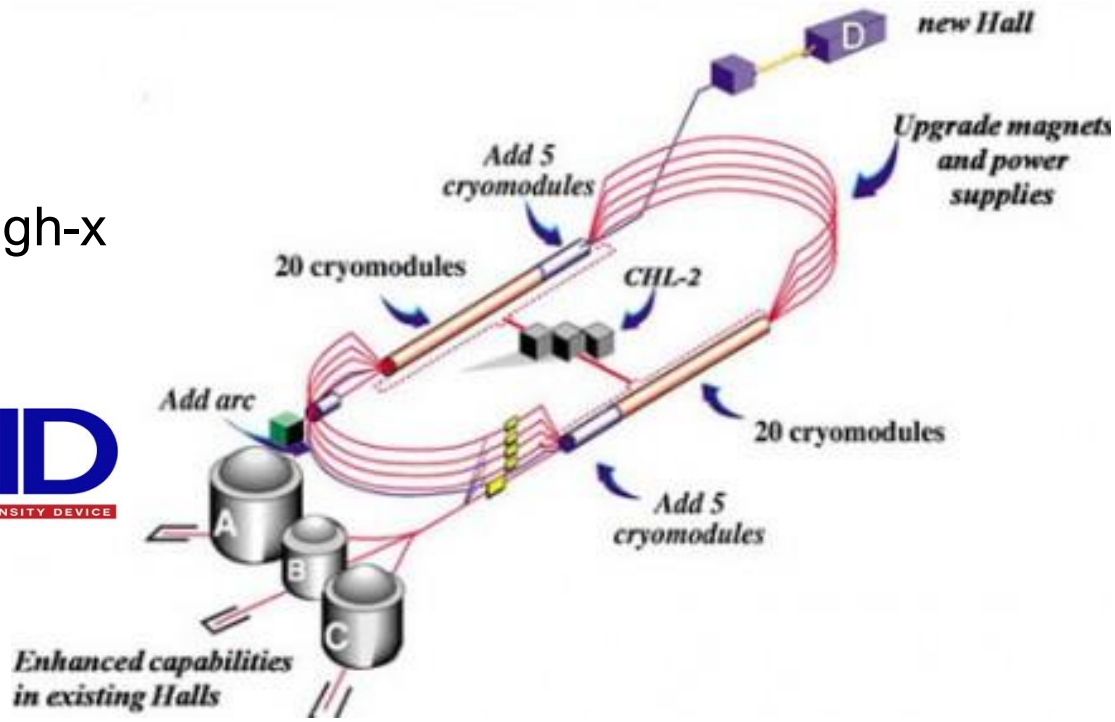
JLab Spin Experiments and Future (SoLID) Program

Pacific Spin 2026, October 23-30, 2026

Jian-ping Chen
Jefferson Lab

JLab12 Spin Experiment: A1n @ high-x



Acknowledgement: Thanks to JLab A1n and SoLID collaborators.

Outline

1. Introduction

2. JLab12 A1n Experiment
3. Future Spin Program

4. SoLID Physics Program
5. Proposed SoLID Apparatus
6. New Approach: SoLID-Lite

7. Summary

Introduction

Precision Study of Strong QCD

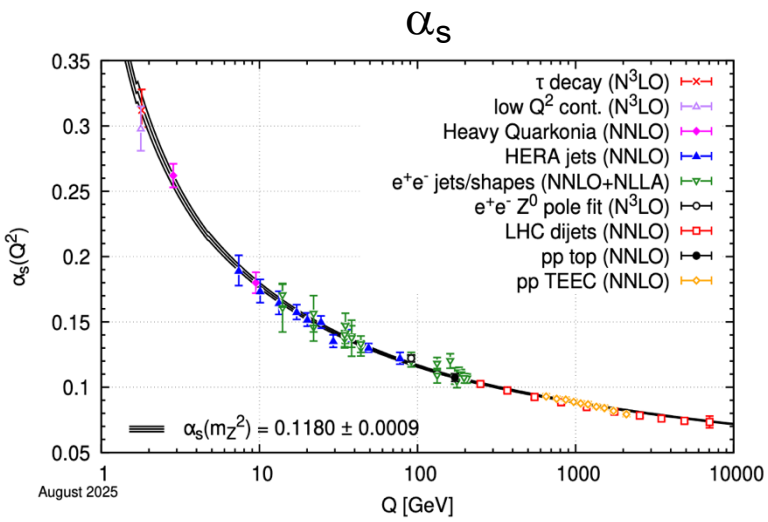
- QCD has been well-established as The Theory for Strong Interaction for decades, yet is poorly-understood in Strong Region where the real world lives (~ nucleon size (fm), energy (GeV)).

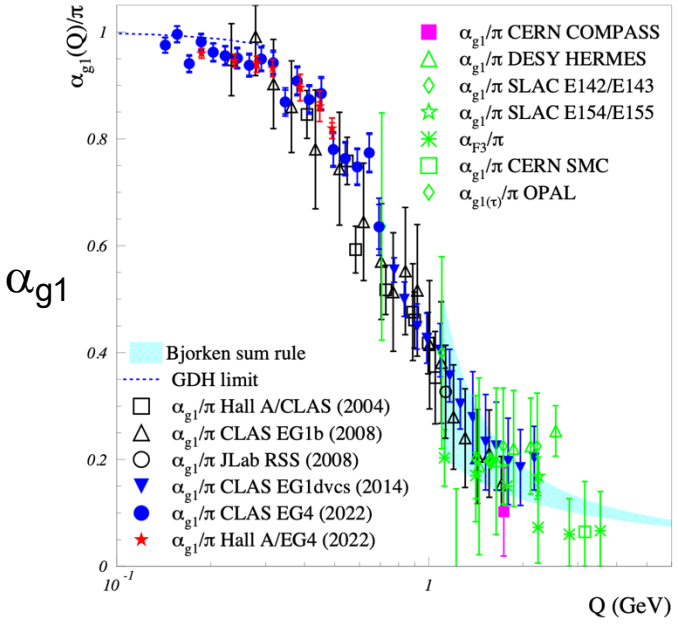
  - Tested in perturbative region over many order of magnitudes

  - Only to few %, contrast to EW theory tested to up to 10^{-12} !

- Precision study is essential for understand Strong QCD/nucleon structure and for search for NEW Physics Beyond Standard Model

- Theoretical developments in Strong QCD:
  - Lattice QCD
  - Schwinger-Dyson, Continuum Schwinger Method
  - AdS/CFT, Holographic QCD
  - …



