PAC 53 Closeout

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Documents received

13 New Proposals	2 referees
2 Conditionally Approved Proposals	2 referees
2 Run Group Proposals	1 referee
2 Jeopardy Experiments	1 referee
2 Letters of Intent	1 referee

Among the New Proposals:

-5 focused on the "3D structure of the hadrons"

-4 focused on the "Transverse structure of the hadrons"

-3 focused on the "Hadrons and cold nuclear matter"

-1 focused on the "Hadron spectra as probes of QCD"

+ supporting TAC reports, and Theory reports

General Remarks

All the received documents were scientifically well-motivated, detailed, and showed significant potential impact. Thanks to the proponents for the hard work that went into their preparation

The committee highly appreciated the exchange with the proponents, where the answers were often detailed, supported by new plots, and accompanied by clear explanations

We discourage the submission of a new document if previous recommendations have not been fully addressed — please take this seriously into consideration!

General Remarks … from PAC52

- The PAC expects that proposals contain estimates for both statistical and systematic uncertainties (both correlated and uncorrelated).
  The basis of these estimates must be clearly documented.
  This holds also for measurement that are statistics dominated (we need to understand that this is the case).
- To assess the physics reach of a proposal, it is often indispensable to have a comparison with theory or model predictions, including their uncertainty or plausible range of variation.
- Showing expected errorbars with central values lined up on a curve can be useful for illustration, but is generally not suitable for impact studies. A more realistic picture is obtained if central values are randomized according to their expected statistical uncertainties.
- It is important to distinguish between observables of a measurement and quantities derived from them: the latter often include additional uncertainties from theory (which a proposal may or may not be able to quantify).
  Examples: GPDs, TMDs, gravitational form factors.
- Overview tables and schematics of experimental setups (with labels!) are very helpful. (A picture can be worth a thousand words.)
- The PAC ackowledges the diligence of proponents in replying to questions by the readers.

  However, the exchange between readers and proponents after proposal submission is meant to clarify specific questions.
  It is not meant to fill in major gaps in a proposal – a proposal must contain all essential information.
- Reminder: Proposals cannot be updated once submitted.

Important instructions already contained in the available guidelines

I'm leaving them here for future reference

General Remarks

A New Proposal can be:
-Rejected
-Deferred
-Conditionally approved: there are conditions to be fulfilled
(C1 doesn't go back to PAC, C2 does come back)
-Approved

A Run Group can be endorsed or not

A Jeopardy proposal may "remain active" or not. If it stays active, its scientific grade could be re-evaluated

A Letter of Intent receives recommendations

General Remarks

Please note that a deferred project is not a rejected one! While the physics case is considered strong, the numerous conditions necessary to move forward in the approval process led us to recommend the submission of a new proposal.

A New Proposal can be:
-Rejected
-Deferred
-Conditionally approved: there are conditions to be fulfilled
(C1 doesn't go back to PAC, C2 does come back)
-Approved

Receive a Scientific Grade

it is the average of secret votes

A Run Group can be endorsed or not

A Jeopardy proposal may "remain active" or not. If it stays active, its scientific grade could be re-evaluated

A Letter of Intent receives recommendations

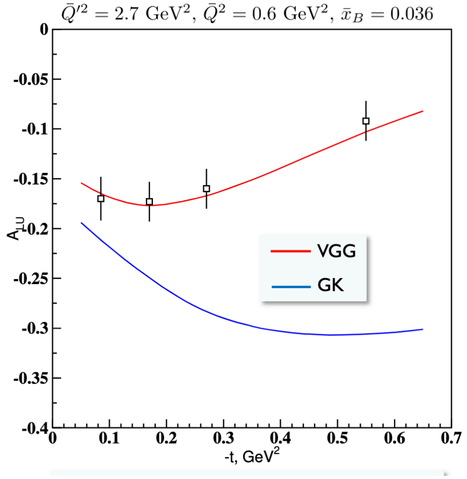
Quick overview of the New Proposals

The complete PAC53 public report will be released in a couple of weeks, providing full details of the project reviews, with particular emphasis on the recommendations

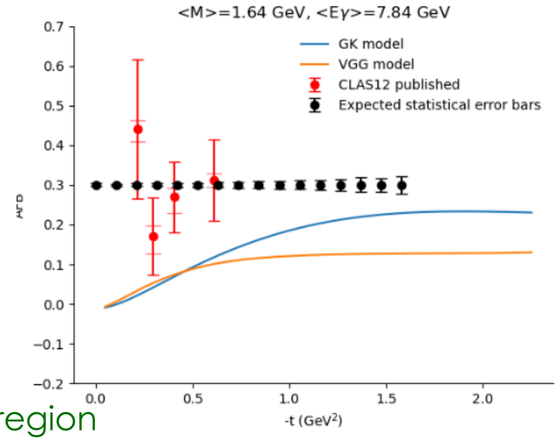
PR12-25-001 Electro- and photo-production of muon pairs with μCLAS12

Hall-B 245 PAC days

It is an innovative experimental program to explore nucleon structure via DDVCS, Timelike Compton Scattering, and near-threshold J/ψ production, using muon pairs in the final state



First precision measurements of TCS



distinguish models down to the small-t region

PAC recognizes the high-impact program. It complements and extends existing CLAS12 results.
Critical parts:

