Hall-B Status Report

- News from Hall-B Group
- Status of Run Preparations
- Update on PRad and HPS Collaborations
- Data Processing, Publications, and Theses
- There will be a business meeting this Friday 2:00 pm to discuss strategies for experiment scheduling and for software development

Run Group Listing at https://www.jlab.org/Hall-B/clas12-web/HallB-RunGroupsExperiments-Mar2025.pdf

Patrick Achenbach

Mar 4, 2025

News from Hall-B Group and Collaborations

User Visits

- **Single point-of-contact** for Hall B visitors is admin support Chris Ross (cross@jlab.org)
- **New User Visit Initiation Form** from Hall B staff to help, but not required by JLab
- Ladder (SAF307) and Basic Electrical (ESC001) Safety **Trainings** required for work in Hall-B
- New regulations require **ePAS permits** before work commences (*Electronic Permit Admin-instration System* for work permits, risk assessments, job hazard analyses, etc.)
- New regulations require **pre-job briefings** for every work task that is performed
- All documentation needs to be submitted **7 days in advance** of the visit, also for meetings
- Every visitor must **check in and check out** with their hosts upon arrival and ending the visit

Dates

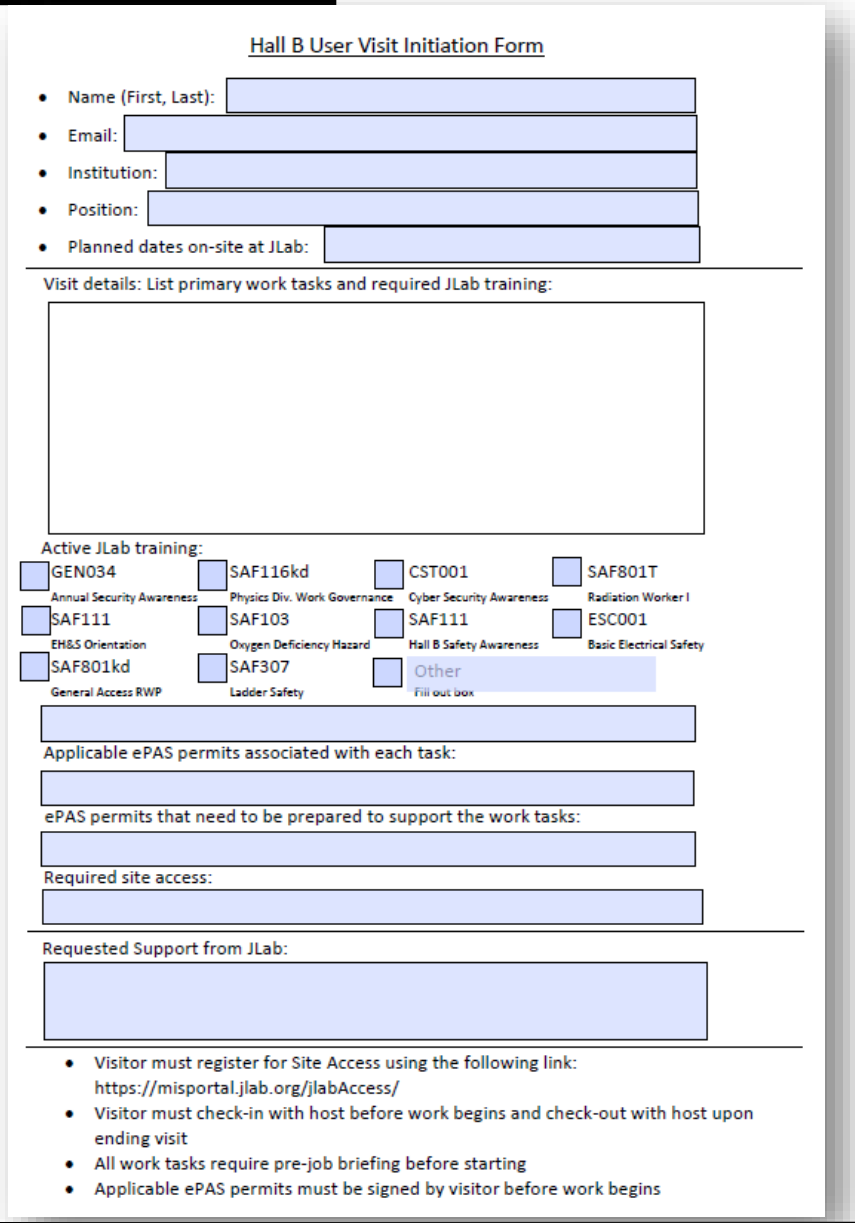
Work tasks

Trainings

ePAS

Support

Responsi-bilities



Hall B User Visit Initiation Form

- Name (First, Last):
- Email:
- Institution:
- Position:
- Planned dates on-site at JLab:

Visit details: List primary work tasks and required JLab training:

Active JLab training:

GEN034 Annual Security Awareness	SAF116kd Physics Div. Work Governance	CST001 Cyber Security Awareness	SAF801T Radiation Worker I
SAF111 EH&S Orientation	SAF103 Oxygen Deficiency Hazard	SAF111 Hall B Safety Awareness	ESC001 Basic Electrical Safety
SAF801kd General Access RWP	SAF307 Ladder Safety	Other Fill out box	

Applicable ePAS permits associated with each task:

ePAS permits that need to be prepared to support the work tasks:

Required site access:

Requested Support from JLab:

- Visitor must register for Site Access using the following link: https://misportal.jlab.org/jlabAccess/
- Visitor must check-in with host before work begins and check-out with host upon ending visit
- All work tasks require pre-job briefing before starting
- Applicable ePAS permits must be signed by visitor before work begins

Hall-B Group

- **Hall-B Postdoc Bhawani Singh** (TUM, Germany, ALICE Collab.) started last week
  - High-level physics analysis to extract GPDs from RG-A and RG-K data

- **New LDRD Postdoc position** on AI/ML developments
  - Candidate was selected, hiring was approved
  - Job offer will get extended this week

- Under preparation:
  - Renewal **Joint Appointment with Duke**
  - New **Joint Appointment with Lamar**

- Currently **35** positions in Hall B Group including small Spin-Polarized Fusion team
  + 2 Joint Appointments with CNU

Group Leader

Achenbach, Patrick

Scientific Staff

Avagyan, Harut
Baltzell, Nathan
Boyarinov, Sergey
Burkert, Volker
Cao, Tongtong
Carman, Daniel
De Vita, Raffaella
Dilks, Christopher
Elouadrhiri, Latifa
Gavalian, Gagik
Gotra, Yuri
Hauenstein, Florian
Kubarovsky, Valery
Mokeev, Viktor
Paremuzyan, Rafayel
Pasyuk, Eugene
Sharabian, Youri
Stepanyan, Stepan
Ungaro, Maurizio
Wei, Xiangdong
Ziegler, Veronique

Post Docs

Liyanaarachchi, Sara
Tyson, Richard
Singh, Bhawani

Joint Appointments

Heddle, David (CNU)
Phelps, William (CNU)

Admin. Support

Ross, Christopher

Engineering Staff

Dobrenz, Phillip
Miller, Robert

Designer Staff

Guthrie, Chris

Technical Staff

Bruhwel, Krister
Cook, Morgan
Docherty, Steve
Insley, Denny
Mealer, Calvin
Tucker, Dontre
Williams, Donald

Status of Run Preparations

General Hall-B Status

- **Superconducting magnets** prepared for energization
- **Hot Check-Out** for all CLAS12 subsystems has started
- Expecting beam for physics from **24 Mar to 7 Sep, 2025**
- **PRad-II/X17 Experiments** are tentatively and conditionally scheduled for Spring 2026
- Hall B has recovered from a **safety incident** on 14 Feb, 2025 (the first incidence since years)

Safety Flash Alert:

Hall B Electrical Shock

On Friday, Feb. 14, an employee working in Hall B was shocked while replacing a band heater on the torus service tower. The access space was very tight, with limited visibility and mobility to work. The employee was unaware that the area where the heater was located was fed by multiple power sources. The employee immediately reported the event to their co-worker, and they were driven to Occupational Medicine for evaluation and released back to work without restrictions.

What We Require You To Do:

- During the work-planning process, ensure that you have considered what to do in case of an incident, so mitigations are established.
- Ensure non-Nationally Recognized Testing Laboratory (NRTL) equipment is inspected prior to use and equipment with multiple energy sources are appropriately labeled. Contact John Riesbeck, Electrical Authority Having Jurisdiction, for more information.
- Always perform a voltage verification on the workspace before starting your work.
- Ensure that you are both mentally and physically fit for duty, regardless of the time pressures.

What We Have Done:

- Work was paused in Hall B.
- Timely fact-finding was conducted.
- Comprehensive review of work planning and controls took place.
- Prepared new work-planning documents to address controls for multiple hazardous energy sources.

ALERT Detector Installation in Nov 2024

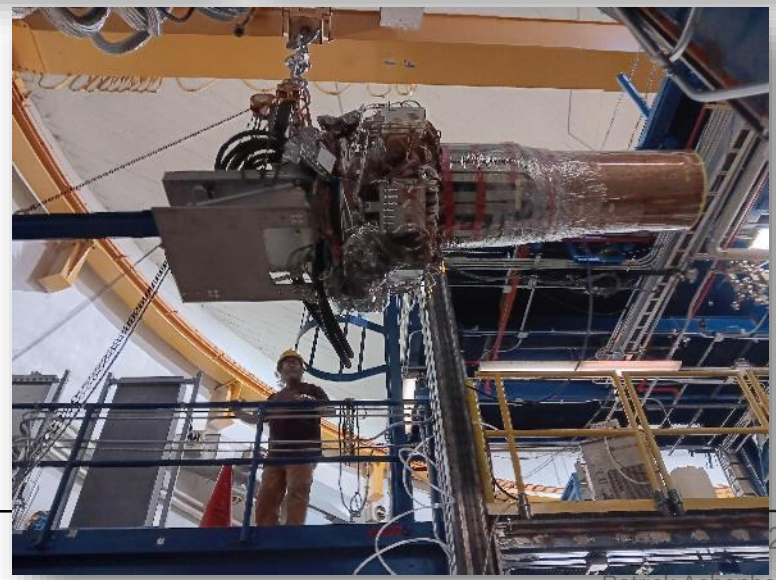
Featured in *JLab Weekly* on 13 Nov 2024

ALERT DETECTOR INSTALLED IN HALL B FOR JANUARY 2025 RUN

After eight months of assembly, cabling, gas system configuration and electronics testing in the Experimental Equipment Lab, the ALERT detector has now been successfully moved to Hall B, marking a significant milestone in preparation for the upcoming CLAS12 run period beginning in January 2025. ALERT, which stands for "A Low Energy Recoil Tracker," is a state-of-the-art detector that will replace the Central Vertex Tracker of the CLAS12 system for one year. ALERT was specifically designed to track and identify low-momentum recoil nuclei from interactions of the electron beam with the target gas (typically helium). For more information on ALERT and its upcoming role in CLAS12, contact Patrick Achenbach.

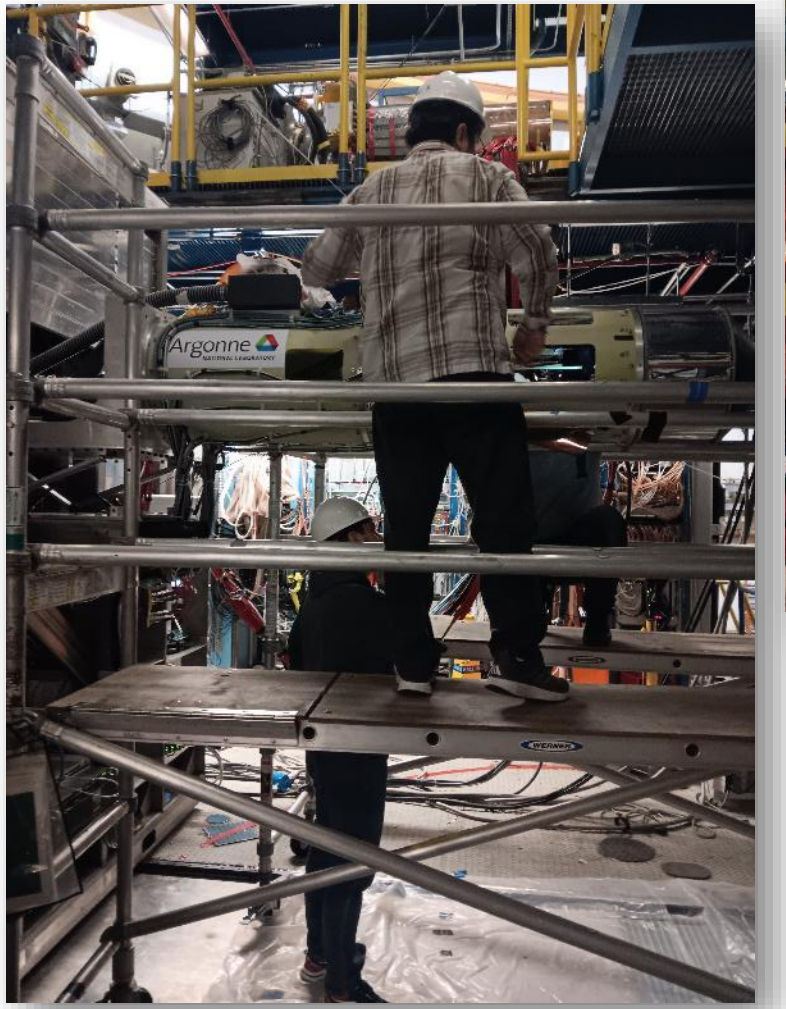
The ALERT detector is transported to its new home in Hall B.