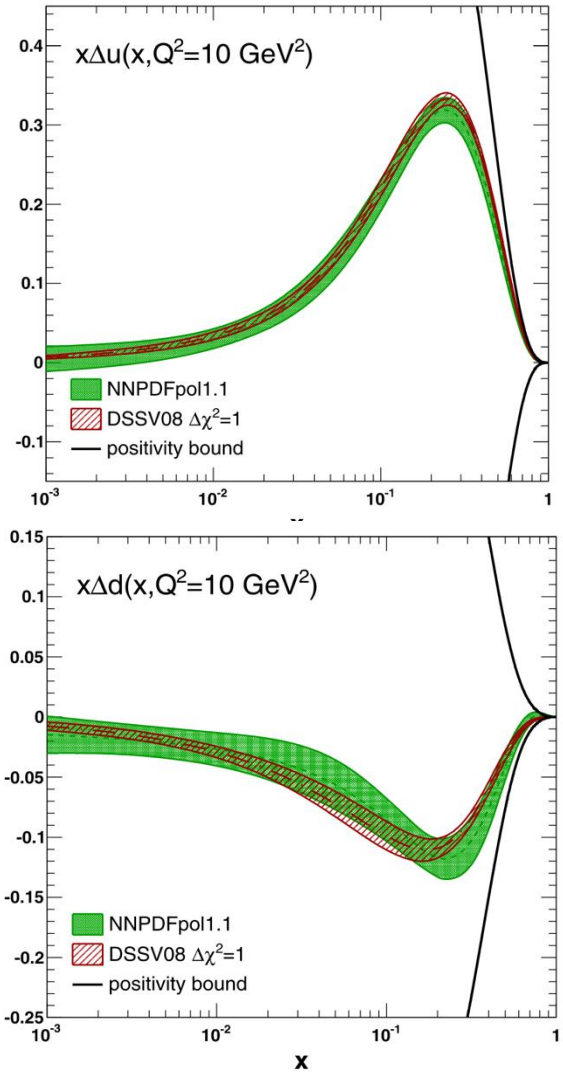


A. Deur, V. Burkert, J. P. Chen and W. Korsch Particles, 5-171 (2022)

Polarized PDFs of the Nucleon

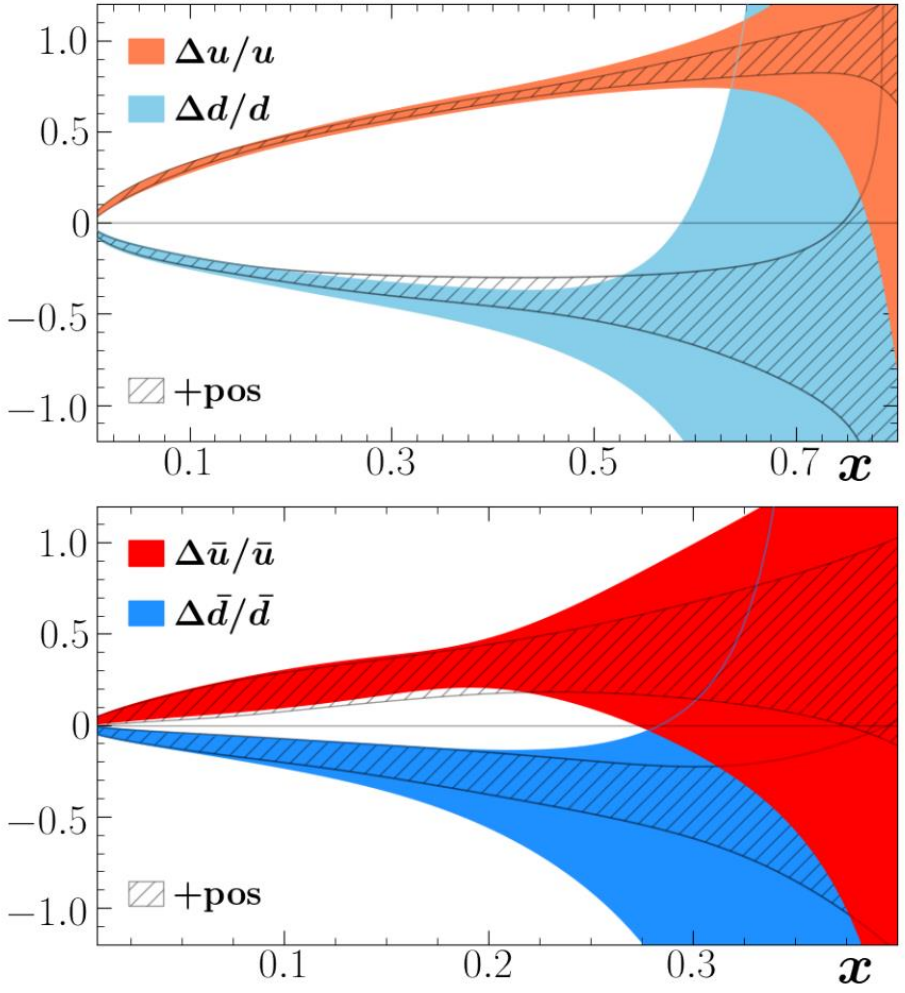
NNPDF pol 1.1

https://doi.org/10.1016/j.nuclphysb.2014.08.008



JAM Analysis

C. Cocuzza et al., PRD 106 (2022) 3, L031502

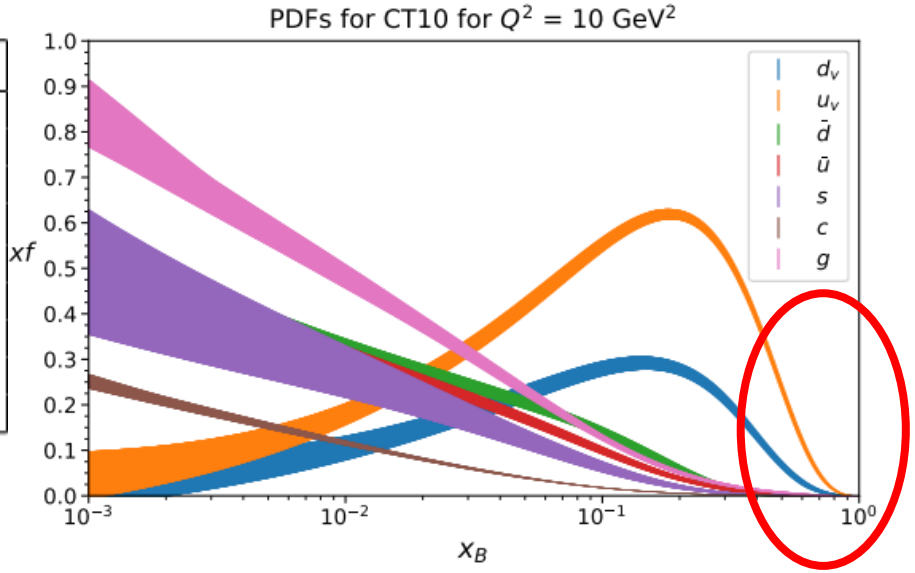


light quark polarization at Q^2=10 GeV^2.

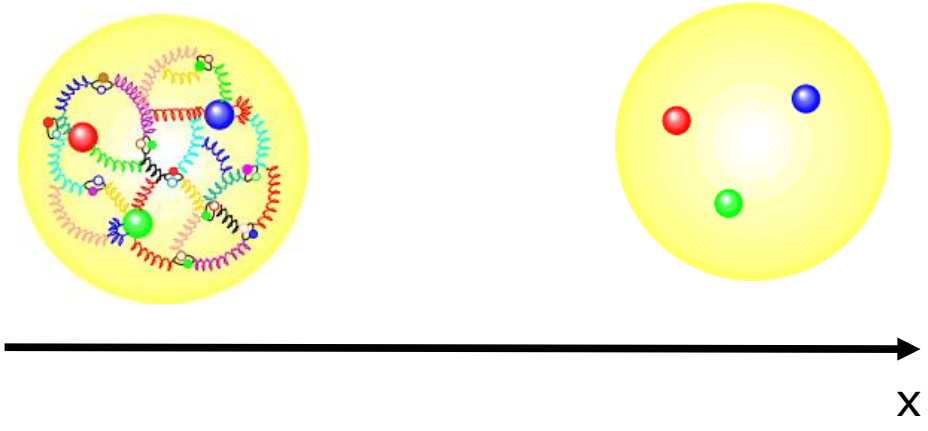
Why high x?

$$|p^{\uparrow}\rangle = \frac{1}{\sqrt{2}}|u^{\uparrow}(ud)_{00}\rangle + \frac{1}{\sqrt{18}}|u^{\uparrow}(ud)_{10}\rangle - \frac{1}{3}|u^{\downarrow}(ud)_{11}\rangle - \frac{1}{3}|d^{\uparrow}(uu)_{10}\rangle - \frac{\sqrt{2}}{3}|d^{\downarrow}(uu)_{11}\rangle$$