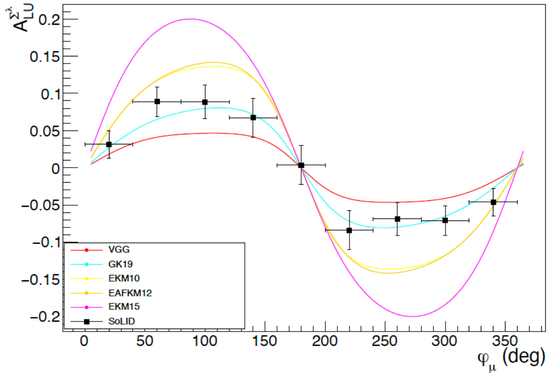
- Detector R&D and validation of GEM/μRWELL systems
- Beamline and shielding upgrades

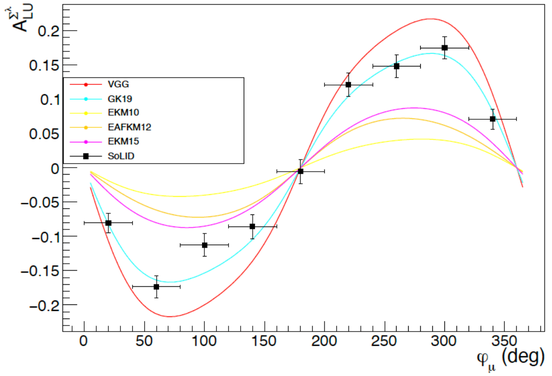
Approved C1 (μCLAS12 detector readiness) with Scientific Grade A

PR12-25-010 Double Deeply Virtual Compton Scattering with SoLIDμ spectrometer

Hall-A 110 PAC days

It is a breakthrough physics program based on the measurement of DDCS with SoLIDμ spectrometer and will open the frontiers to several studies of hadron structure





First time measurement of the BSA sign change between the two regions

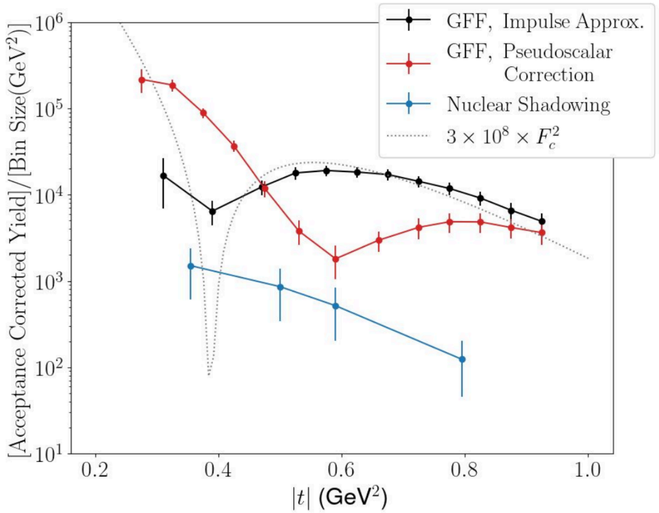
The physics case is based on a solid theoretical formalism. It would provide a real breakthrough with important impacts in the field of hadronic structure studies

Approved C1 (required parameters xcheck once SOLID will be functioning) with Scientific Grade A

PR12-25-004 A Measurement of the Coherent J/psi Electroproduction Cross Section off 4He

Hall-B 100

The proposal aims at checking if there is a difference between the charge radius and matter (gluonic) radius of ^{4}He, similar to what existing data suggest about the proton



GFF, IA follows the charge form factor

GFF, PS Correction shifts the diffraction minimum

Nuclear shadowing shifts in (non-zero) minimum location

Searching for a diffraction minimum in the gluonic form factor for $|t|$=0.3-0.9 GeV^2

Although the theoretical formalism is not well founded, the PAC recognizes that the physics case is important.
Take advantage of data from ALERT Run Group and get first insights based on real data (e.g. electroproduction cross section+background)

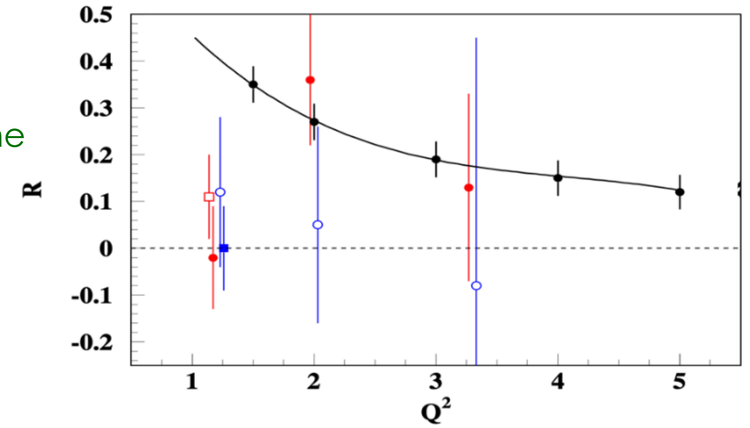
Approved C2

PR12+25-011 Multi-Photon Effects in Inclusive and Semi-Inclusive Deep Inelastic Scattering

Hall-C 58.5 PAC days

By measuring the ratio of positron to electron cross sections. This ratio will provide direct access to the real part of TPE + measure Coulomb correction effects in SIDIS