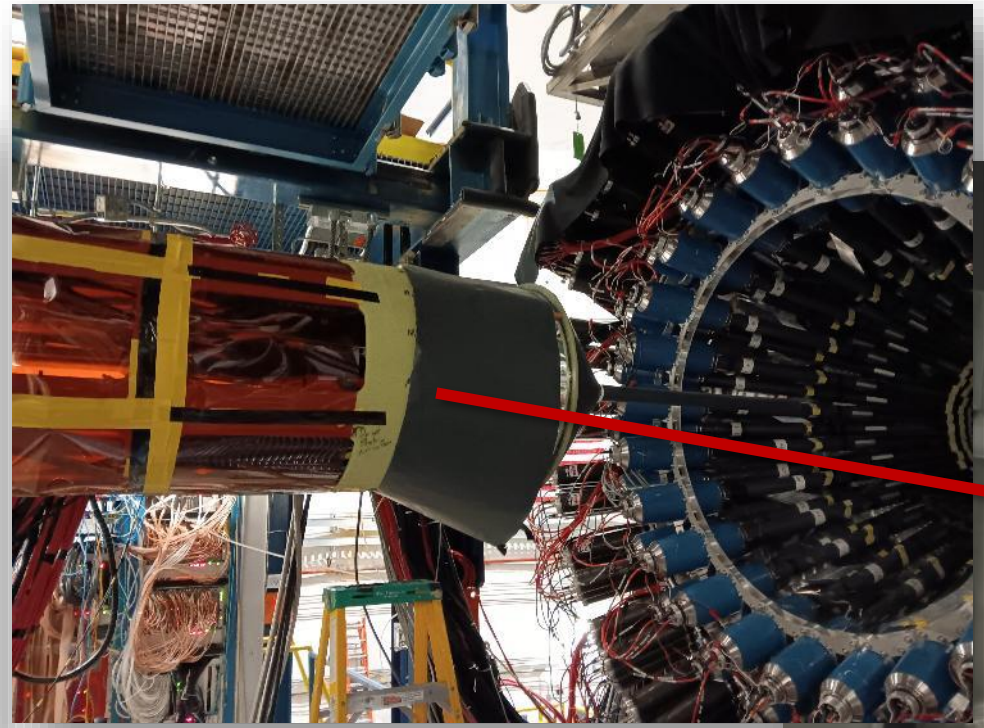
Swapping out CVT with ALERT



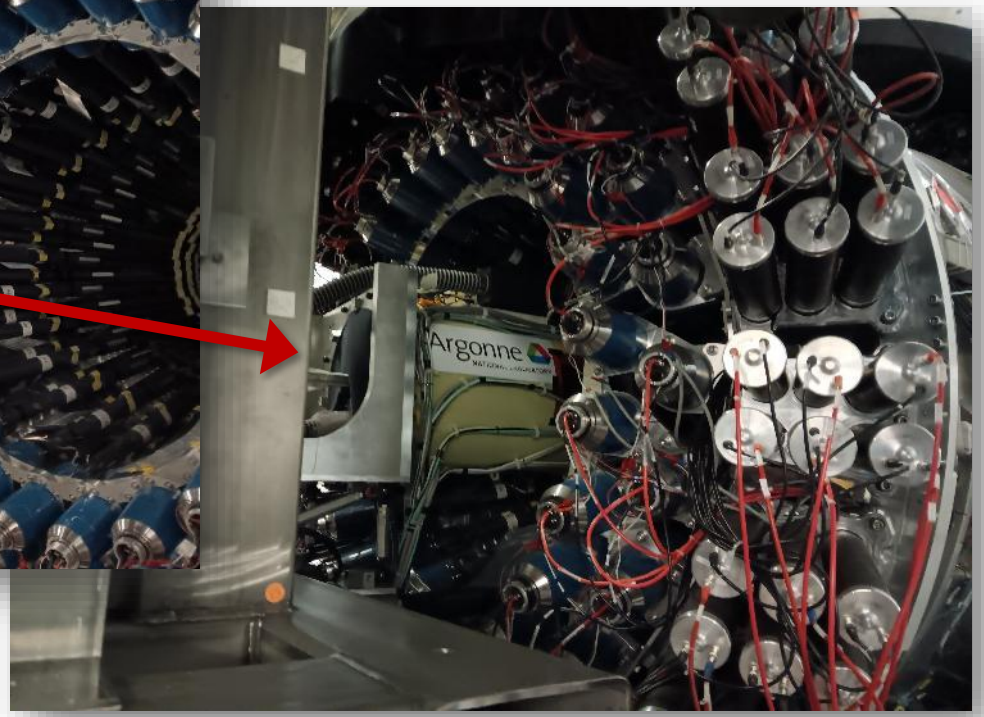
ALERT Insertion Into Solenoid Bore

Maintenance position





Operation position



ALERT detector is ready for the run

Current ALERT Schedule

SAD or scheduled Run Group	Setup / Status	Target	Beam Energy	Start Date	End Date	Scheduled Calendar Days	Remaining PAC Days Before Run	Scheduled PAC Days = Cal.Days/2	Actual PAC Days from ABUs	Remaining PAC Days After Run
SAD 2024				2024-05-19	2025-03-07	292				
RG-L	ALERT	high pressure gas	2.1	2025-03-24	2025-03-31	7	55	4		52
	pass change			2025-03-31	2025-04-01	1				
RG-L	ALERT	high pressure gas	11	2025-04-01	2025-07-18	108	52	54		-3
	pass change			2025-07-18	2025-07-19	1				
RG-L	ALERT	high pressure gas	2.1	2025-07-19	2025-07-21	2	-3	1		-4
	pass change			2025-07-28	2025-07-29	1				
RG-L	ALERT	high pressure gas	6.6	2025-07-29	2025-09-04	37	17	18.5		-1.5
SAM 2025	reconfigure	change				157	**sum:**	**77**		

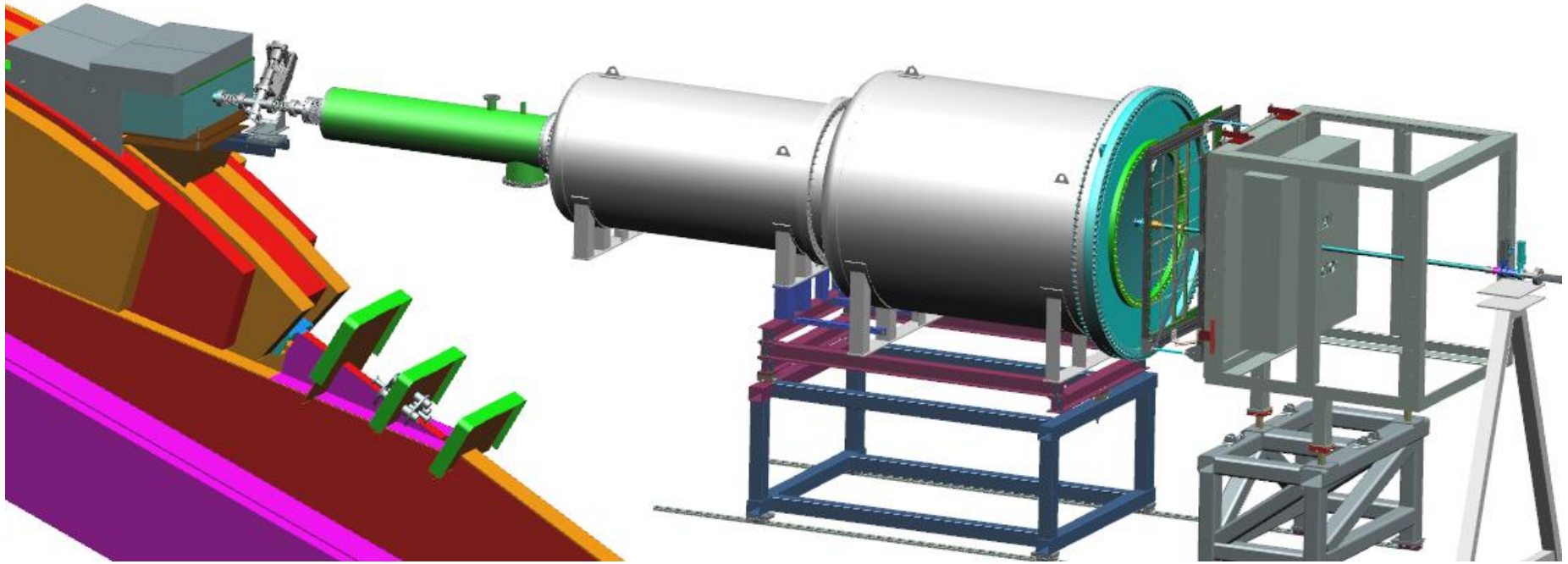
Calorimeter Setup in Hall B for X17 Search

Experimental setup based on existing PRad equipment

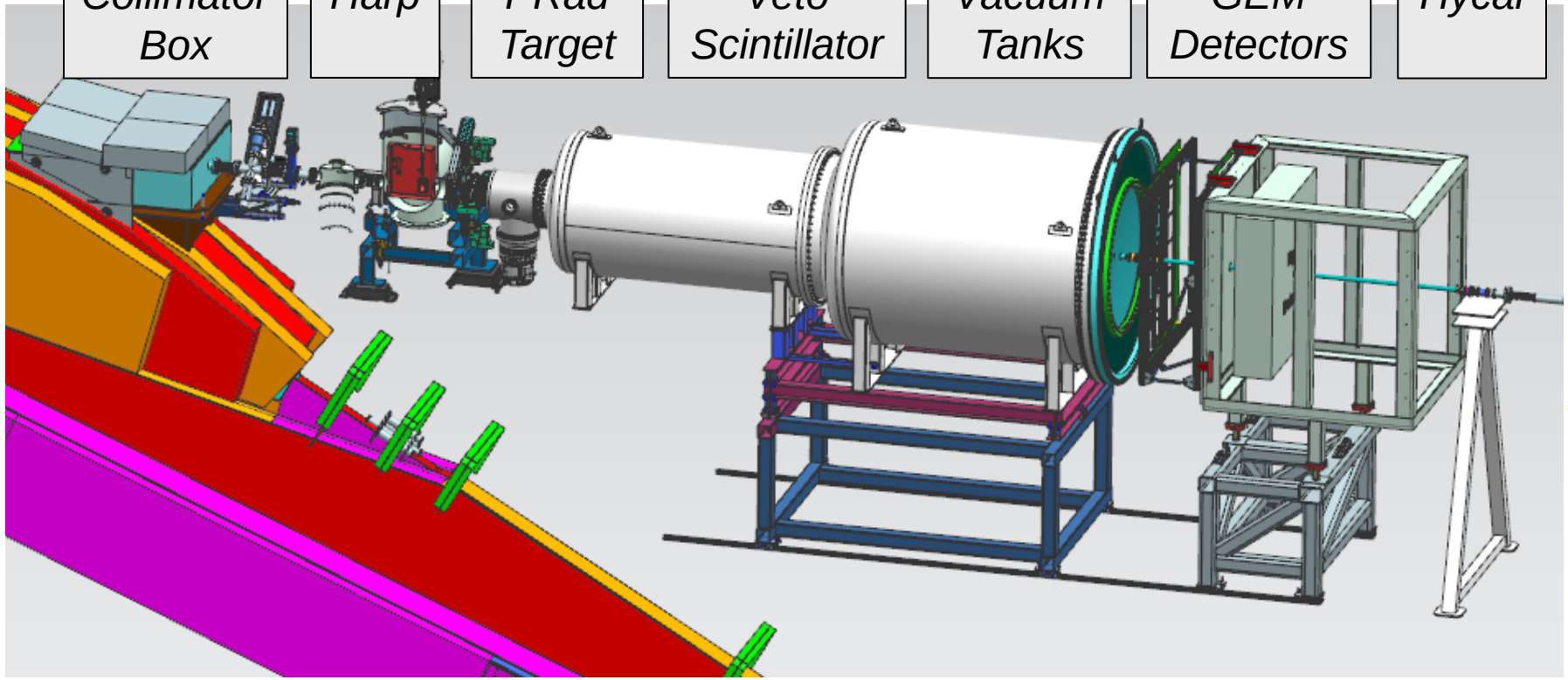
- Hall B Photon Tagger for $PbWO_4$ calorimeter calibration
- Large vacuum box to minimize scattering
- Two planes of GEM detectors for tracking
- HyCal Calorimeter for electrons and gammas
- For X17 specific: 1 μm Ta (2.4 x 10^{-4} X_0) thin foil targets