Model	$\frac{F_2^n}{F_2^p}$	$\frac{d}{u}$	$\frac{\Delta d}{\Delta u}$	$\frac{\Delta u}{u}$	$\frac{\Delta d}{d}$	A_1^n	A_1^p
CSM	0.45(5)	0.23(6)	-0.14(3)	0.63(8)	-0.38(7)	0.15(5)	0.58(8)
DSE-1	0.49	0.28	-0.11	0.65	-0.26	0.17	0.59
DSE-2	0.41	0.18	-0.07	0.88	-0.33	0.34	0.88
$0^+_{[ud]}$	$\frac{1}{4}$	0	0	1	0	1	1
NJL	0.43	0.2	-0.06	0.8	-0.25	0.35	0.77
SU(6)	$\frac{2}{3}$	$\frac{1}{2}$	$-\frac{1}{4}$	$\frac{2}{3}$	$-\frac{1}{3}$	0	$\frac{5}{9}$
CQM	$\frac{1}{4}$	0	0	1	$-\frac{1}{3}$	1	1
pQCD	$\frac{3}{7}$	$\frac{1}{5}$	$\frac{1}{5}$	1	1	1	1
HLFQCD	0.28	0.035	0.035	1	1	1	1

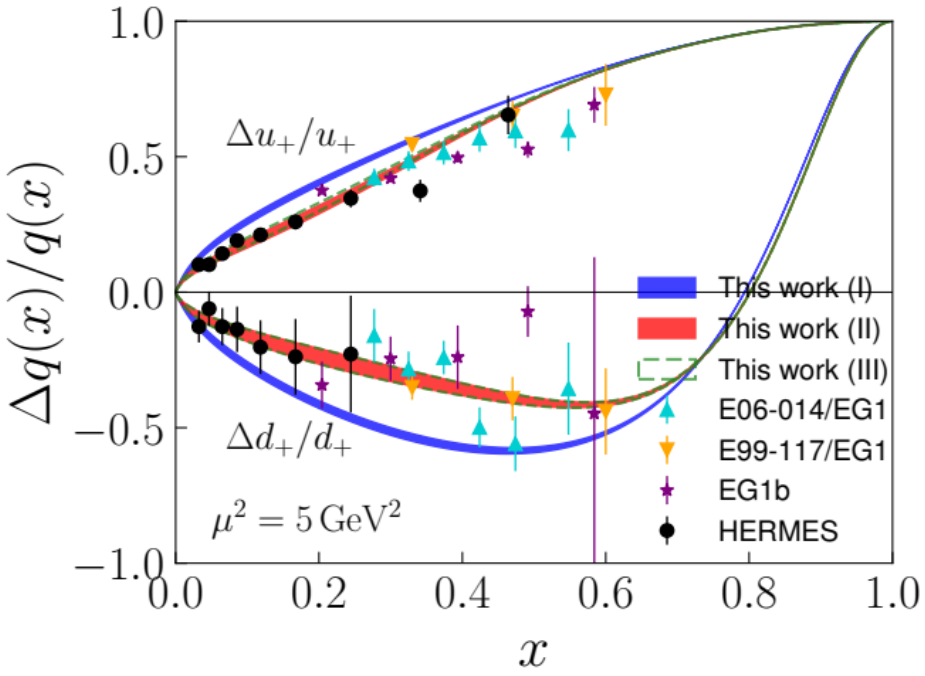


- a clean region where QCD (and models) can make predictions for (the ratio of) structure functions
- ratios of pol/unpol PDFs at x→ 1 unambiguous, scale invariant, non-perturbative features of QCD

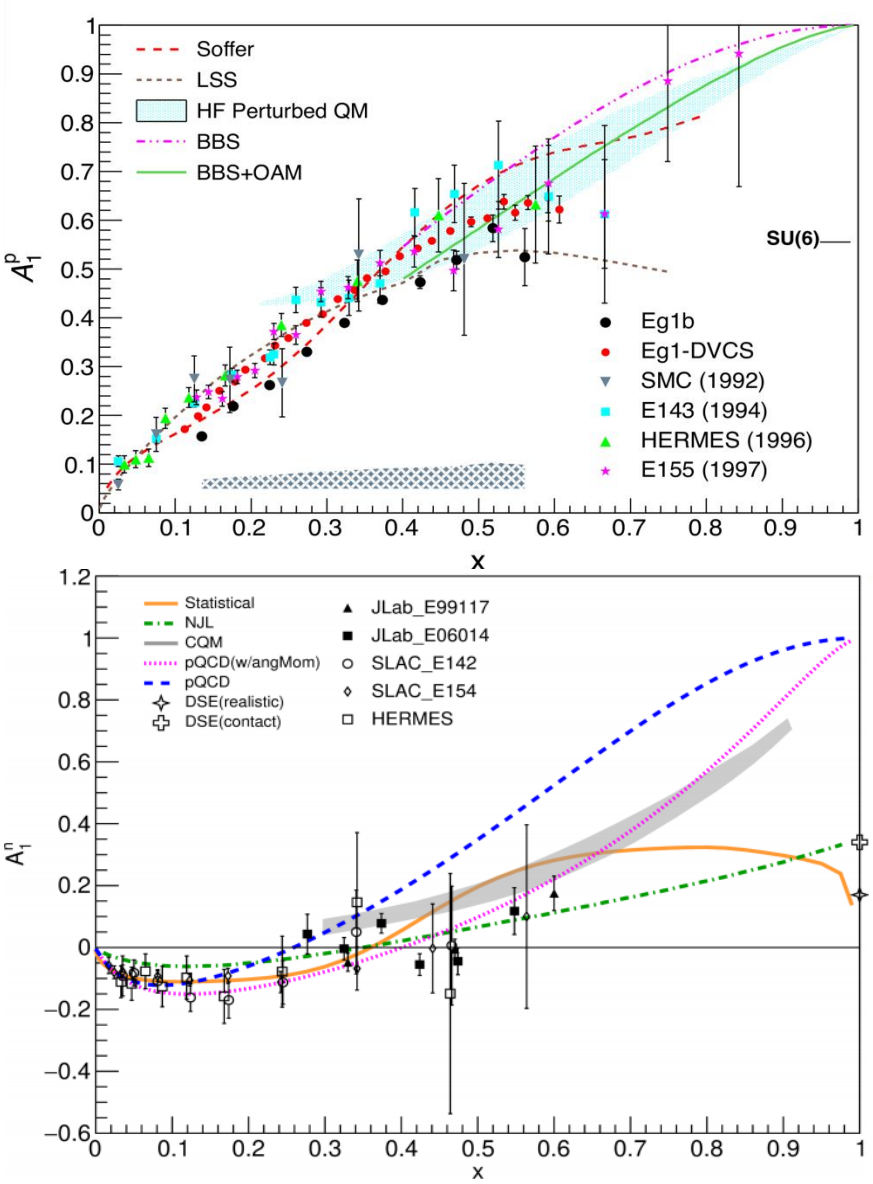


Spin at high x

Model	$\frac{F_2^n}{F_2^p}$	$\frac{d}{u}$	$\frac{\Delta d}{\Delta u}$	$\frac{\Delta u}{u}$	$\frac{\Delta d}{d}$	A_1^n	A_1^p
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CQM	$\frac{1}{4}$	0	0	1	$-\frac{1}{3}$	1	1
pQCD	$\frac{3}{7}$	$\frac{1}{5}$	$\frac{1}{5}$	1	1	1	1
HLFQCD	0.28	0.035	0.035	1	1	1	1