Possible impact of the TPE in the L/T (Rosenbluth) separations



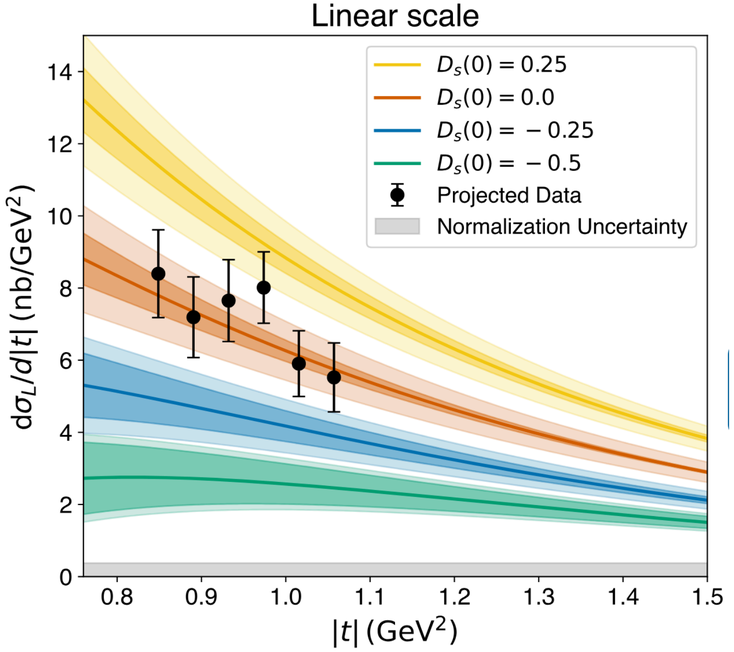
Timely and conceptually strong effort to investigate multi-photon exchange effects, fundamental to understanding systematic uncertainties in key observables

Approved C1 (condition on e+ beam, and required mitigation plan in case data from other JLab experiments are not delivered) with Scientific Grade B+

PR12-25-007 Studying the Strangeness D-Term in Hall C via Exclusive Phi Electroproduction

Hall-C 35 PAC days

The proposed experiment explores the only presently known path to access information on the strangeness contribution $D_s(t, \mu_2)$



Precise enough to constraint the curves and validate or not the claim that D_s=$D_{u,d}$

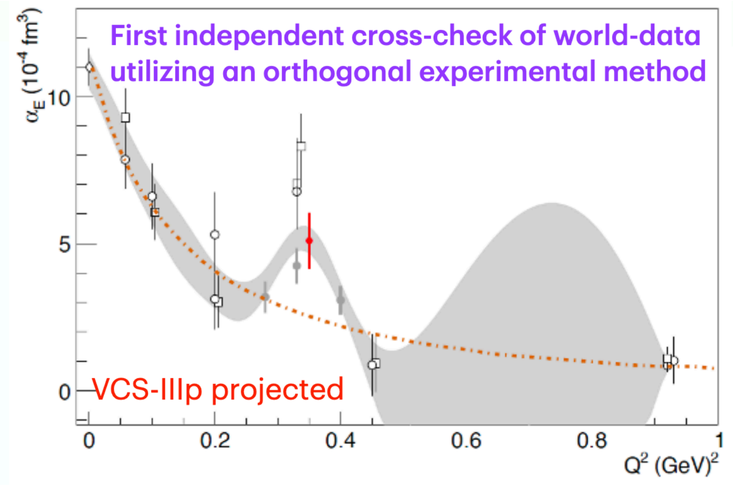
The proposal makes excellent use of the unique possibilities of the lab and will have important impact on the field

Approved with a Scientific Grade A-

PR12-25-008 First Measurement of the Proton Generalized Polarizabilities with a polarized electron beam in Virtual Compton Scattering

Hall-C 20.5→21 PAC days

New measurement to provide an important independent cross-check of the unpolarized VCS experiments, in particular, in a Q^2 region where electric polarizability data has revealed a significant enhancement



Following the TAC's recommendation, an additional 0.5 days is allocated to secure a high level of beam polarization

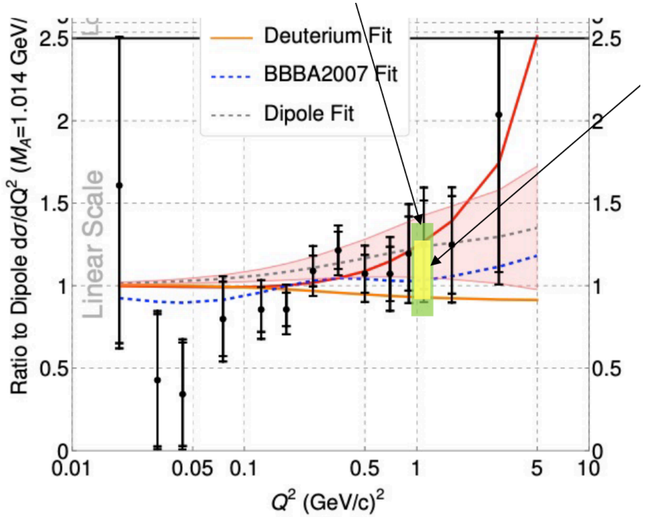
Approved with Scientific Grade B+

PR12-25-009 The Nucleon Axial-Vector Form Factor from the p($\vec{e}$, n)ν_e Reaction