Background-minimized
very-forward detector

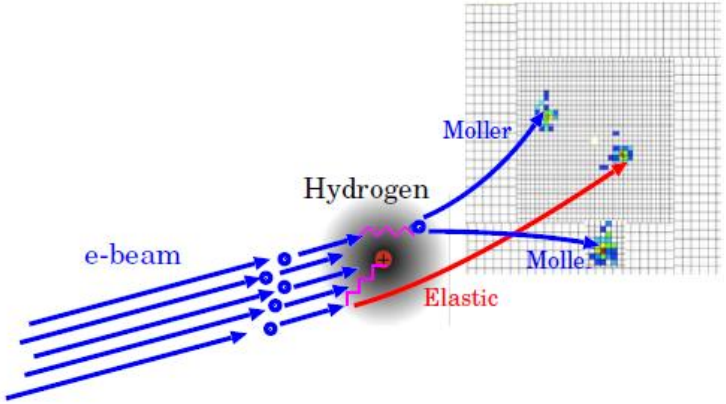
Collimator Box	*Target & Harp*	*Vacuum Tube*	*Vacuum Tanks*	*1 Meter Window*	*GEM Detectors*	*Hycal*

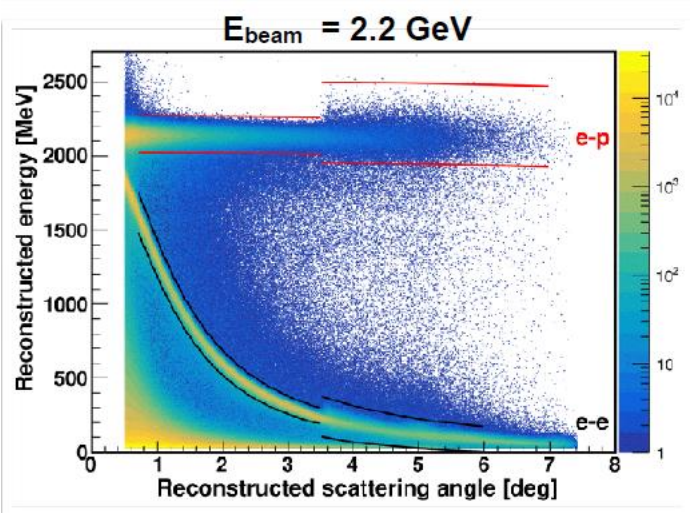


Calorimeter Setup in Hall B for PRad-II



Elastic to Møller scattering





This experimental design:

- Allows control of systematics
- Eliminates need to monitor luminosity

Data from PRad Collaboration

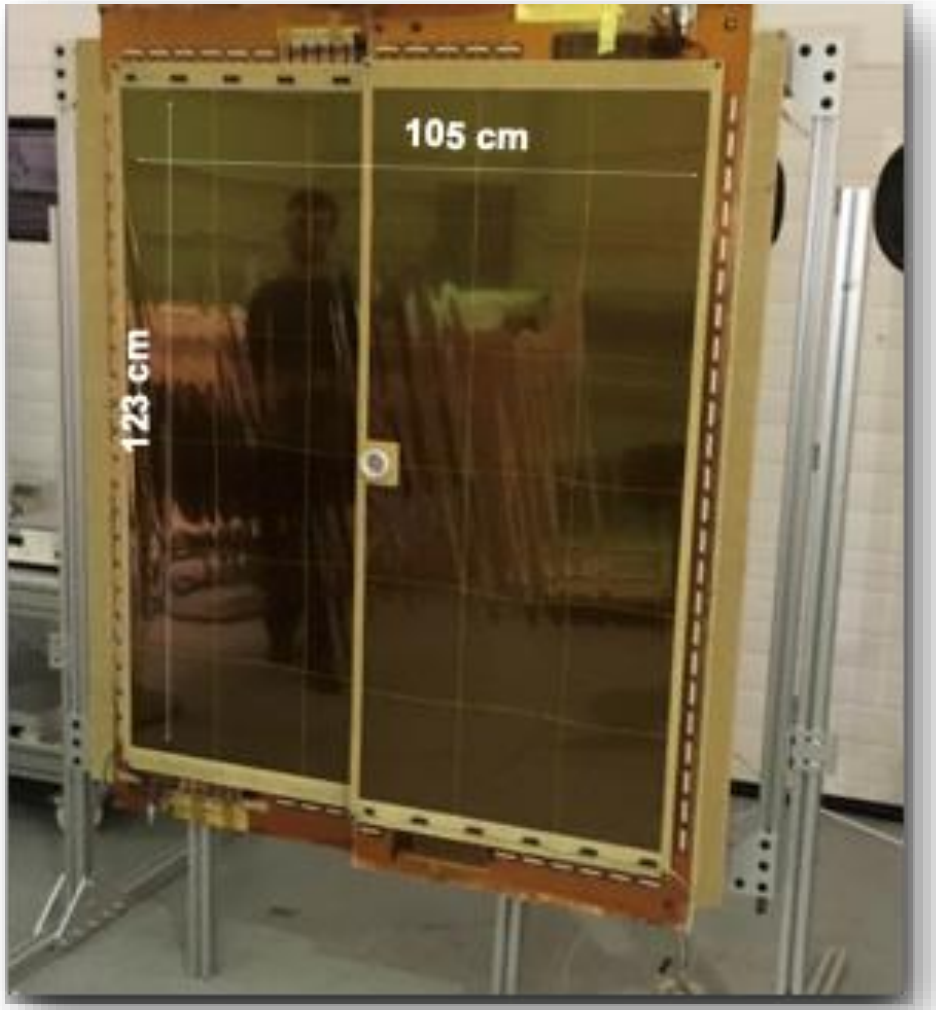
GEM Detector Tracking

Two planes (4 layers) of **new GEMs**

- Located in front of $PbWO_4$ behind vacuum window
- Veto of neutral particles for $X \rightarrow e^+e^-$ channel and Veto of charged particles for $X \rightarrow \gamma\gamma$ channels

- Optimized relative distance of 40 cm for resolution
- Optimized design for GEM foil, drift foil
- New spacer location
- Good position resolution of $\boldsymbol{\sigma = 72\ \mu m}$
- **New electronics** based on APV-25 readout system

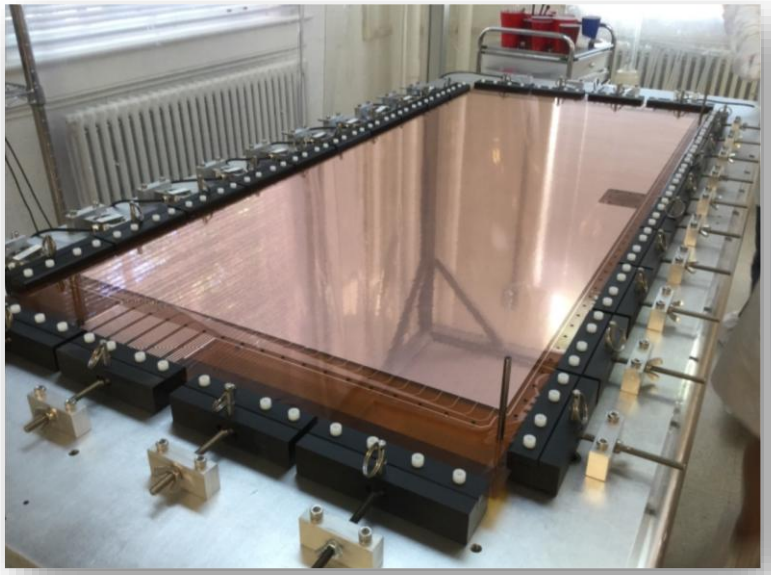
This detector will improve on the PRad precision

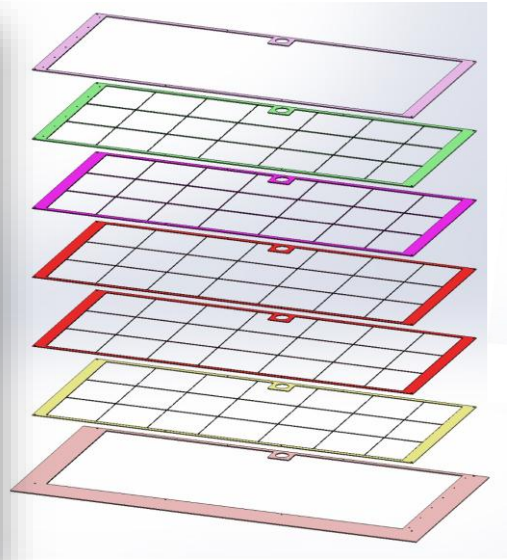


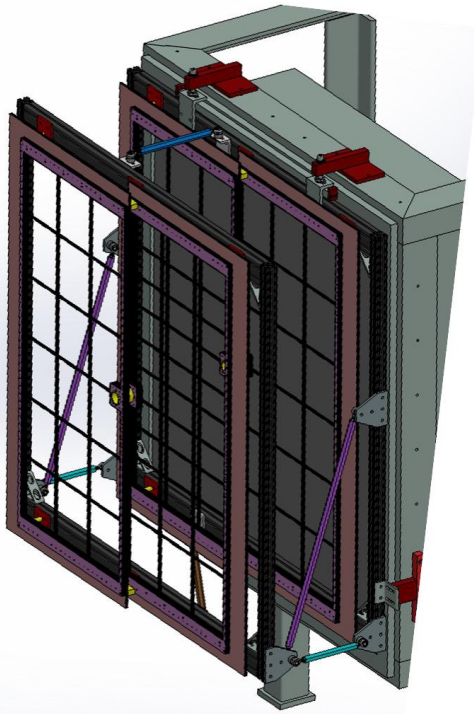
PRad chambers not to be used in Prad-II/X17 Experiments

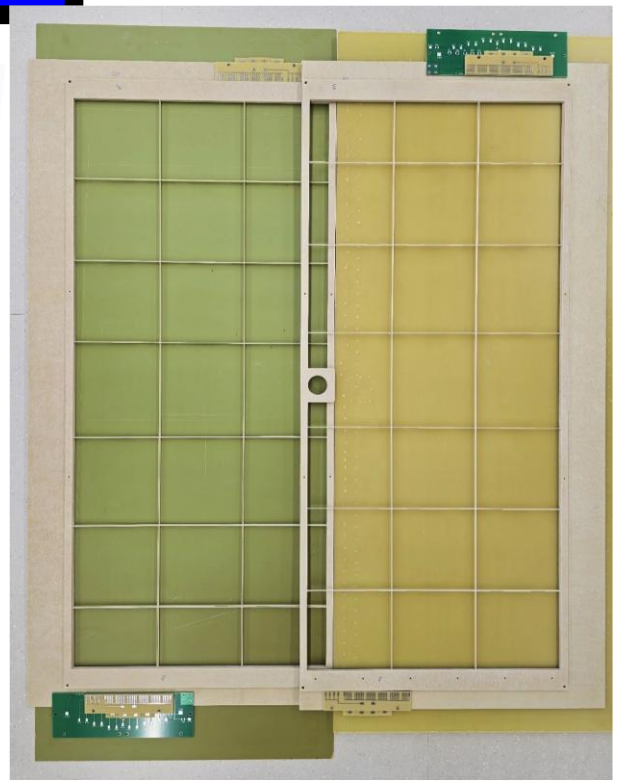
PRad-II/X17 Run Preparations at UVa

- GEM frames arrived at Uva
- GEM foils and readouts will arrive at UVa in March
- GEMs Assembly in cleanroom to start in 2 weeks





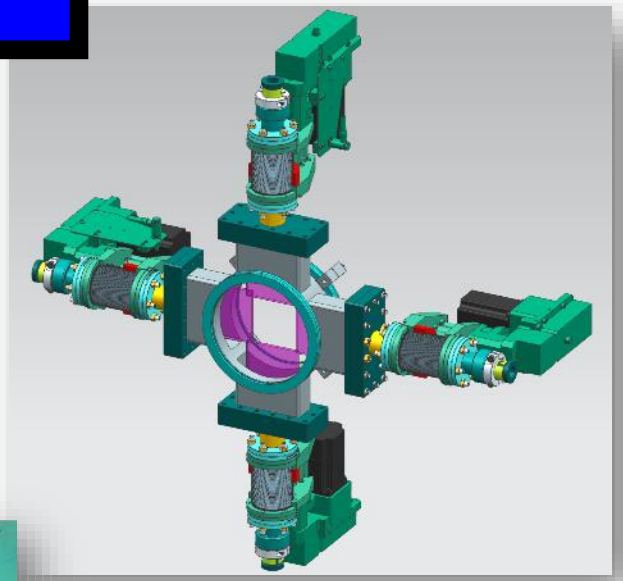


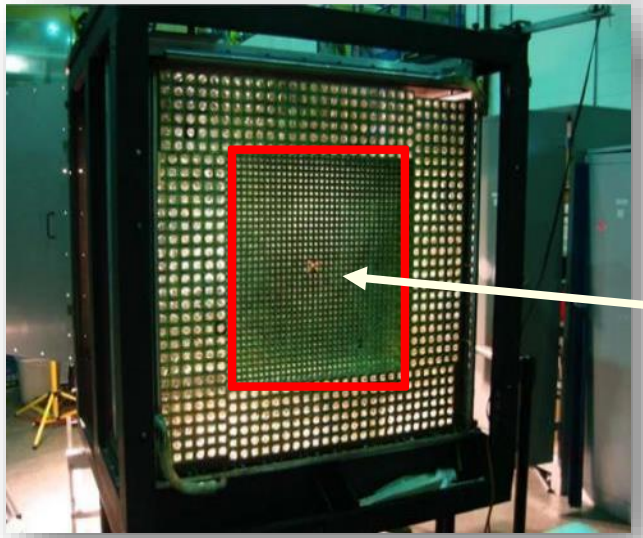


Finish of characterization and moving 2 chambers to JLab in June, 2025

PRad-II/X17 Run Preparations at JLab

- **New scintillator system** designed and constructed at JLab
- **Beam-lines** for PRad2/X17 designed; **Vacuum box** inspected
- **HyCal** is being refurbished and tested channel-by-channel
- **HyCal electronics** is procured (based on new fADC-250 modules)
- **PRad windowless gas flow target** is tested on site