T. Liu et al., Phys. Rev. Lett. 124, 082003 (2020)arXiv:1909.13818



D. Parno et al. Phys.Rev.Lett. 113 (2014) 2, 022002, 1404.4003

JLab 12 GeV A_1^n Experiment

E12-06-110 in Hall C

A_1n@High-x: E12-06-110 in Hall C

Spokespersons: X. Zheng, G. Cates, J.-P. Chen, Z. E. Meziani

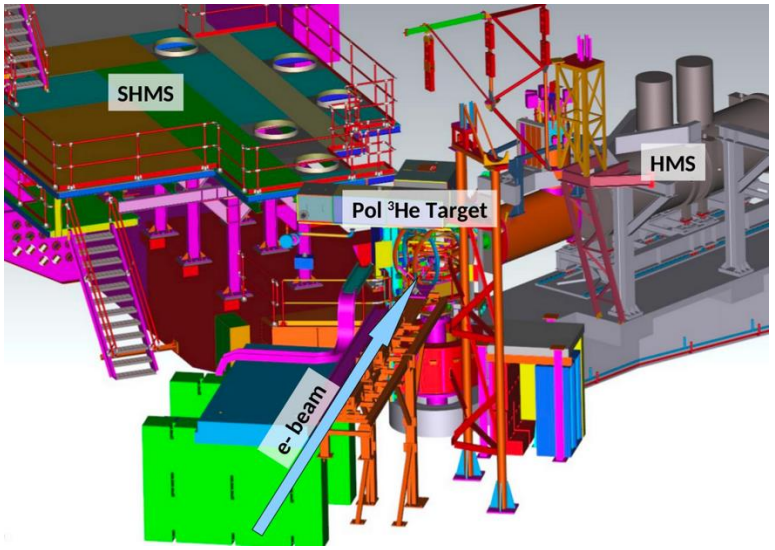
Ph.D Students: M. Chen, M. Rehfuss

- 30 uA, 85% polarized 10.4 GeV electron beam
- 40 cm L/T polarized ^{3}He with in-beam polarization reach up to 60% (average ~ 55%)

  luminosity (2×10^{36} cm^{-2}s^{-1}) and FOM are

  a factor of 2 improved over the world record
- HMS and SHMS detecting electrons in inclusive mode

Data taking from Dec. 2019 to March 2020

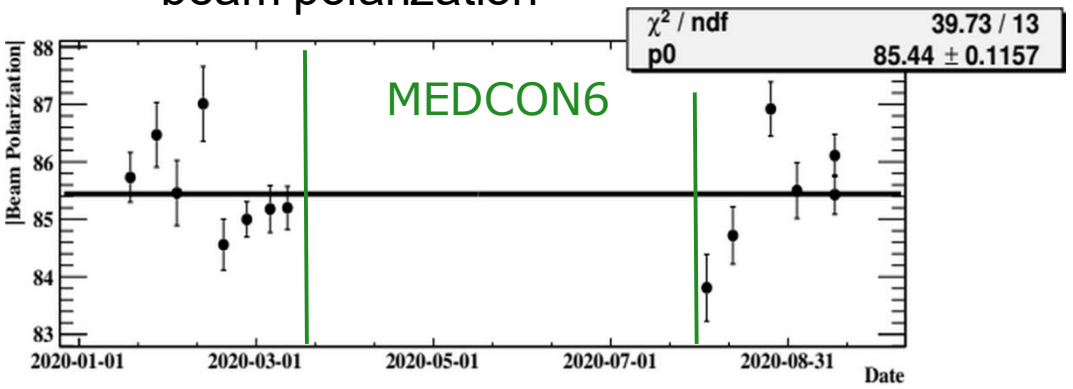


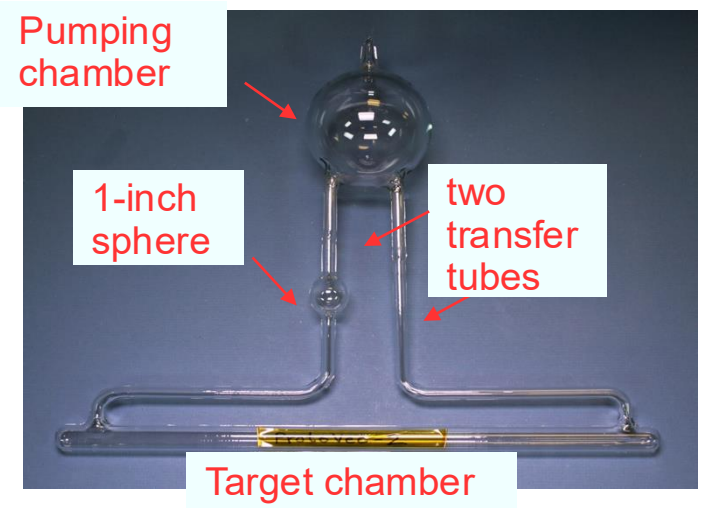
Kine	Spec	E_b GeV	E_p GeV	θ (∘)	beam time (hours)
$\Delta(1232)$	SHMS	2.17	-1.79736	8.5	4.0
Elastic	SHMS	2.17	-2.12860	8.5	8.0

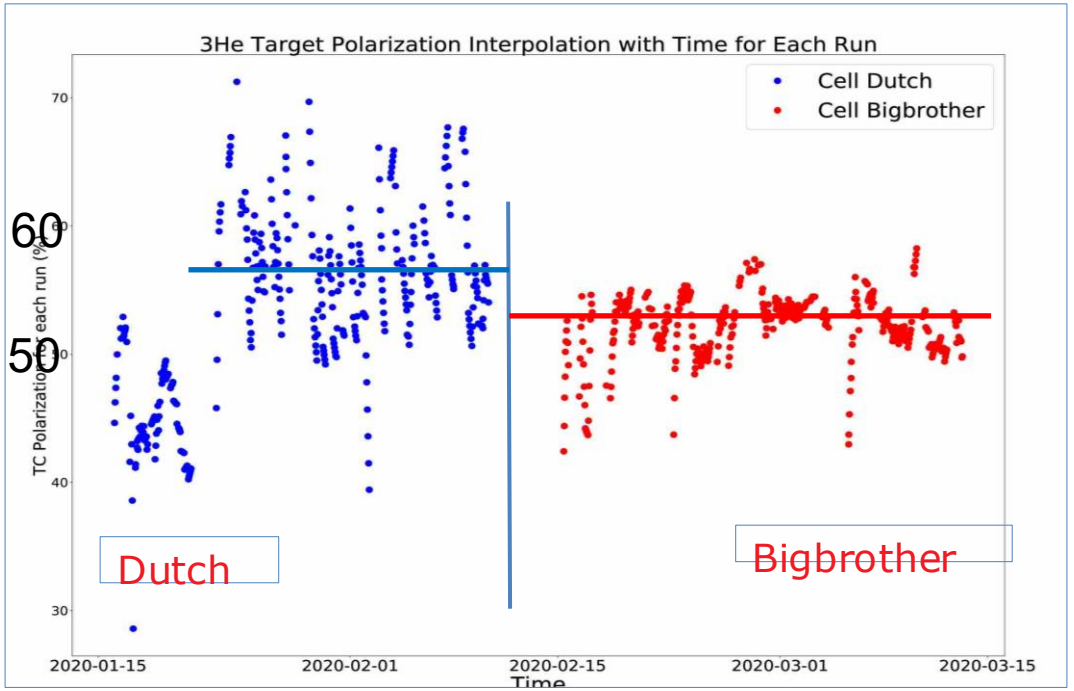
Kine	Spec	E_b GeV	E_p GeV	θ (∘)	e^- production (hours)	e^+ prod. (hours)	Tot. Time (hours)
DIS							
3	HMS	10.38	2.90	30.0	88.0	0.0	88.0
4	HMS	10.38	3.50	30.0	511.0	0.0	511.0
B	SHMS	10.38	3.40	30.0	511.0	4.0	515.0
C	SHMS	10.38	2.60	30.0	88.0	4.0	92.0