Hall-A/C

First to use inverse neutron beta decay to extract the axial mass, addressing a controversial issue in neutrino physics that limits cross-section predictions + links to GPD measurements

conservative approach



time resolution <50 ps

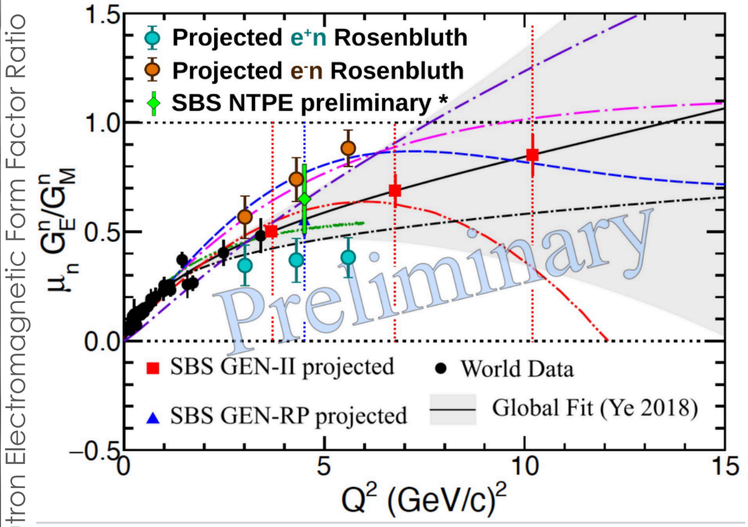
The experiment is well-motivated. However, the physic merit of an 18-20% extraction of the axial mass at a single kinematic point does not justify the scale of the effort

Deferred

PR12+25-006 Measurement of the Two-Photon Exchange Contribution in Electron-Neutron and Positron-Neutron Elastic Scattering

Hall-C

The interest lies in the two-photon exchange contribution to the difference in Rosenbluth slopes between e^+–neutron and e^-–neutron scattering, with a focus on the neutron, which lacks the extensive data available for the proton



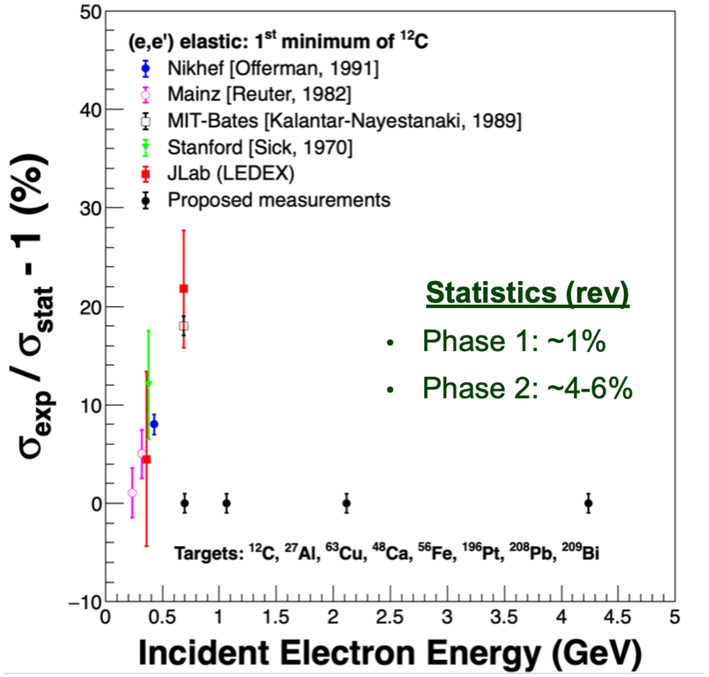
This experiment will provide new explorations of two photon exchange on the neutron in elastic e^+-neutron and e^--neutron scattering

Approved C2
(radiative correction uncert., longer target and systematics)

PR12+25-013 Energy Dependence of Dispersive effects in Unpolarized Inclusive Elastic Electron/Positron-Nucleus Scattering

Hall-C

Many potential relevant impacts on the description of nuclear matter



dispersive effects around diffraction minima

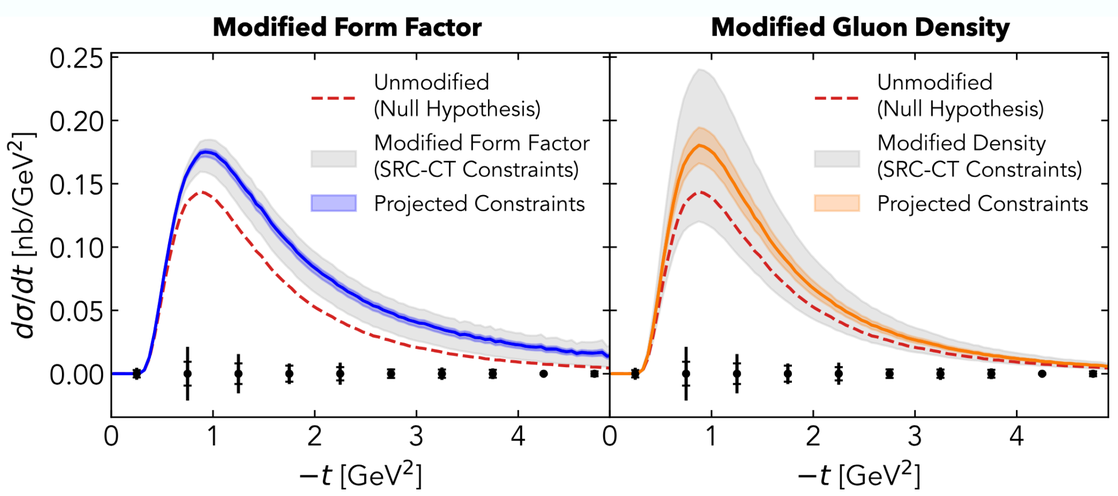
The proposal needs to be improved by including all the details of the analysis and by demonstrating the impact of the measurements using modern theoretical calculations