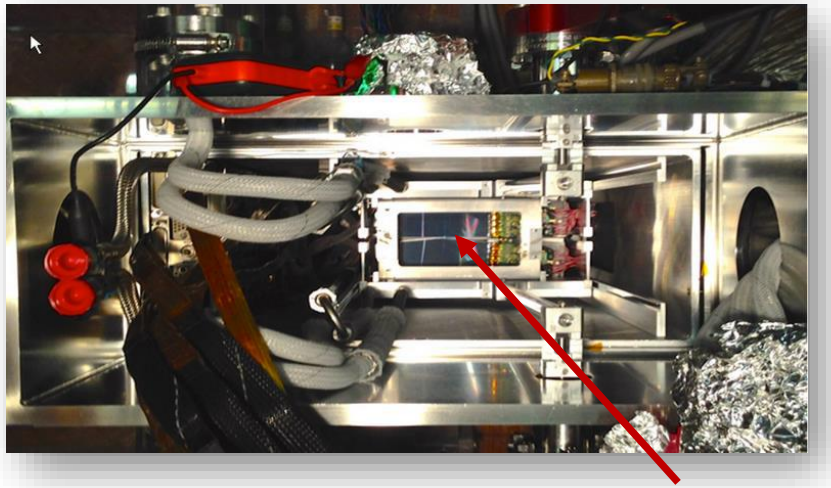


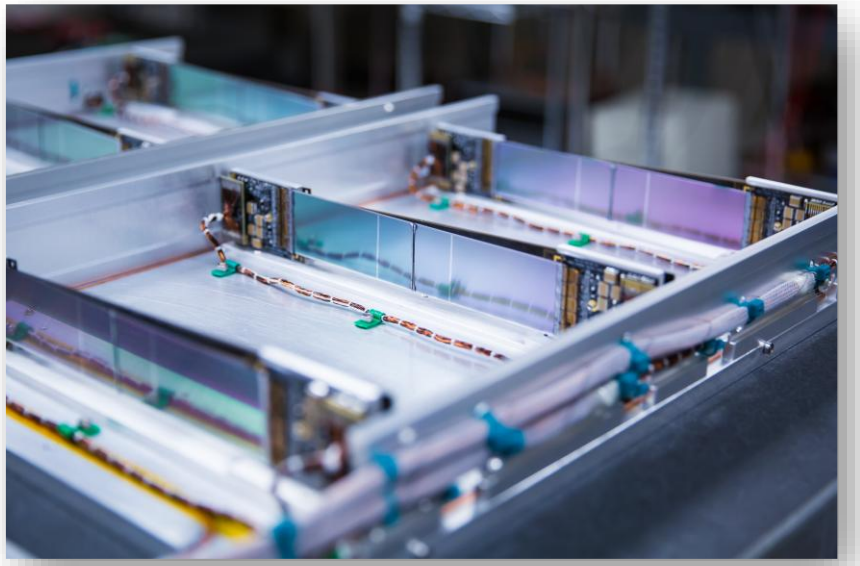


Experimental Readiness Review is scheduled for 9 May, 2025

Update on HPS

- **SIMS analysis from 2016 data**: reach in uncharted regions of **dark meson** parameter space
- **SVT alignment for 2021 data** in good shape
- Beam background merging implemented in MC instead of CPU-intensive simulations





- **Preparations for next run:**
  - New FEB fabrication in progress after validation of two boards
  - Issues with cutting edges of slim sensors
  - Setup optimization for running beam on target without chicane magnets for alignment

Data Processing, Publications, and Theses

Data Processing for CLAS12

- **Run Group C Fall 2022 data set** was processed in Fall 2024
- **Run Group C Spring 2023 data set** was approved for data processing

There seems to be a ‘calibration constant’ of a **2-year latency** between data taking and processing

- **Calibration Task Force** was implemented to address this issue; first results will get reported today

- **Run Group A Spring 2018 data set** was reviewed last week for data processing
  - This is the largest data set; however, it has the most issues as it followed the engineering run
- Remaining data sets are 2023/24 are currently calibrated, to be ready later this year

Completed PhD Theses with CLAS12 Data

MEASURING CLAS12 $D(E, E'\Pi^{\pm})$ CROSS SECTIONS FOR *E4NU*

by

Caleb Fogler
B.S. December 2016, Old Dominion University
M.S. May 2019, Old Dominion University

A Dissertation Submitt
Old Dominion University in
Requirements for

DOCTOR OF P

PHYS

OLD DOMINION
Decembe

Search for a Singly Strange Hexaquark Using Polarization Data From CLAS12 at Jefferson Lab Virginia

Geraint Clash

Doctor of Philosophy

University of York
sics, Engineering and Technol

Timelike Compton Scattering from a Longitudinally Polarised Target with CLAS12 at Jefferson Lab

Kayleigh Gates

Submitted in fulfilment of the requirements for the
Degree of Doctor of Philosophy

School of Physics and Astronomy
College of Science and Engineering
University of Glasgow

University of Glasgow

2024

université PARIS-SACLAY

Nucleon Structure Studies at Jefferson Lab and the Electron Ion Collider

Études de la structure des nucléons au laboratoire Jefferson et au collisionneur électrons-ions

rat de l'université Paris-Saclay

rticules Hadrons Énergie et Noyau :
e, Cosmos et Simulation (PHENIICS)
ité de doctorat : Physique nucléaire
érent : Faculté des sciences d'Orsay

CLab (Université Paris-Saclay, CNRS),
via NICCOLAI, Directrice de recherche,
OZ CAMACHO, Directeur de recherche.

Paris-Saclay, le 14 octobre 2024, par

Noémie PILLEUX

Differential Cross Sections from CLAS12 RG-A Inclusive Electron Scattering

Valerii Kilimenko

B.S. Physics, Moscow State University, 2017
M.S. Physics, Moscow State University, 2019

A Dissertation
Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy
at the
University of Connecticut
2024

In Q4/2024:

- Geraint Clash
- Valerii Klimenko
- Caleb Fogler
- Kayleigh Gates
- Noémie Pilleux

Completed PhD Thesis with HPS Data

- Last December, Alic Spellman graduated from UCSC with a search for SIMS using 10% of 2016 data

UNIVERSITY OF CALIFORNIA
SANTA CRUZ

SEARCHING FOR STRONGLY-INTERACTING DARK MATTER WITH THE HEAVY PHOTON SEARCH EXPERIMENT

A dissertation submitted in partial satisfaction of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PHYSICS

by

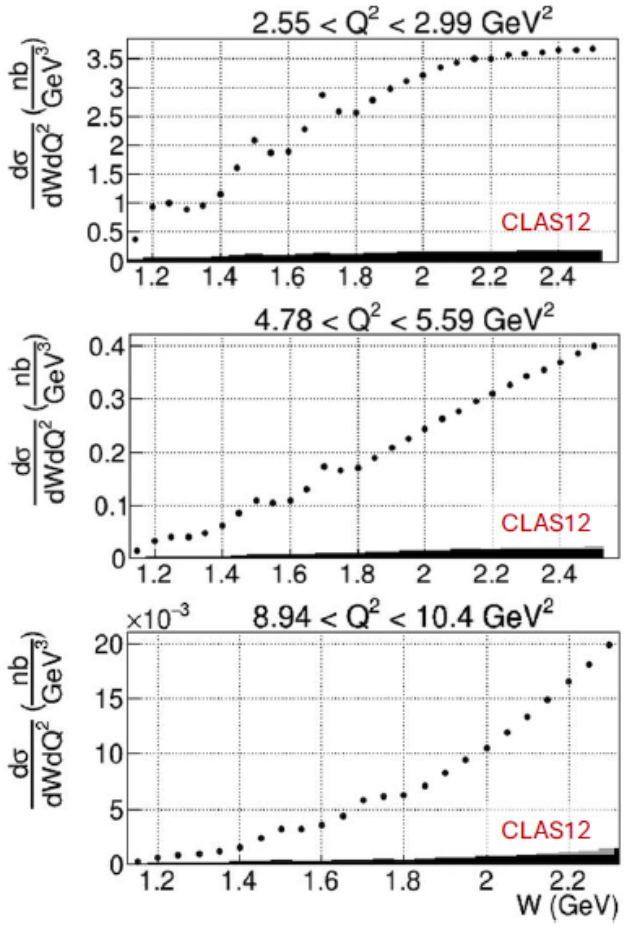
Alic Spellman

December 2024

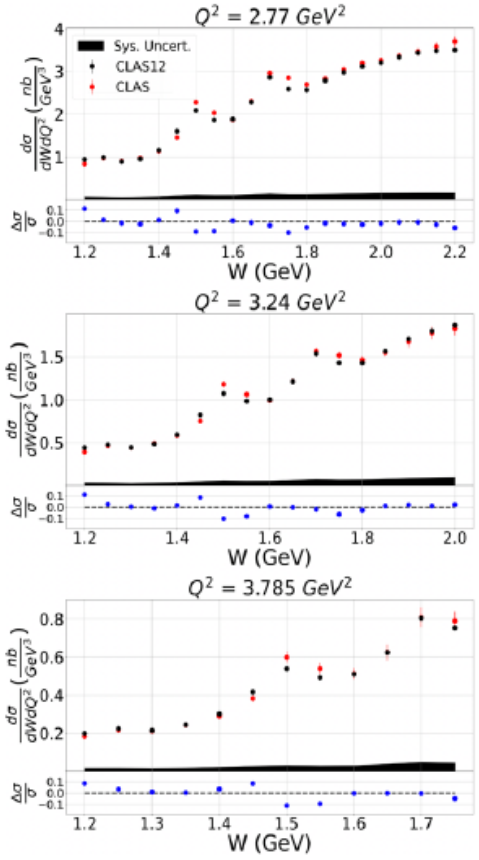
Inclusive Cross Sections Publication

- First results for **inclusive electron scattering** differential cross sections from CLAS12 **RG-A data**
- Extension of available data from CLAS and Hall C

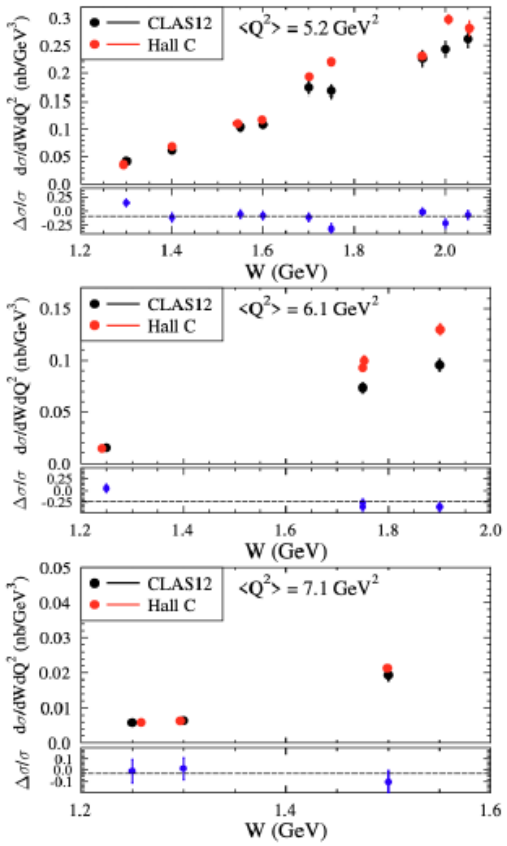
V. Klimenko *et al. (CLAS Collaboration)*, "*Inclusive Electron Scattering in the Resonance Region off a Hydrogen Target with CLAS12*", accepted in Phys. Rev. C (2025)