Polarizations During A_1n

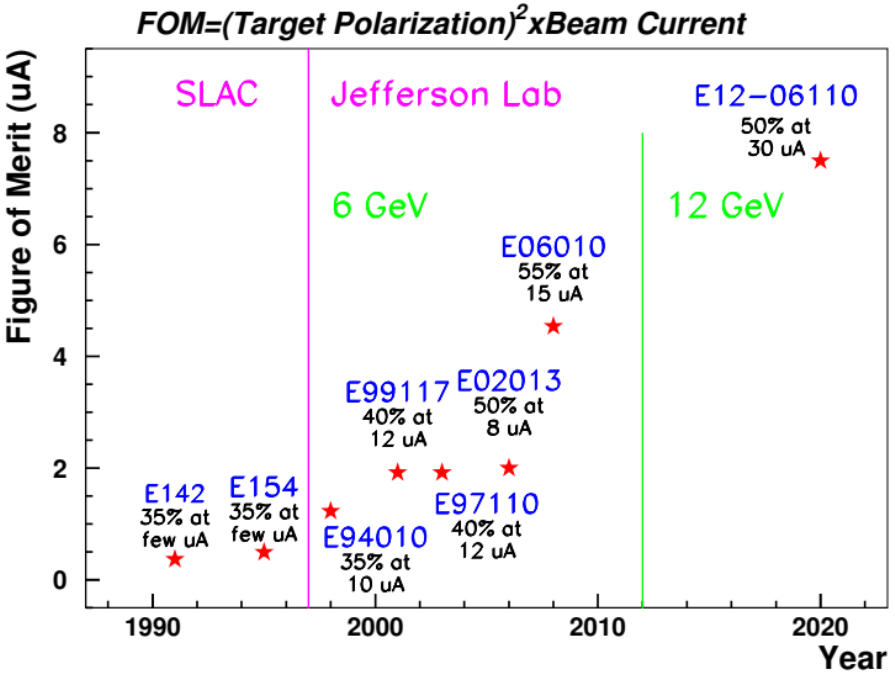
beam polarization







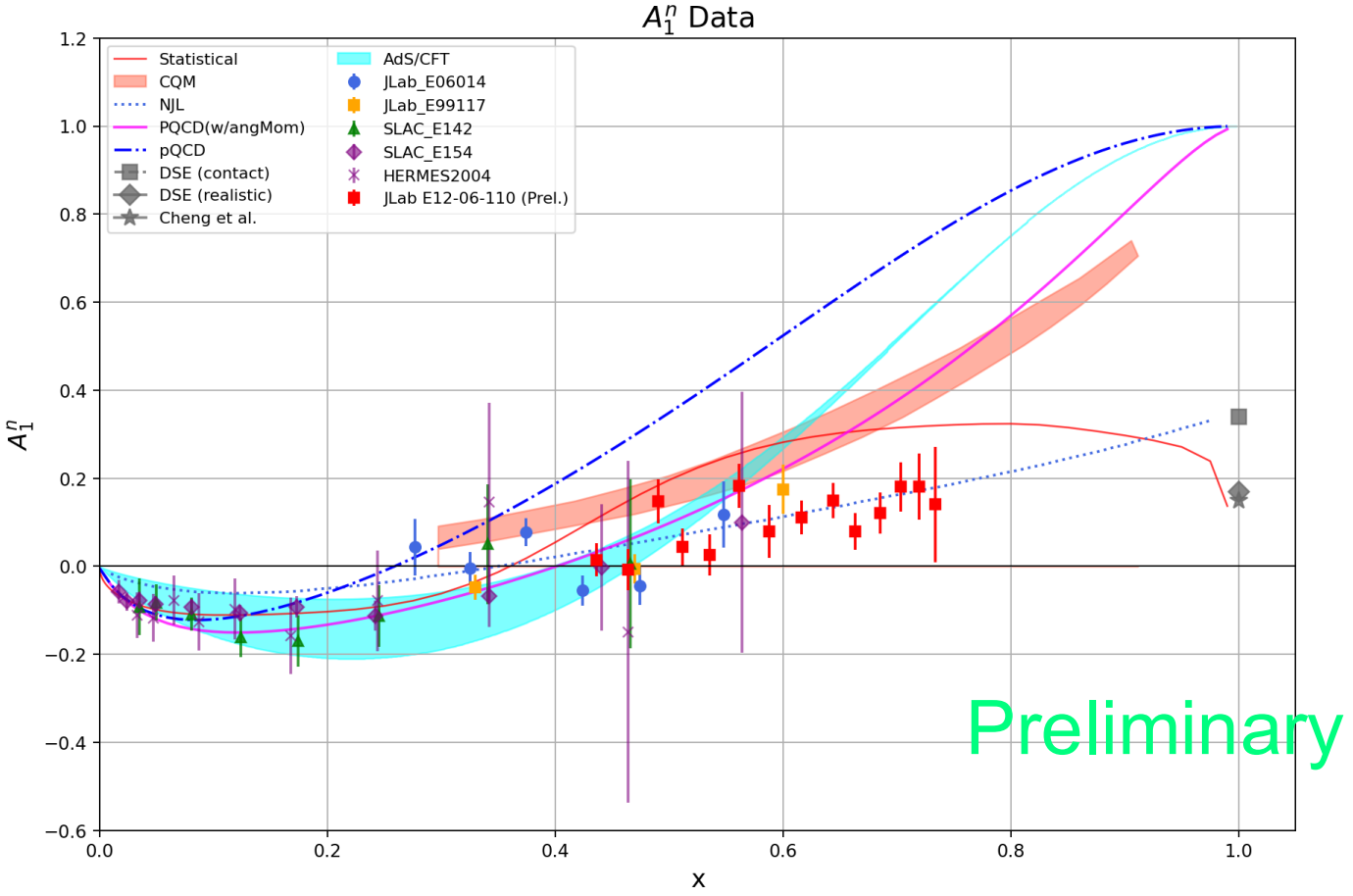
target polarization



Preliminary Results on A_1^n (DIS)

A_1^n extracted using effective polarizations, a fit for the proton A_1^p, F1F2-21 (p, n, plus our own ^{3}He fit)