Deferred

PR12-25-002 Threshold J/Ψ Photoproduction as a Probe of Nuclear Gluon Structure

Hall-D 85 PAC days

A precision experiment to dig into the modifications in gluon distributions in bound nucleons



It is possible to separate and constrain modification hypothesis

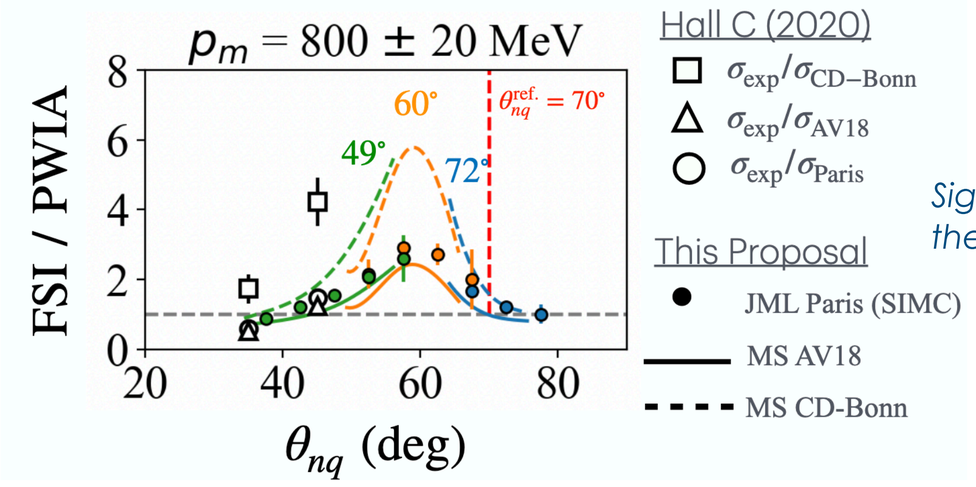
The recently published results (pilot experiment) provide sufficient motivation for further investigation

Approved with Scientific Grade B+

PR12-25-003 Final-State Interactions Studies in Deuterium at Very High Missing Momenta

Hall-C

Frontier investigation on non-nucleonic components in deuteron and exploration of the short-range repulsive part of the NN interaction. This can happen measuring cross sections for a wide range of neutron angles



Signature where the FSI are stronger

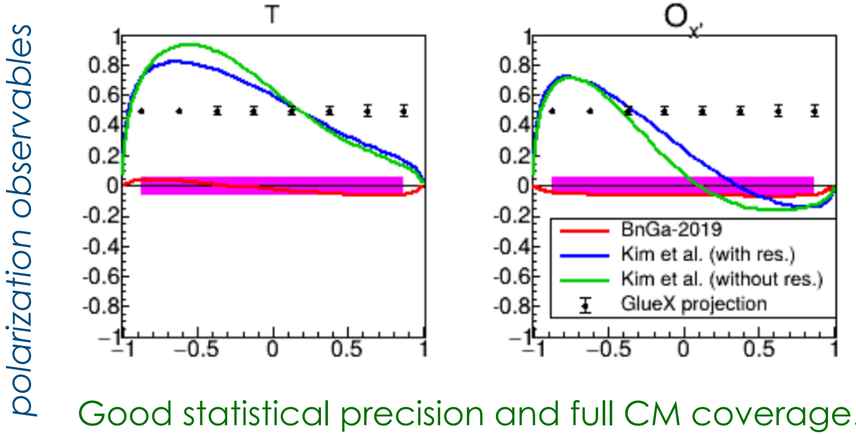
The proposed experiment has a great significance because the physics behind is compelling.
However, as already asked for the LOI (PAC52) the proponents were requested to carry out fully-relativistic theoretical calculations and simulations before submitting a full proposal

Deferred

PR12-25-005 GlueX with a 1-4 GeV Photon Beam

Hall-D 28 PAC days

Experimental program that takes advantage of the low-energy operation (2026) using the existing GlueX setup. Three physics topics addressed: (i) Measurement of the weak decay, (ii) baryon spectroscopy by single- and double-polarization observables, (iii) investigation of the transition region between resonance and Regge production



Good statistical precision and full CM coverage.
Will be very constraining to models

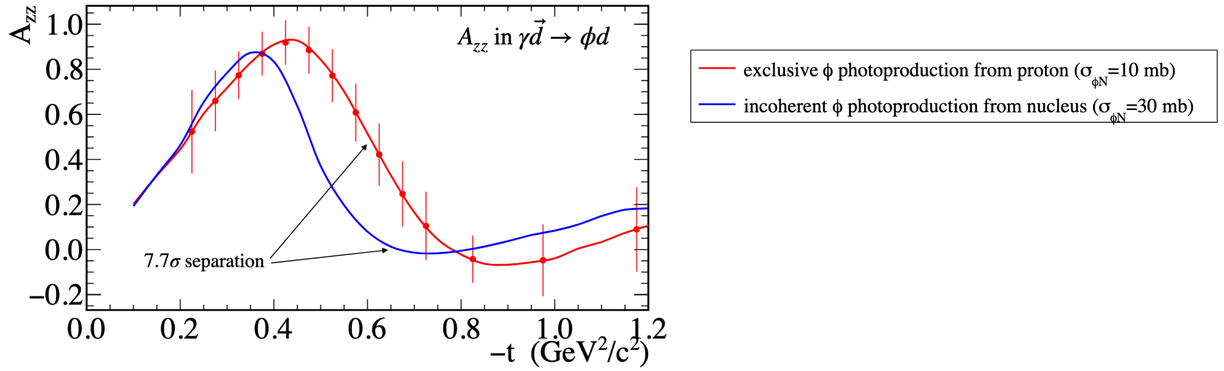
Very appealing proposal, especially (i) and (ii). Part (iii) needs additional studies, but proxy for additional relevant analyses