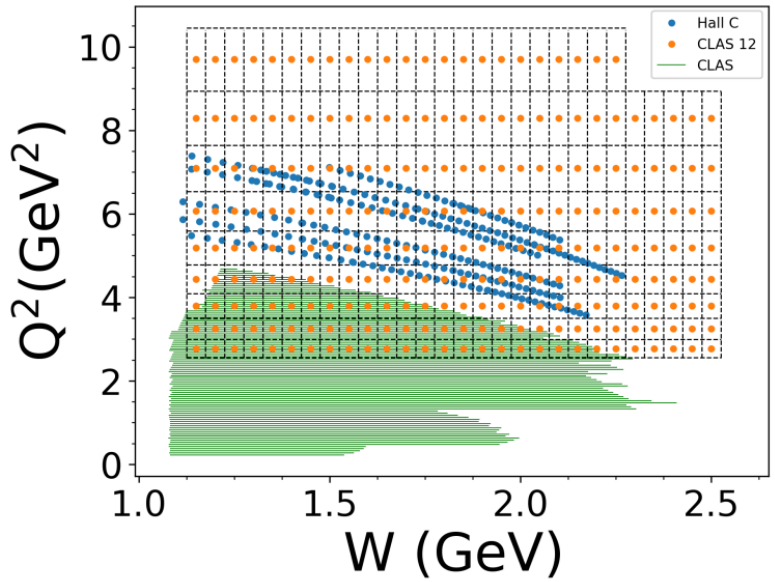


CLAS12 vs. CLAS



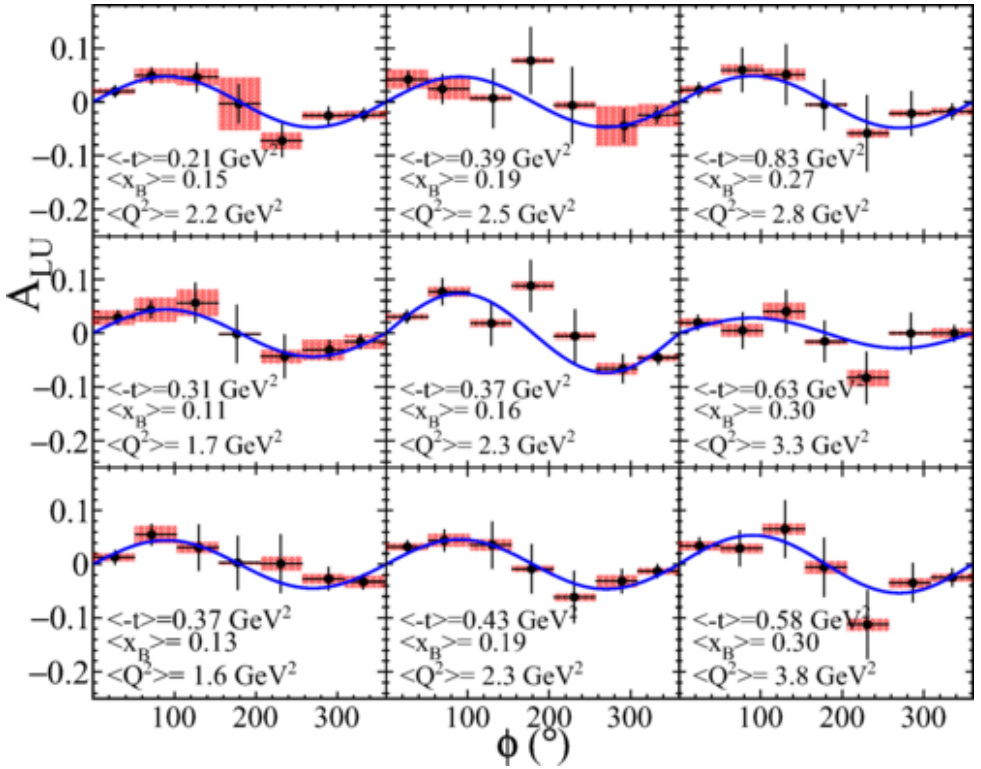
CLAS12 vs. Hall C



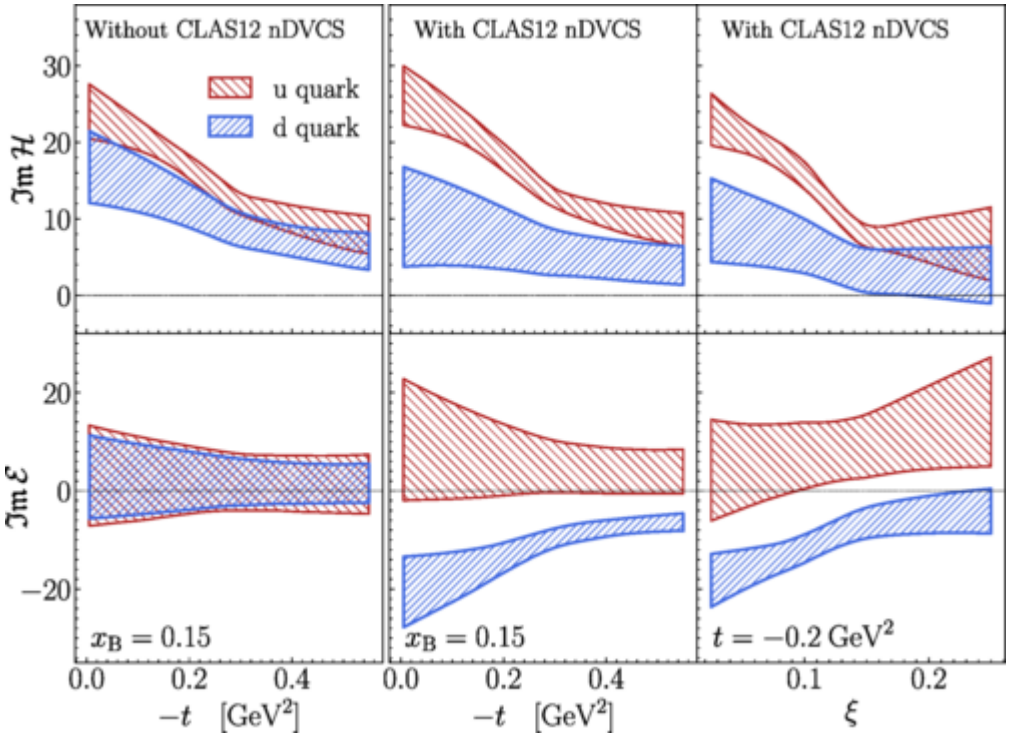


DVCS on the Neutron Publication

Beam-spin asymmetry for nDVCS versus ϕ for 3 bins in $-t$, 3 bins in x_B , and 3 bins in Q^2



Extraction of up and down quark contributions to the Compton Form Factors ℑm H and ℑm E



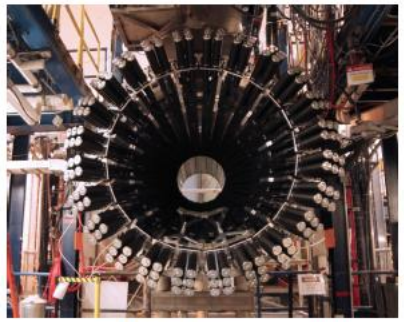
Results from CLAS12 **RG-B data**

A. Hobart *et al. (CLAS Collaboration)*, "First Exclusive Measurement of Deeply Virtual Compton Scattering on the Neutron", Phys. Rev. Lett. 133, 211903 (Nov. 2024)

News Release 21 Nov / *JLab Weekly* 26 Nov 2024

ACCESSING THE LESSER KNOWN NUCLEON

ACCESSING THE LESSER KNOWN NUCLEON



The Central Neutron Detector installed in Experimental Hall B. Silvia Niccolai and her team at the Laboratory of the Physics of the two Infinities Irène Joliot-Curie (IJCLab), a joint research unit of CNRS in Orsay, France, Paris-Saclay University, and Paris-City University, began constructing the detector in 2011 with funding from the French National Institute of Nuclear and Particle Physics. (Photo courtesy Silvia Niccolai)

An inaugural measurement of the neutron will help physicists learn about nucleon structure and spin

Protons and neutrons–known collectively as nucleons–are the building blocks of matter, but one of these particles has received a bit more attention in certain types of nuclear physics experiments.

Until now. New results published in *Physical Review Letters* describe a first-time glimpse of the internal structure of the neutron thanks to the development of a special, 10-years-in-the-making detector installed in Experimental Hall B at the U.S. Department of Energy's Thomas Jefferson National Accelerator Facility.

"We detected the neutron for the first time in this type of reaction, and it's a quite important result for the study of nucleons," said Silvia Niccolai, a research director at the French National Centre for Scientific Research (CNRS).

Niccolai proposed the experiment that enabled this measurement, which will help physicists better understand the structure and spin of both neutrons and protons.

A new way to detect neutrons

Nucleons are made up of smaller particles called quarks and gluons. Physicists don't yet fully understand how these constituent particles are distributed inside nucleons, or how they contribute to overall nucleon spin. Experimenters use the Continuous Electron Beam Accelerator Facility (CEBAF), a DOE Office of Science user facility, to probe these particles, scattering electrons off nucleon targets and detecting the final products of these reactions.

One reaction is called deeply virtual Compton scattering (DVCS). In DVCS, an electron interacts with a nucleon target. The nucleon absorbs some of the electron's energy and emits a photon, but doesn't break. In the end, three particles can be detected: the impinged nucleon, the photon it emitted, and the electron that interacted with the nucleon.

Researchers have studied DVCS extensively using the CLAS12 detector, which stands for the CEBAF Large Acceptance Spectrometer at 12 GeV beam energy, as well as its predecessor, CLAS. However, the CLAS and CLAS12 detectors in Hall B have mostly been used to explore DVCS on the proton, which is easier to measure than DVCS on the neutron.

Neutrons involved in DVCS are more difficult to detect because they tend to scatter 40 degrees up from the beamline, an area CLAS12 cannot access.

"In the standard configuration, there was no detection for neutrons possible in these angles," Niccolai said. In 2007, she started thinking about how the CLAS collaboration of nuclear physicists could measure these neutrons. Her solution? The Central Neutron Detector.

and her team encountered an unexpected problem during data analysis: proton contamination.

The detector was designed to discard charged, non-neutron signals. However, they found that the part of the detector responsible for vetoing protons had dead zones, allowing protons to sneak in and contaminate the neutron measurements.

Fortunately, Adam Hobart, a researcher at IJCLab who led the data analysis for this experiment, was able to clean the data.

neutron measurements from this experiment allowed the researchers to access one of the least known types, denoted as GPD E.

During the experiment, CEBAF's beam was polarized, meaning the spins of its electrons were pointed in the same direction. This allowed the researchers to extract an observable, known as an asymmetry, that depends on the spin of the beam. With this asymmetry, they were able to extract GPD E with unprecedented precision.

"The GPD E is very important because it can give us information into the spin structure of nucleons,"

with other GPDs, GPD E can be how much constituent quarks total spin of the nucleon, which is vn. Though that calculation will be ture work, in this work the another step toward solving the on spin crisis."

n two types, or flavors, of quarks: proton has two up quarks and one eutron has two down quarks and PDs can be split up by quark

surements of DVCS on the vious measurements of DVCS on ed the researchers to separate the of the GPDs E and H by quark t time. Separating the up and down quarks will help stand how different flavors of to nucleon spin.

Čuić and Krešimir Kumerički also is first-time flavor separation, but entire CLAS collaboration was ng these pioneering results.

"We must give gratitude to the whole CLAS Collaboration," Hobart said. "Taking and processing the data is collaborative work."

CLAS12 in Experimental Hall B.

Proof of principle in hand, the researchers plan next to collect more data with CLAS12 and the Central Neutron Detector to make even more precise measurements.

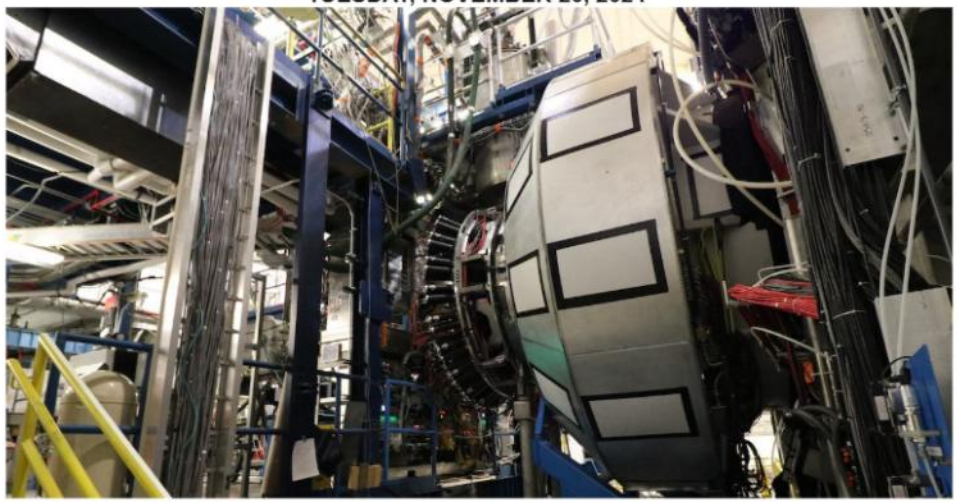
"But this first result is major," Niccolai said. "It feels like the completion of a cycle and a lifetime achievement because this is the first project that I took full responsibility for in my career. Finally arriving at a physically meaningful result and having it published feels like I've had another baby."

Further Reading
How Strong is Strong?
Experimental Hall B

By Chris Patrick

Contact: Kandice Carter, Jefferson Lab Communications Office, kcarter@jlab.org

TUESDAY, NOVEMBER 26, 2024



A view of the Central Neutron Detector in Hall B's CEBAF Large Acceptance Spectrometer for 12 GeV (CLAS12).