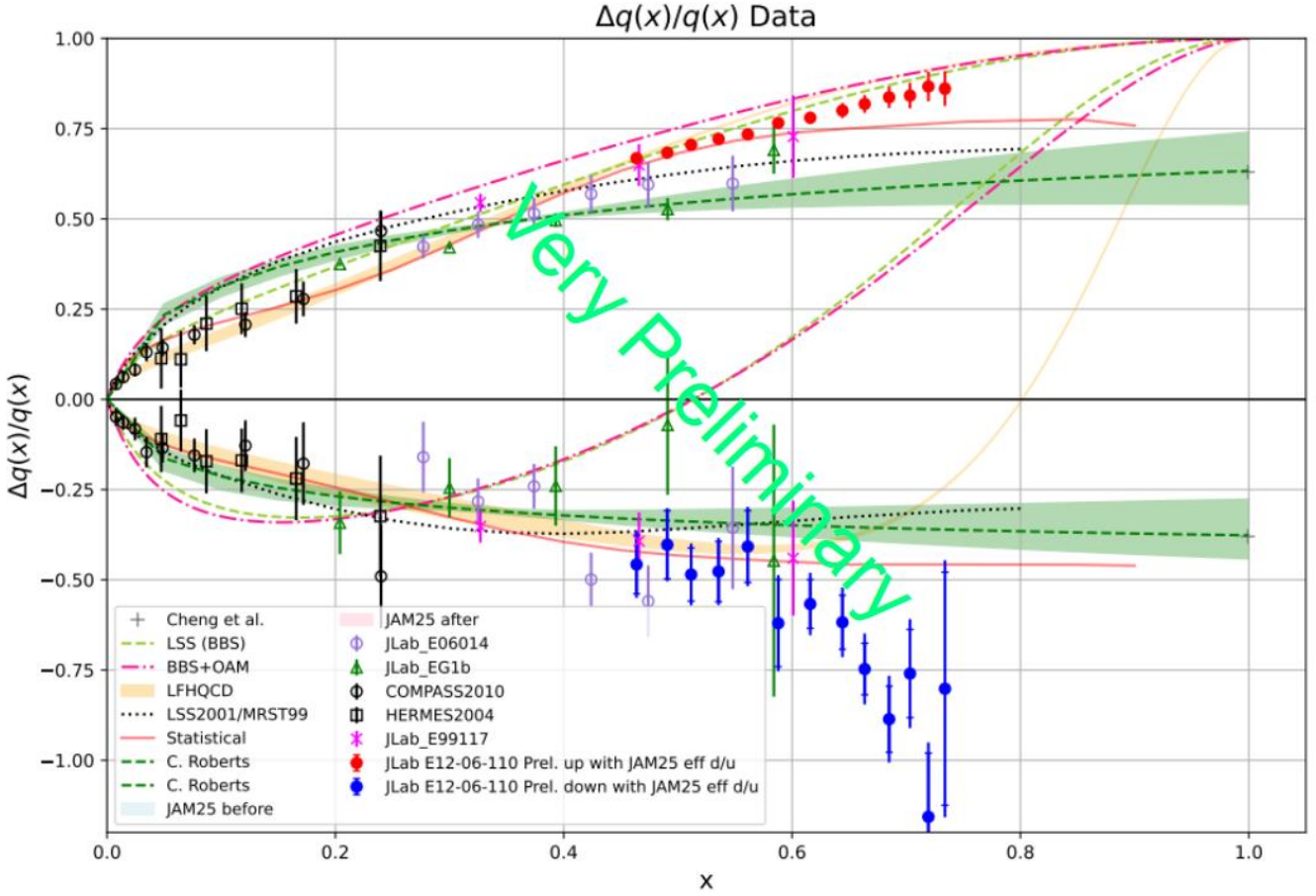
$$A_1^n = \frac{1}{P_n}\frac{F_2^{^3\mathrm{He}}}{F_2^n}\left(A_1^{^3\mathrm{He}} - 2P_p\frac{F_2^p}{F_2^{^3\mathrm{He}}}A_1^p\right)$$



Preliminary Results on Quark Polarizations

$$\frac{\Delta u + \Delta \bar{u}}{u + \bar{u}} = \frac{4}{15}\frac{g_1^p}{F_1^p}\left(4 + R^{du}\right) - \frac{1}{15}\frac{g_1^n}{F_1^n}\left(1 + 4R^{du}\right)$$

$$\frac{\Delta d + \Delta \bar{d}}{d + \bar{d}} = -\frac{1}{15}\frac{g_1^p}{F_1^p}\left(1 + \frac{4}{R^{du}}\right) + \frac{4}{15}\frac{g_1^n}{F_1^n}\left(4 + \frac{1}{R^{du}}\right)$$



$$R^{du} = \frac{d + \bar{d}}{u + \bar{u}}$$

Preliminary Results on Quark Polarizations

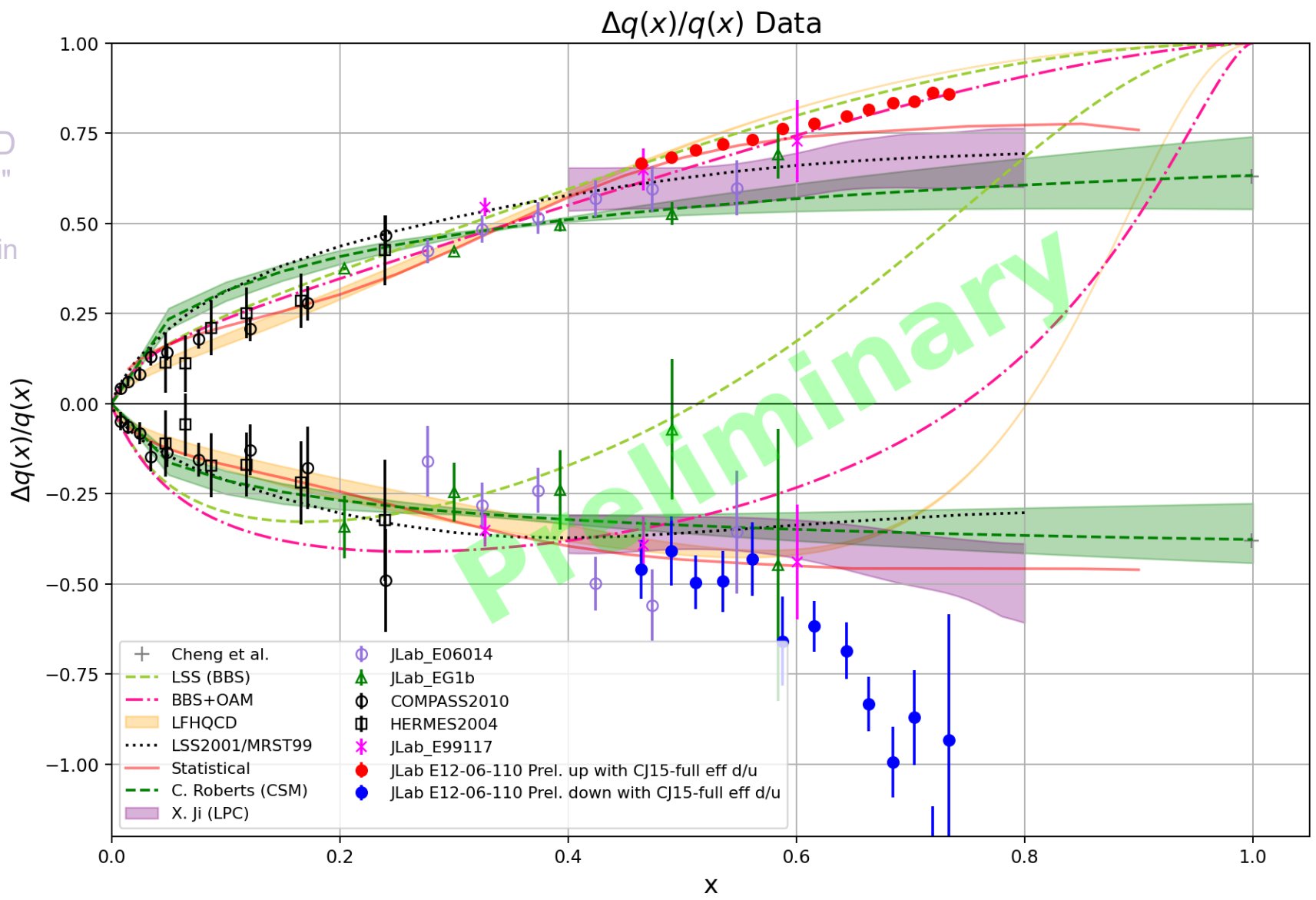
Comparison with predictions:

- X. Ji et al: LQCD "LPC, to be published" LPC: = Lattice Parton Collaboration (based in China)
- C. Roberts et al.: CSM
- T. Liu et al.: LFHQCD.

