

Technical Publications, cont'd

• A bootstrap method for gain calibration	R.T. Jones	NIM A566 (2006) 366
• Performance of the RadPhi Detector	R.T. Jones	NIM A570 (2007) 384
• Calibration of the JLab Photon Tagger	S. Stepanyan	NIM A572 (2007) 654
• A Double-Target System for the CLAS-EG2 run	H. Hakobyan	NIM A592 (2008) 218
• BoNuS: Radial TPC using Cylindrical GEMs	H. Fenker	NIM A592 (2008) 273
• Nuclear Targets for PRIMEX	R. Miskimen	NIM A612 (2009) 46
• Portable cryostat for cold transfer of pol. HD target	C. Bass et al.	NIM A 737 (2013) 107

CLAS12

• Innovative Photon detectors for CLAS12 RICH	M. Contalbrigo	NIM A787 (2015) 224
• Ionising radiation effects on CLAS12 FT calorimeter	S. Fegan	NIM A789 (2015) 101
• Operation of resistive micromegas in air	S. Procureur et al.,	NIM A664 (2012) 11
• Dynamic magnetic shield for CLAS12 CTOF PMTs	V. Baturine et al.,	NIM A664 (2012) 213
• The CLAS12 large area RICH detector	M. Contalbrigo et al.	NIM A639 (2011) 302
• Discharge in Micromegas in hadron beams	G. Charles et al.	NIM A 648 (2011) 174
• Discharge in Micromegas in a magnetic field	B. Moreno et al.,	NIM A 654 (2011) 135
• Discharge in Micromegas a150GeV/c pion beam	S. Procureur et al.,	NIM A 659 (2011) 91
• Readout electronics for Silicon Tracker in CLAS12	A.G. Voronin et al.	Springer IET 53 (2010) 805
• Time resolution of fine mesh and regular PMTs	V. Kuznetsov et al.	NIM A621 (2010) 184
• The MicroMegas tracker project for CLAS12	S. Aune et al.	NIM A604 (2009) 53
• MCP Time Resolution	V. Batourine et al.	NIM A562(2006) 327

Hall B Technical Publications, cont'd

HPS

• The HPS electromagnetic calorimeter	I. Balossino et al.,	NIM A854 (2017) 89-99
• The Heavy Photon Search Test Detector	M. Battaglieri et al.,	NIM A777 (2014) 91-101