Accessing the Lesser-Known Nucleon

Protons and neutrons – known collectively as nucleons – are the building blocks of matter, but protons have received more attention in certain types of nuclear physics experiments. Until now. New results published in Physical Review Letters describe a first-time glimpse of the internal structure of the neutron thanks to the development of the Central Neutron Detector installed in Experimental Hall B's CLAS12 detector. To read the full story, click here.

Media Coverage of News Release Nov 2024

Русский · Паблик ВК · Телеграм Канал

SE7EN.ws

Революционный детектор открывает новые возможности изучения внутренней структуры нейтрона через первые измерения глубокого виртуального комптоновского рассеяния

24 Ноя в 00:40 · Техника и IT · Прокомментировать · 16

Протоны и нейтроны, известные под общим названием нуклоны, являются основополагающими элеме
материи. Тем не менее в ядерной физике нейтронам традиционно уделялось меньше внимания по сра
протонами. В недавно опубликованной статье в Physical Review Letters описывается новаторский подхо
изучению внутренней структуры нейтрона, достигнутый благодаря созданию специального детектора,
разработку которого потребовалось 10 лет.

INTERESTING ENGINEERING

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SCIENCE

A reaction that only measured protons detected neutrons for the first time

For the last 10 years, scientists have been working on a neutron detector. Finally, they tested it, and it worked like magic.

Updated: Nov 24, 2024 07:40 AM EST

Rupendra Brahambhatt

5 days ago

EurekAlert! | AAAS

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NEWS RELEASE 22-NOV-2024

Accessing the lesser known nucleon

An inaugural measurement of the neutron will help physicists learn about nucleon structure and spin

Peer-Reviewed Publication

DOE/THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY

Protons and neutrons–known collectively as nucleons–are ~~both~~ the building blocks of matter, but one of these particles has received a bit more attention in certain types of nuclear physics experiments.

PHYS.ORG

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NOVEMBER 22, 2024

Editors' notes

117

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Accessing the lesser known nucleon: New neutron measurement can help physicists learn about nucleon structure and spin

by Chris Patrick, Thomas Jefferson National Accelerator Facility

SciTechDaily

Biology · Chemist

Home » Physics » Inside the Neutron: Scientists Discover Hidden Layers of Matte

PHYSICS

Inside the Neutron: Scientists Discover Hidden Layers of Matter

BY THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY – NOVEMBER 24, 2024 · NO COMMENTS · 9 MINS READ

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Foreign Media Coverage of News Release

Germanic

TECHNIK UND WISSENSCHAFT

Wissenschaftler entdecken verborgene Materieschichten

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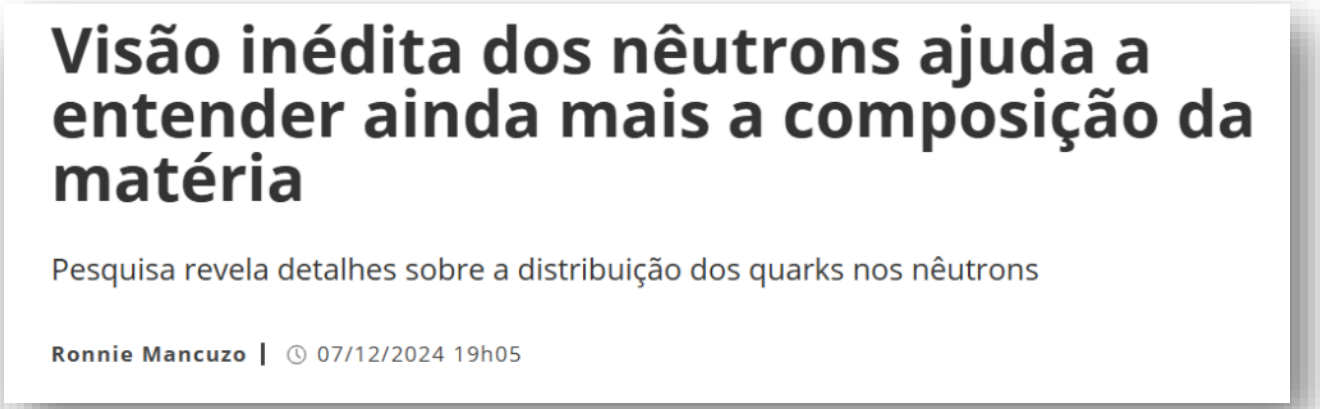


Visão inédita dos nêutrons ajuda a entender ainda mais a composição da matéria

Pesquisa revela detalhes sobre a distribuição dos quarks nos nêutrons

Ronnie Mancuzo | 07/12/2024 19h05

Nipponese

nipponese.news

科学者が物質の隠れた層を発見

世界 | November 24, 2024 | No Comments

Home » Los científicos descubren capas ocultas de materia

Tecnología

LOS CIENTÍFICOS DESCUBREN CAPAS OCULTAS DE MATERIA

24/11/2024

daily geek show

Des scientifiques dévoilent la structure interne d'un neutron avec une précision effarante

Une étude qui a demandé plus de dix ans d'efforts

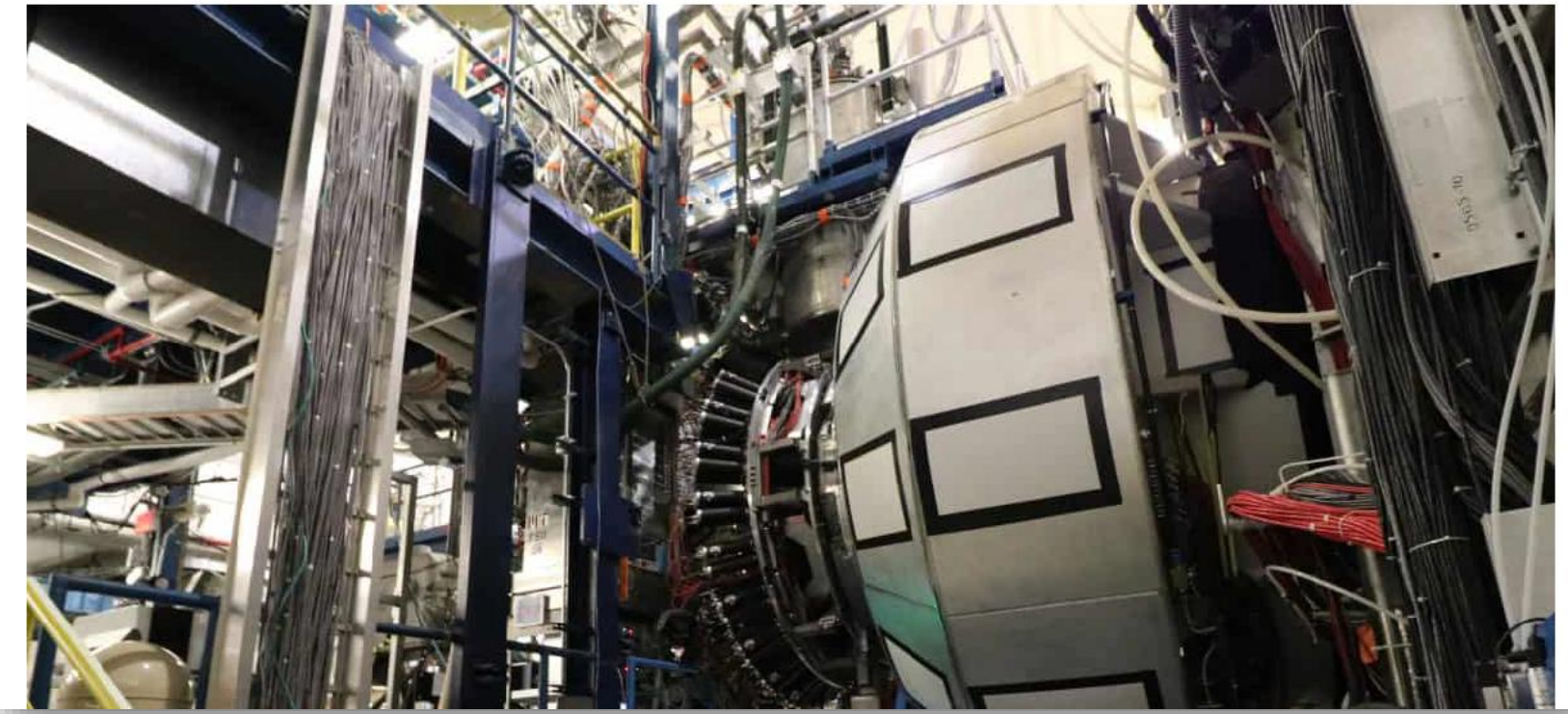
Follow-up in *Physics News* 17 Dec 2024

physicsworld

PARTICLE AND NUCLEAR RESEARCH UPDATE

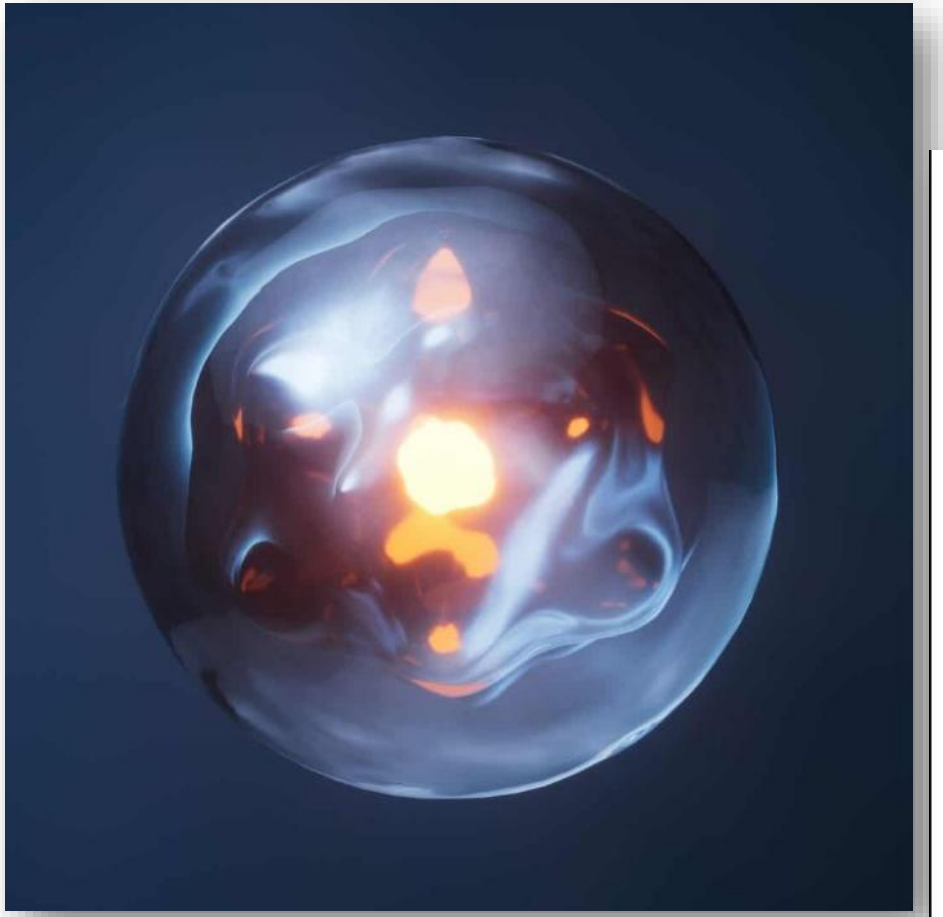
Inner workings of the neutron illuminated by Jefferson Lab experiment

17 Dec 2024



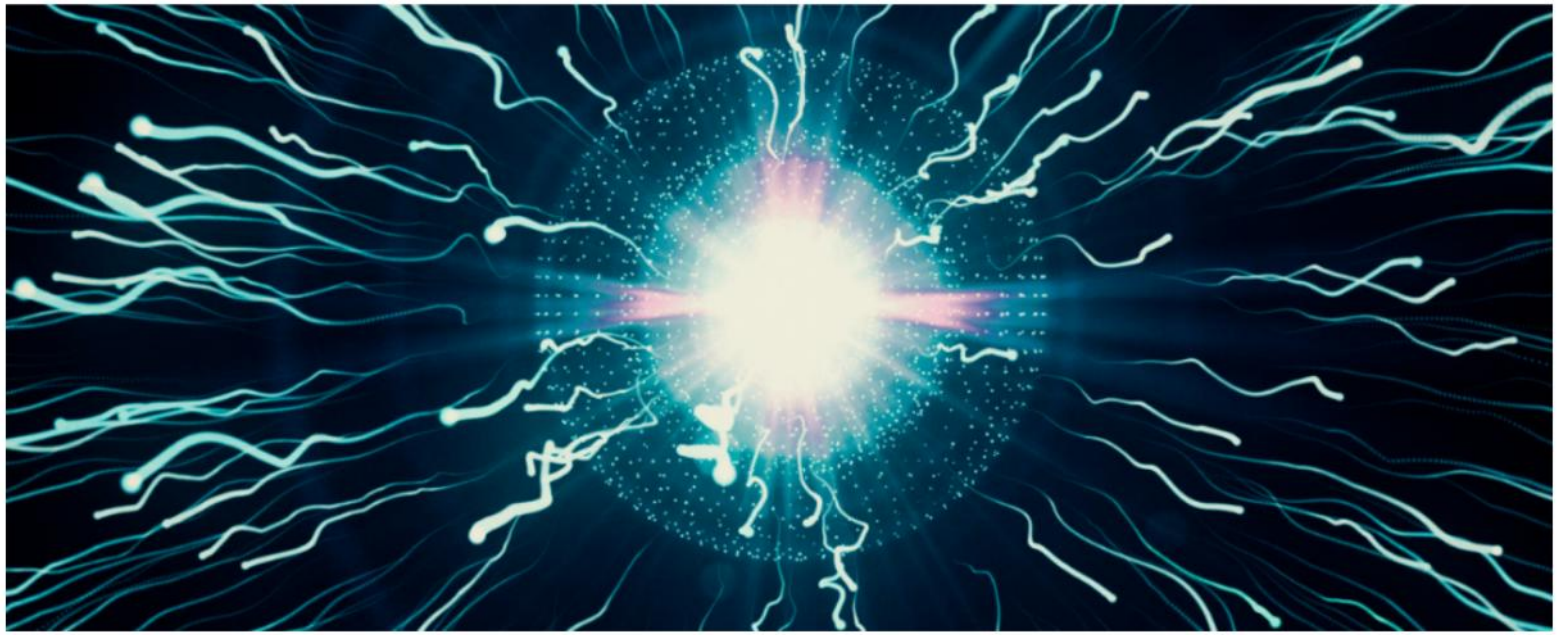
https://physicsworld.com/a/inner-workings-of-the-neutron-illuminated-by-jefferson-lab-experiment/

Glimpse of The Neutron (AI Generated?)