Approved with Scientific Grade A-

PR12-25-012 High precision measurement of phi-nucleon cross section using a tensor polarized deuteron target

Hall-D 65 PAC days

Introducing a tensor-polarized deuterium target enables measurement of the tensor asymmetry A_{zz}, which can distinguish between cross sections in coherent ϕ photoproduction and help resolve whether $\sigma_{\phi N}$ is ~10 mb (from photoproduction) or ~30 mb (from A-dependent incoherent ϕ photoproduction)



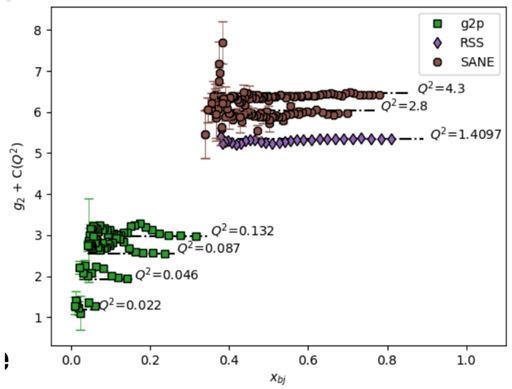
The proposal presents a clear main physics case and strong scientific value, along with additional opportunities enabled by the unique tensor-polarized deuterium target

Approved with Scientific Grade A-

C12-24-002 Revealing the Transition Region of QCD with the Proton's g2 Structure Function

Hall-C 26 PAC days

Precision measurement in the region $Q^2 \in [0.22 - 2.2]\ GeV^2$ by inclusive deep inelastic scattering of an electron beam off a transversely polarized proton target. It has never been directly measured in this regime, where both effective theories and perturbative approaches break down.



Benchmarks for future lattice QCD, probing higher-twist effects, testing the Burkhardt-Cottingham sum rule, and reducing key uncertainty in hydrogen hyperfine splitting

Strong physics motivation. The conditional requirements asked by PAC52 have been fulfilled in great detail.
PAC recommend to shorten of 1 day the overhead and include an additional data point at even lower Q^2, fully closing the gap to the existing data points

Approved with Scientific Grade A-

C12-24-Run-Group-H CLAS12 Run-group H Experiments with a Transversity Polarized Target

Hall-B 125 PAC days

The RGH program consolidates three high-impact CLAS12 experiments:

- C12-11-111: Semi-Inclusive DIS
- C12-12-009: SIDIS with dihadron final states
- C12-12-010: Deeply Virtual Compton Scattering with a transversely polarized proton target

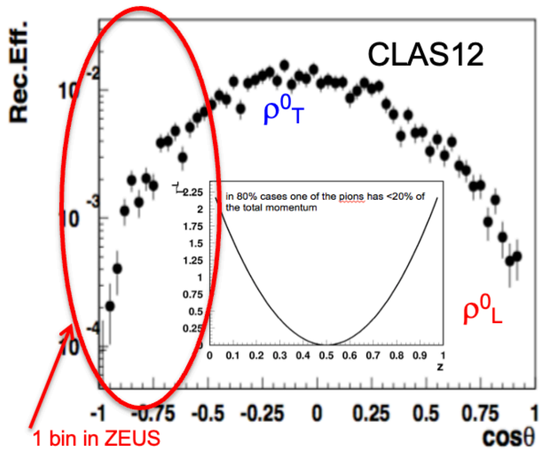
These measurements address critical gaps in our knowledge of 3D nucleon structure, particularly in the valence region at high x, where world data are sparse and theoretical uncertainties remain large. They also serve as benchmarks for lattice QCD calculations and global fits of TMD and GPD frameworks

The science case is very strong. Completion of the polarized target and recoil detector, as well as careful integration into the beamline must be considered. Several challenges are highlighted in the recommendations

Approved with Scientific Grade A

C12-11-111A Measurements of Single Spin Asymmetries in exclusive production of hadrons with CLAS run group H transversely polarized target

Provides access to the poorly known GPD E, relevant to quark orbital momentum studies, and the helicity GPDs $\tilde{H}$, $\tilde{E}$, and GPDs relevant to quark orbital angular momentum. Detailed measurements that would allow for the subtraction of exclusive rho meson events that contaminate SIDIS measurements