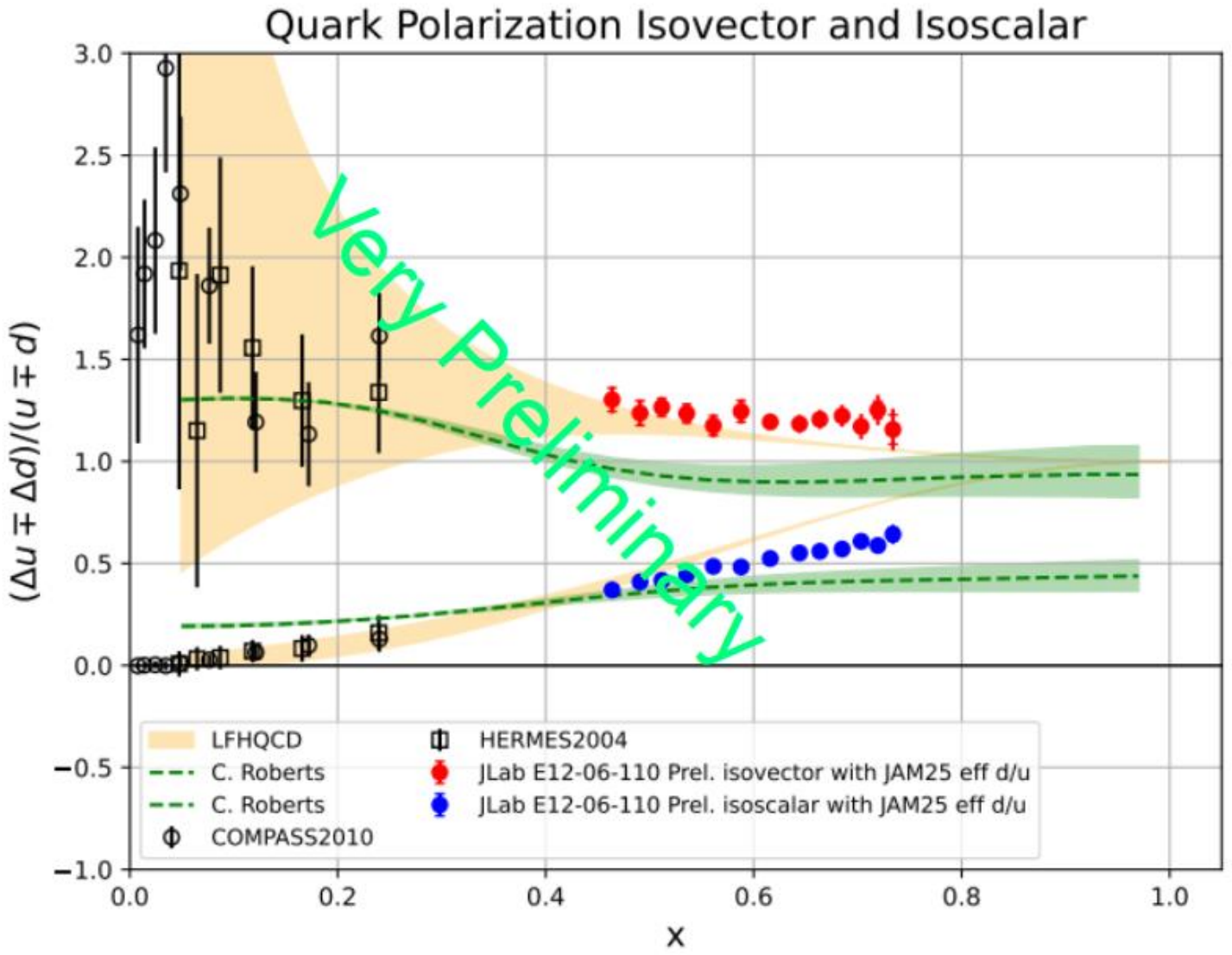
…

Not consistent with pQCD predictions!

--> Non-perturbative QCD dynamics important



Isospin (Flavor) Combinations



Future: Precision Spin Program with SoLID

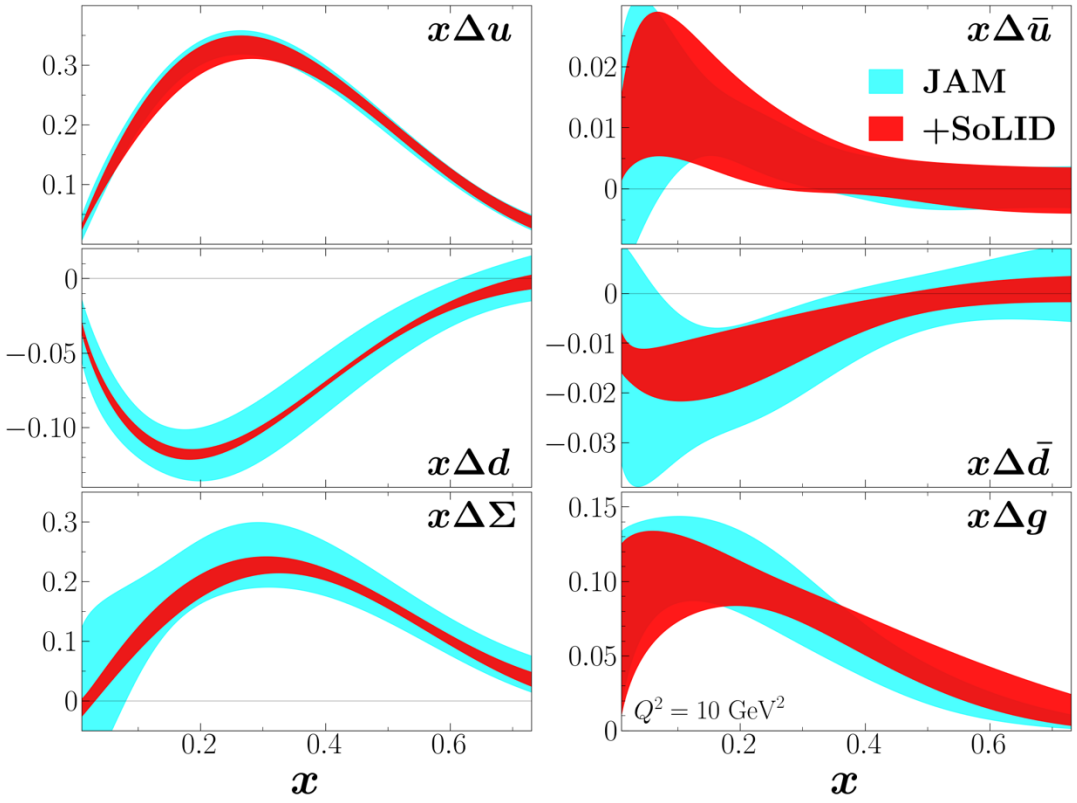
Flavor separation – valence and sea quark spin

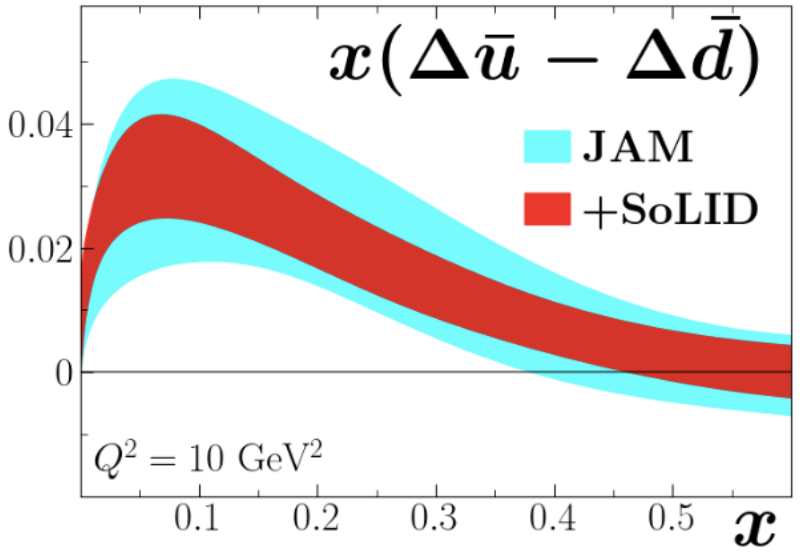
SoLID Run-group Proposal: SIDIS with Polarized ^{3}He