Huge Experiment Gives First Glimpse of The Internal Structure of a Neutron

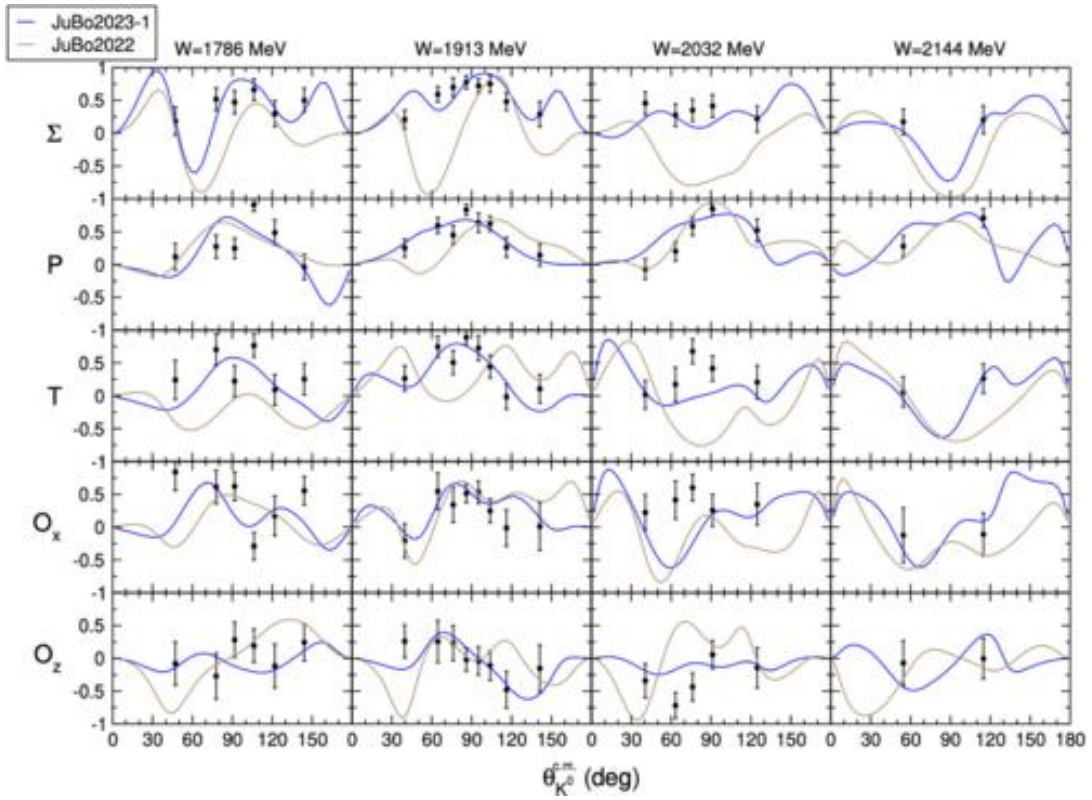
PHYSICS 07 December 2024 By MIKE MCRAE



(Eduard Muzhevskyi/Science Photo Library/Getty Images)

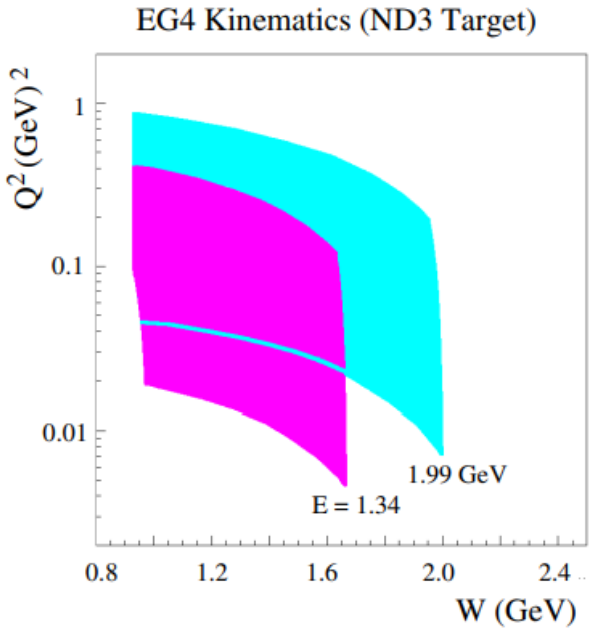
Publications Using CLAS Data

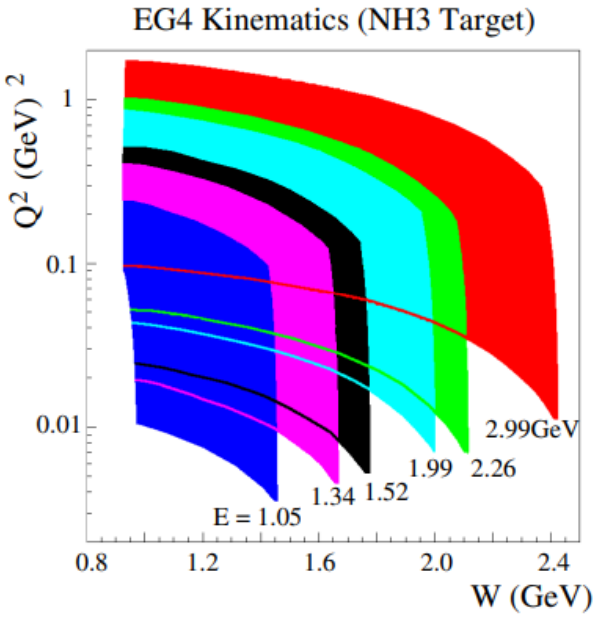
L. Clark *et al.* (CLAS Collaboration), "*Photoproduction of the Σ^+ hyperon using linearly polarized photons with CLAS*", Phys. Rev. C 111, 025204 (20 Feb 2025), DOI: https://doi.org/10.1103/PhysRevC.111.025204



A. Deur *et al.* (CLAS Collaboration), "*Measurement of the nucleon spin structure functions for 0.01 < Q^2 < 1 GeV^2 using CLAS*", submitted to Phys. Rev. C

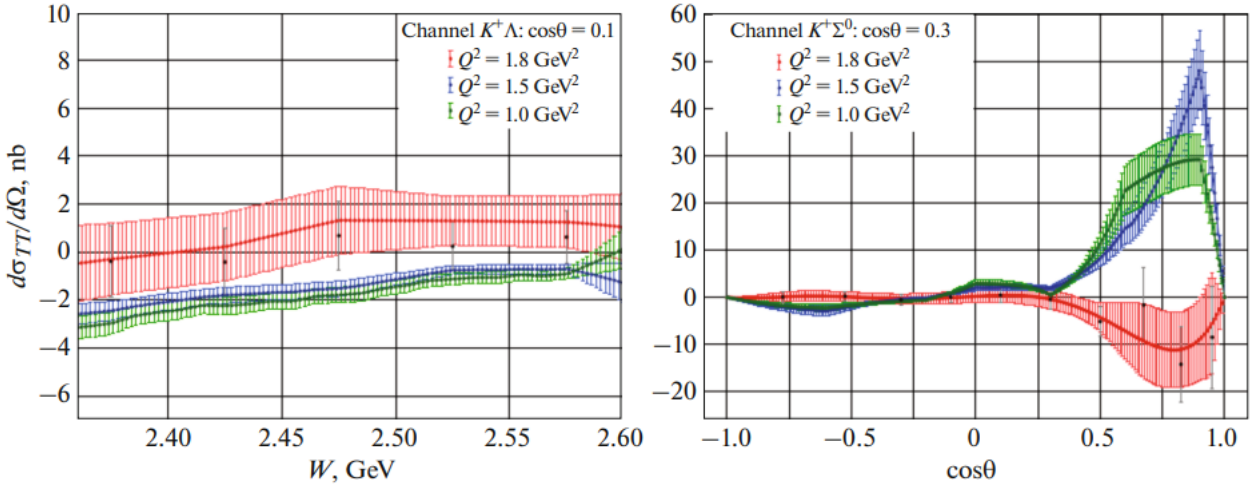
Archival paper with details of the CLAS EG4 experiment in 2006 and final results for **proton and deuteron spin structure function** data





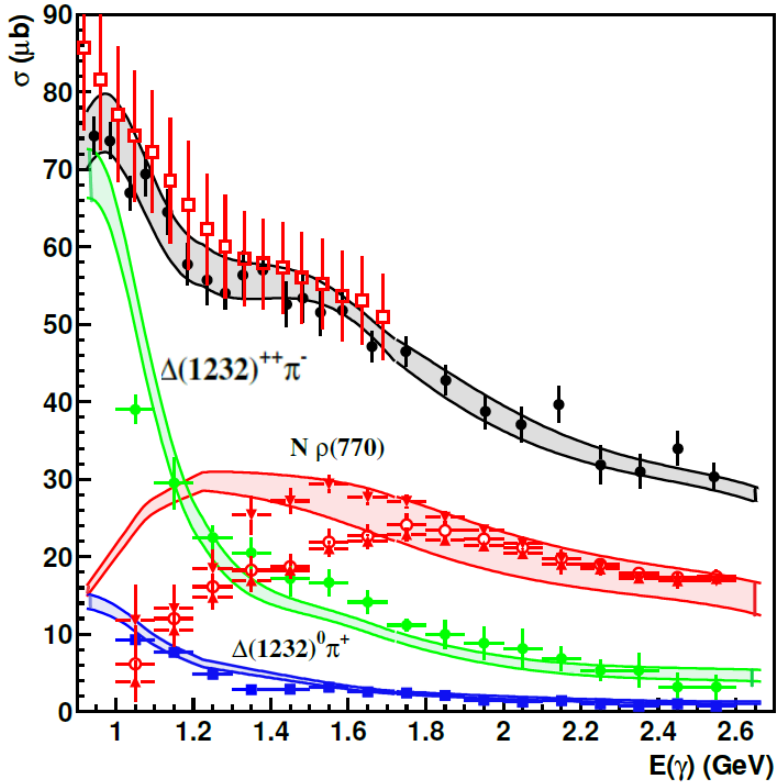
More Publications Using CLAS Data

A.V. Golda, …, V.I. Mokeev *et al.*, "*Cross Section Evaluation for Exclusive Channels of $K^+\Lambda$ and $K^+\Sigma^0$ Electroproduction off Protons Using CLAS Detector Data*", Moscow Univ. Phys. 79, 450 (2024), DOI: https://doi.org/10.3103/S0027134924700577



Estimates of the structure function $d\sigma_{TT}/d\Omega_K$ for $K^+\Lambda$ channels (left) and $K^+\Sigma^0$ channels (right)

A.V. Sarantsev, E. Klempt *et al.* (CLAS Collaboration), "*Photoproduction of two charged pions off protons in the resonance region*", accepted in Phys. Rev. C (2025)



Total cross section for the reaction γp → pπ+π− including different isobar contributions

Publications in Computing, Networking, Software

Submitted to Comp. Phys. Comm.:

High-Performance Data Format for Scientific Data Storage and Analysis

Gagik Gavalian [a]

Preprint in https://arxiv.org/abs/2501.07666

Submitted to Comp. Phys. Comm.:

CONVERTING SWEIGHTS TO PROBABILITIES WITH DENSITY RATIOS

A PREPRINT

D.I. Glazier [1] and R. Tyson [2,*]

Preprint in https://arxiv.org/abs/2409.08183

Three conference proceedings for CHEP 2023 with Hall B contributions:

Real Time implementation of Artificial Intelligence compression algorithm for High-Speed Streaming Readout signals.