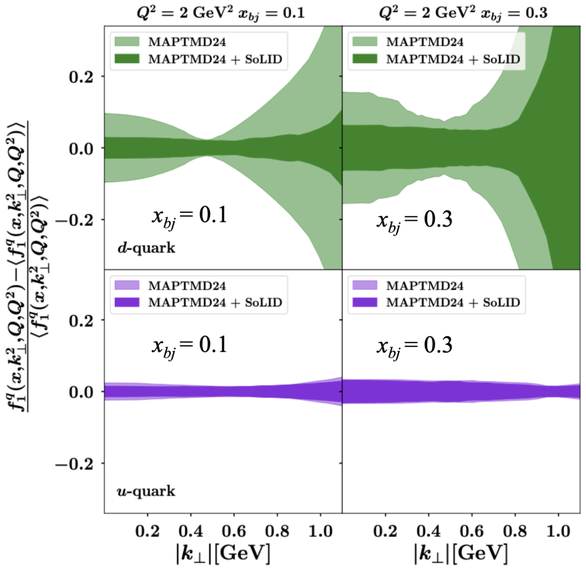
Understanding the ρ^0 asymmetric decay will solve a longstanding puzzle in world SIDIS data

This run group addition (RGH) has the potential to lead to important outcomes for GPD physics and to positively impact SIDIS experiments

Endorsed

E12-11-007B/E12-10-006F Measurement of the Unpolarized SIDIS Cross Section from a 3He Target with SoLID

Several frontier measurements will benefit of measuring the SIDIS unpolarized cross sections on ^{3}He in the kinematic region for TMD factorization



Impact Study of SoLID Pseudo Data

SoLID greatly reduces the uncertainty on k⊥-dependence for the d-quark

This is an update of a PAC52-retracted proposal. According to PAC52 suggestions, it contains many improvements and updates. However, there are still some issues that should be addressed, which are detailed in the final PAC report

Endorsed

J12-20-011 Update on E12-20-011: measurement of the high-energy part of the Gerasimov–Drell–Hearn sum rule

The Gerasimov-Drell-Hearn Sum Rule relates the spin dependent photo-production cross section off a hadron to the anomalous magnetic moment of the hadron. This proposal significantly extends the energy range beyond currently existing data and will provide the first test of Regge theory in the polarized case

The landscape has remained unchanged since this work was first proposed and there remains good motivation for probing the GDH sum rule at high energy. Such measurements are uniquely possible at JLab

Stay Active
Scientific Grading A-

J12-19-001 Strange Hadron Spectroscopy with Secondary KL Beam in Hall D

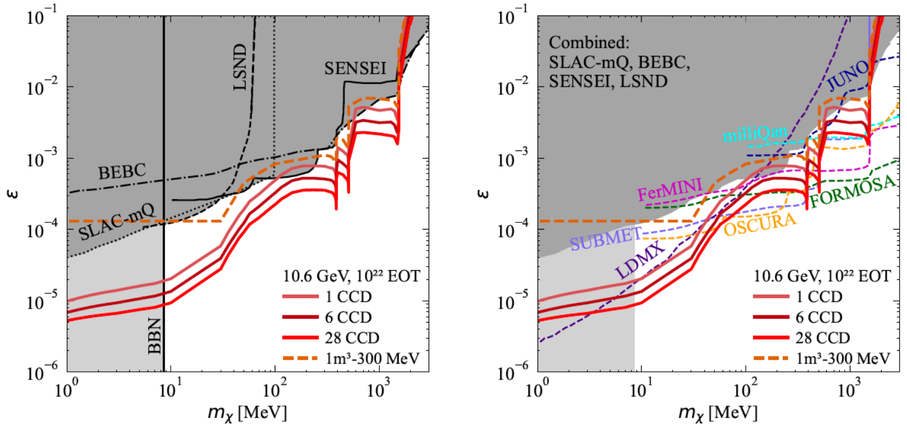
The proposed experiment aims to extend our knowledge of the spectrum of strange baryons and mesons with a K_L beam using the GlueX spectrometer in Hall D

The experiment presents unique opportunities in hadron spectroscopy, with a physics impact that remains substantial. The final report includes specific recommendations

Stay Active
Scientific Grading A-

LOI12-25-001: Probing Millicharged Particles at an Electron Beam Dump with Skipper-CCDs at BDX

The proposed experiment (BDX) is uniquely positioned to perform world-leading searches for light dark-sector particles



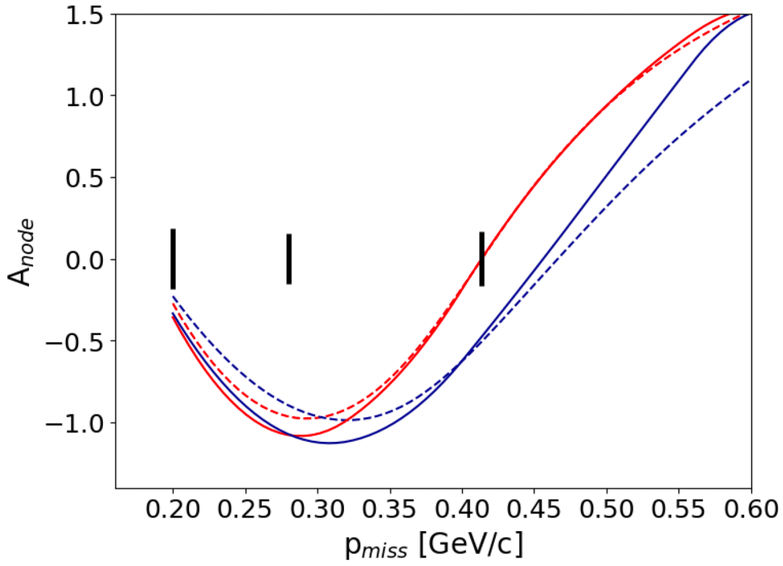
Projected sensitivity to millicharged particles in the millicharge ε versus mCP mass mx