Fabio Rossi[1*], *Marco* Battaglieri[1], *Gagik* Gavalian [2], *Edoardo* Ragusa[3], and *Paolo* Gaastaldo[3]

Real-Time event reconstruction for Nuclear Physics Experiments using Artificial Intelligence

Gagik Gavalian [1,*]

Online Electron Reconstruction at CLAS12

Richard Tyson,[1,*] and *Gagik* Gavalian[1,**]

[1]Thomas Jefferson National Accelerator Facility, Newport News, VA 23606,USA

Publication on ATOMKI Anomaly aka X17

PHYSICAL REVIEW C **111**, 024320 (2025)

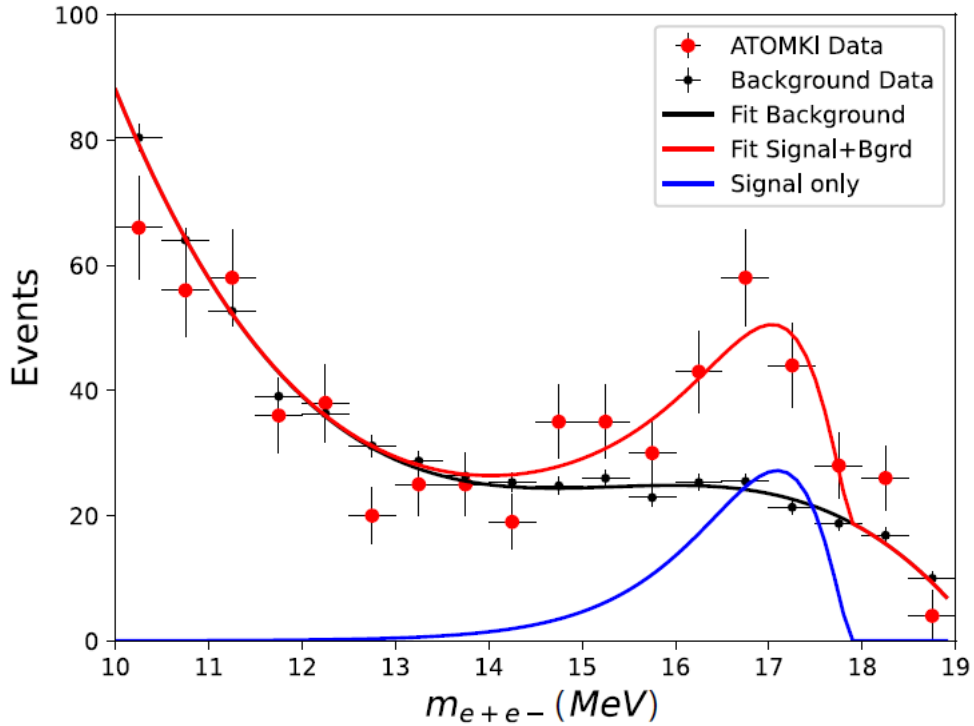
Quantum chromodynamics resolution of the ATOMKI anomaly in ^{4}He nuclear transitions

Valery Kubarovsky [*]
Thomas Jefferson National Accelerator Laboratory, Newport News, Virginia 23606, USA

Jennifer Rittenhouse West [†]
Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA
and EIC Center at Thomas Jefferson National Accelerator Laboratory, Newport News, Virginia 23606, USA

Stanley J. Brodsky [‡]
SLAC National Accelerator Laboratory, Stanford University, Stanford, California 94309, USA

(Received 3 June 2024; accepted 3 February 2025; published 27 February 2025)



"In light of this work, we emphasize the need for independent experimental confirmation or refutation of the ATOMKI results …"

Description of ATOMKI invariant mass distribution with **electromagnetic transition** hexadiquark*(17.9) → ^{4}He + (e+e−)

Publication in Detector Physics

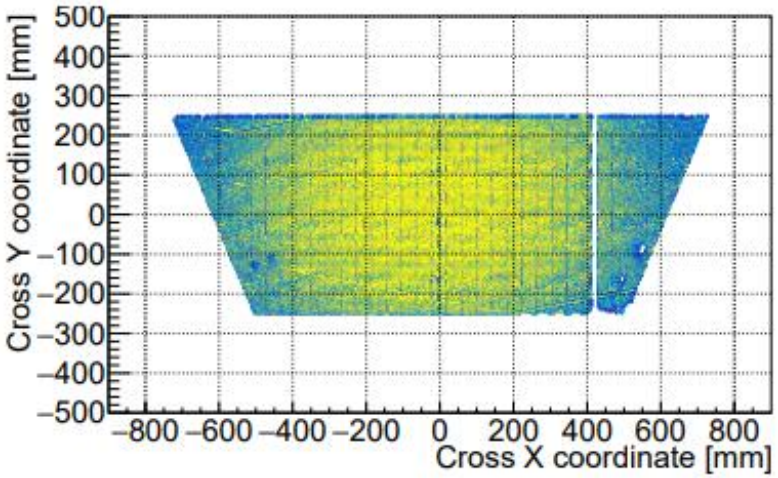
PROCEEDINGS OF SCIENCE

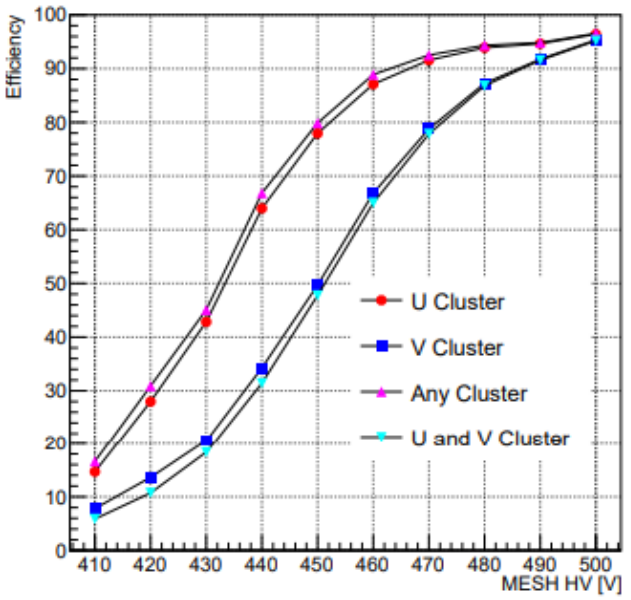
μRWELL detector developments at Jefferson Lab for high luminosity experiments

Kondo Gnanvo [a], Florian Hauenstein [a], Sara Liyanaarachchi [a], Nilanga Liyanage [b], Huong Nguyen [b], Rafayel Paremuzyan [a,*] and Stepan Stepanyan [a]

Preprint in https://arxiv.org/abs/2409.08183

This R&D activity is continuing with a new prototype detector using a revised design





Efficiency with $Ar:C_4H_{10}$ gas 90:10 mixture

Publication in Outreach and Education

V. Burkert, S. Diehl, P. Schweitzer, *"Quarks unter Hochdruck im Proton"*, Physik in unserer Zeit 55 (6) 298–306 (Nov. 2024), https://doi.org/10.1002/piuz.202401699

Mechanische Struktur des Protons

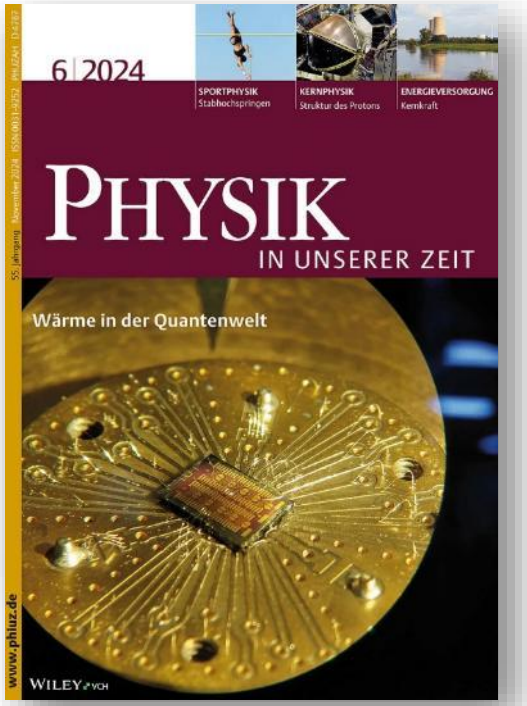
Quarks unter Hochdruck im Proton

VOLKER BURKERT | STEFAN DIEHL | PETER SCHWEITZER

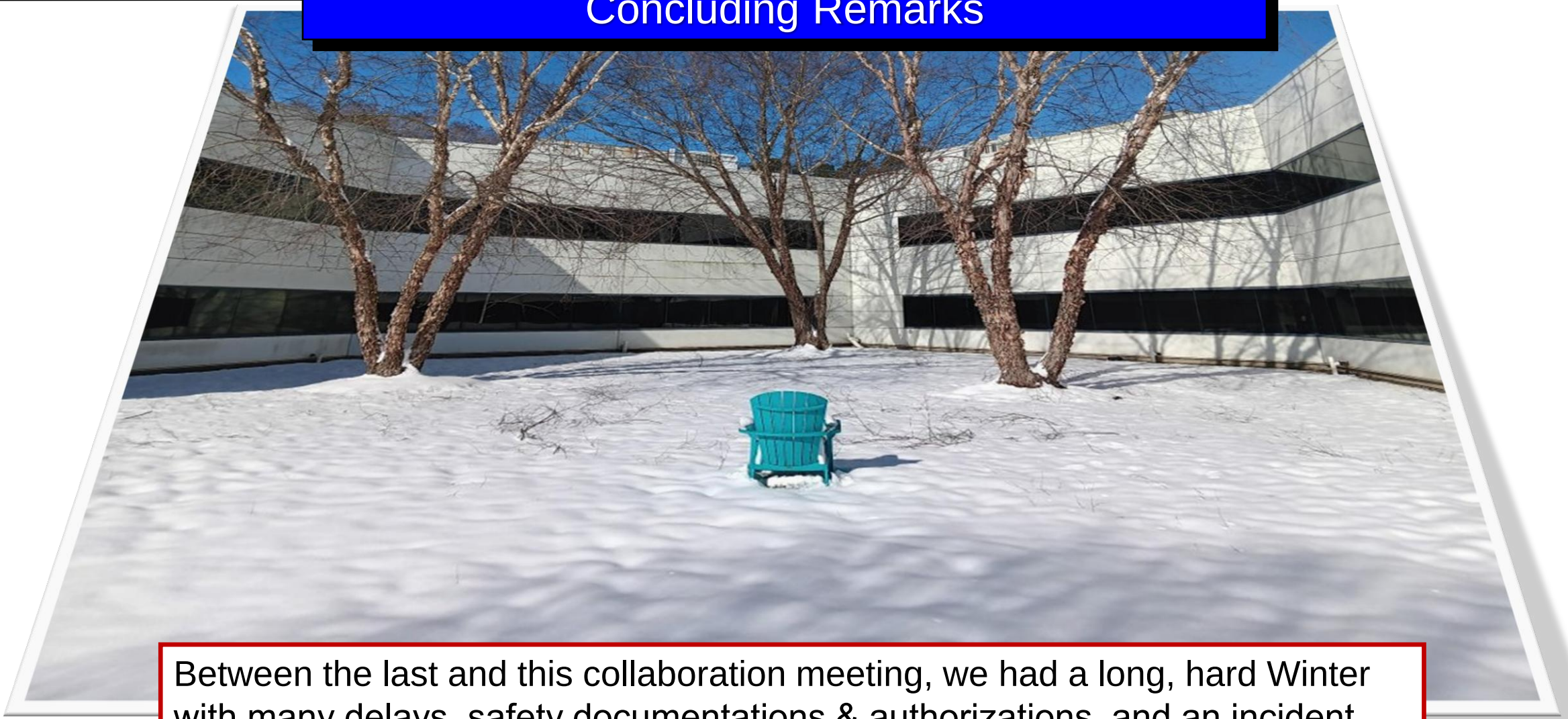
Schon vor etwa 90 Jahren haben Experimente gezeigt, dass das Proton kein punktförmiges Elementarteilchen ist, wie das Elektron, sondern eine innere Struktur aufweist. Dies war der Beginn der Protonstrukturforschung, die vor Kurzem mit der Messung des Drucks im Innern des Protons

nen sind verantwortlich für mehr als 99,9% der Masse der Materie im sichtbaren Universum. Damit sind Nukleonen natürlich auch die am meisten experimentell untersuchten Objekte der Hadronenphysik. Im Folgenden beziehen wir uns auf das Proton, aber viele der diskutierten Fragen gelten gleichermaßen auch für das Neutron.

Ein wichtiger Meilenstein auf dem Gebiet der Proton-



Concluding Remarks



Between the last and this collaboration meeting, we had a long, hard Winter with many delays, safety documentations & authorizations, and an incident, …

… but the Sun and warm temperatures will be back!