This LOI describes a compelling, low-cost addition to extend the BDX program into a new regime of sensitivity to light dark-sector particles

Recommended to Proceed with a New Proposal

LOI12-25-002: Exclusive electro-disintegration of tensor polarized deuterium

possible determination of the tensor asymmetry A_{node} of tensor polarized deuterium through electro-disintegration in the process e + D(pol) -> e' + p +n



Expected results of the tensor asymmetry A_{node} with respect to P_{miss}

The experiment has the potential to be impactful. The PAC outlined a comprehensive list of recommendations

Recommended to Proceed with a New Proposal

PAC53 Results

NUMBER	TITLE	CONTACT PERSON	HALL	DAYS REQUESTED	DAYS AWARDED	SCIENTIFIC RATING	PAC DECISION	TOPIC
New Proposals								
PR12-25-001	Electro- and photo-production of muon pairs with μCLAS12	Stepan Stepanya	B	245	245	A	C1	4
PR12-25-002	Threshold J/psi Photoproduction as a Probe of Nuclear Gluon Structure	Or Hen	D	85	85	B+	Approved	5
PR12-25-003	Final-State Interactions Studies in Deuterium at Very High Missing Momenta	Carlos Yero	C	23	-	-	Deferred	5
PR12-25-004	A Measurement of the Coherent J/psi Electroproduction Cross Section off 4He	Whitney R. Armstrong	B	100	-	-	C2	4
PR12-25-005	GlueX with a 1-4 GeV Photon Beam	Mark Dalton	D	28	28	A-	Approved	1
PR12+25-006	Measurement of the Two-Photon Exchange Contribution in Electron-Neutron and Positron-Neutron Elastic Scattering	Eric Fuchey	C	49	-	-	C2	2
PR12-25-007	Studying the Strangeness D-Term in Hall C via Exclusive Phi Electroproduction	Henry Klest	C	35	35	A-	Approved	4
PR12-25-008	First Measurement of the Proton Generalized Polarizabilities with a polarized electron beam in Virtual Compton Scattering	Nikos Sparveris	C	20,5	21	B+	Approved	2
PR12-25-009	The Nucleon Axial-Vector Form Factor from the H(pol. e, n)nu_e Reaction	Bogdan Wojtsekhowski	A/C	55	-	-	Deferred	2
PR12-25-010	Double Deeply Virtual Compton Scattering with SoLIDμ spectrometer	Alexandre Camsonne	A	110	110	A	C1	4
PR12+25-011	Multi-Photon Effects in Inclusive and Semi-Inclusive Deep Inelastic Scattering	Tyler Hague	C	58,5	58,5	B+	C1	4
PR12-25-012	High precision measurement of phi-nucleon cross section using a tensor polarized deuteron target	Mark Dalton	D	65	65	A-	Approved	5
PR12+25-013	Energy Dependence of Dispersive effects in Unpolarized Inclusive Elastic Electron/Positron-Nucleus Scattering	Paul Gueye	C	53,5	-	-	Deferred	2

Jeopardy								
NUMBER	TITLE	CONTACT PERSON	HALL	DAYS REQUESTED	DAYS AWARDED	SCIENTIFIC RATING	PAC DECISION	TOPIC
J12-20-011	Update on E12-20-011: measurement ofthe high-energy part of the Gerasimov–Drell–Hearn sum rule	Alexandre Deur	D	33	33	A-	Stay active	
J12-19-001	Strange Hadron Spectroscopy with Secondary KL Beam in Hall D	Moskov Amaryan	D	200	200	A-	Stay active	
Conditional								
C12-24-002 (C2)	Revealing the Transition Region of QCD with Proton's g2 Structure Function	David Ruth	C	26	26	A-	Approved	
C12-24-Run-Group-H (C2)	CLAS12 Run-group H Experiments with a Transversity Polarized Target	Marco Contalbrigo	B	125	125	A	Approved	
Run Group Proposals								
C12-11-111A	Measurements of Single Spin Asymmetries in exclusive production of hadrons with CLAS run group H transversely polarized target	Harut Avagyan	B	N/A	N/A		Endorsed	
E12-11-007B/E12-10-	Measurement of the Unpolarized SIDIS Cross Section from a 3He Target with SoLID	Haiyan Gao	A	N/A	N/A		Endorsed	

Conclusions

- All of this highlights both the laboratory's intense activity and its commitment to being at the forefront of scientific progress

- The PAC process developed at JLab aims to ensure the best possible guidance for achieving the highest scientific output

- We wish to tank the colleagues who provided the TAC and the Theory reports, which are fundamental to our evaluation process

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- We wish to tank the colleagues who provided the TAC and the Theory reports, which are fundamental to our evaluation process

- Nothing of this would be possible without the continuous support of Pam Cole

- We are truly grateful to Thia Keppel, Patrizia Rossi, Douglas Higinbotham, Ioana Niculescu, Matt Schepherd

- A warm thank you to the PAC members for their dedication and for the highly scientific and constructive discussions

Alexandra Gade

Marco Radici

Bakur Parsamyan

Peter Schweitzer

Sam Zeller

Krešimir Kumerički

Hirokazu Tamura

Curtis Meyer

Chris Polly

Cynthia Hadjidakis

Bernhard Ketzer