JAM QCD global analysis:

from Christopher Cocuzza

Constrains light valence and sea quark polarized PDFs

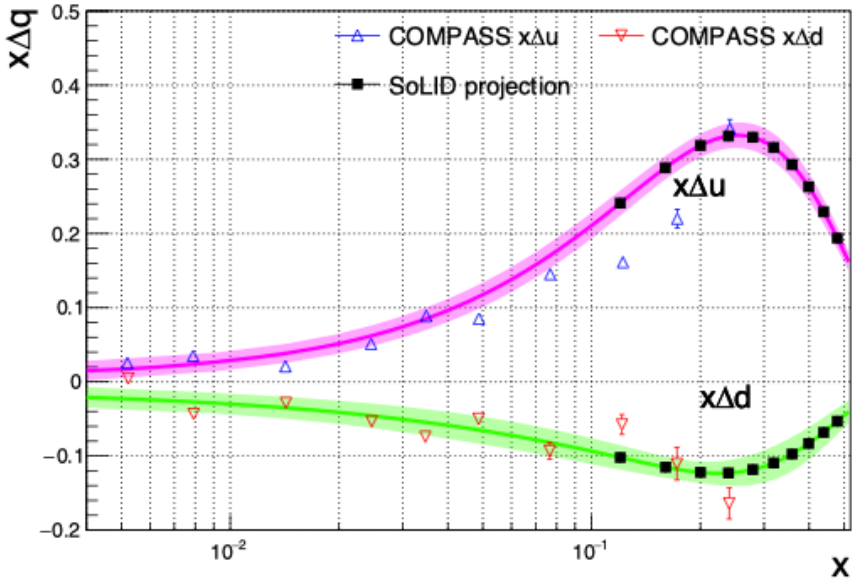


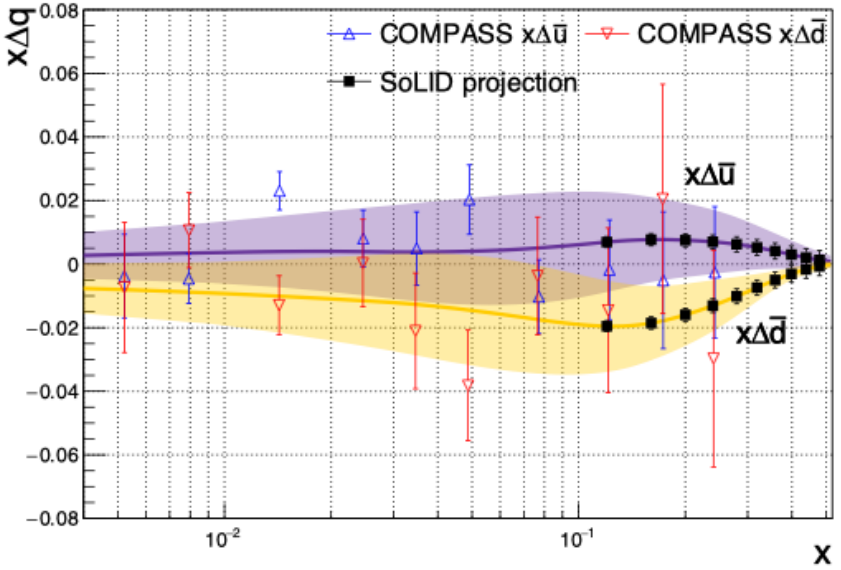


- SoLID's polarized ^{3}He SIDIS data will tighten uncertainties on both valence and sea helicity PDFs, with main impact on d and d_bar quarks
- SoLID helps test if the polarized sea is flavor asymmetric

SoLID @ JLab22 SIDIS Polarized u, d and Sea PDFs

- LO extraction (assuming x-z factorization)
  Using LO Fragmentation Function DSSFFLO
- Order-of-magnitude improvements in statistic precision for light sea PDFs





Bands are current uncertainties from NNPDF

SoLID Physics Program

Precision Study of Strong QCD and SM

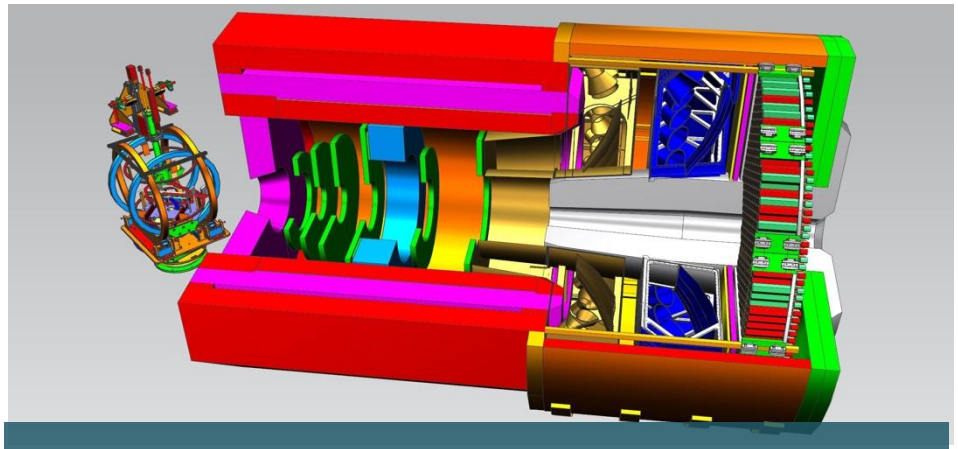
- QCD has been well-established as The theory for Strong Interaction for decades, yet is poorly-understood, especially in Strong Region where the real world lives (~ nucleon size (fm), energy (GeV)).
  - Tested in perturbative region over many order of magnitudes
  - Only to few %, contrast to EW theory tested to up to 10^{-12} !
  - Major limiting factor for search for physics beyond SM (ex. g-2)

- Precision study is essential for understanding Strong QCD/nucleon structure and for search for NEW Physics beyond Standard Model
  - Precision measurements of spin: valence and sea quarks
  - **Precision multi-dimension imaging of nucleon (spin, mass,…)**

    TMDs, GPDs, Threshold J/ψ
  - **Precision test of SM: PVDIS**

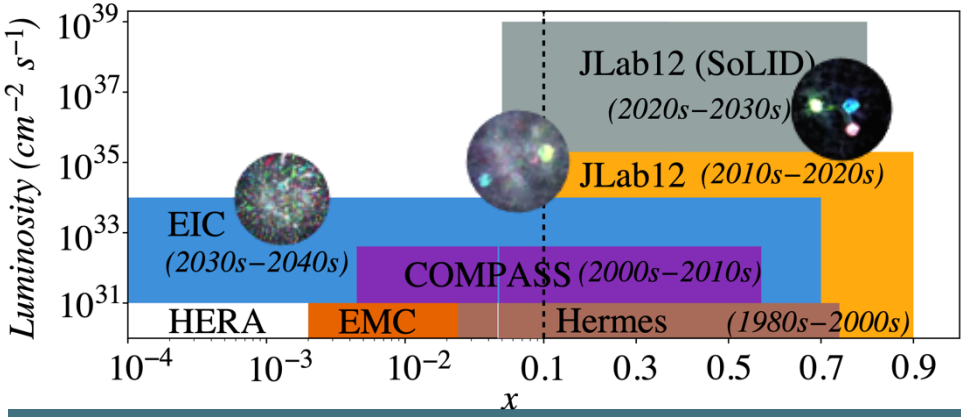
SoLID @ JLab: QCD Intensity FRONTIER

Nucleon spin, mass and BSM search experiments. Precision measurements of small cross sections and asymmetries. Critical: high luminosity (10^{37}-10^{39} $cm^{-2}s^{-1}$) and large acceptance acceptance (at least 100 times better than existing facility in terms of Figure of Merit)



Solenoidal Large Intensity Device (SoLID)

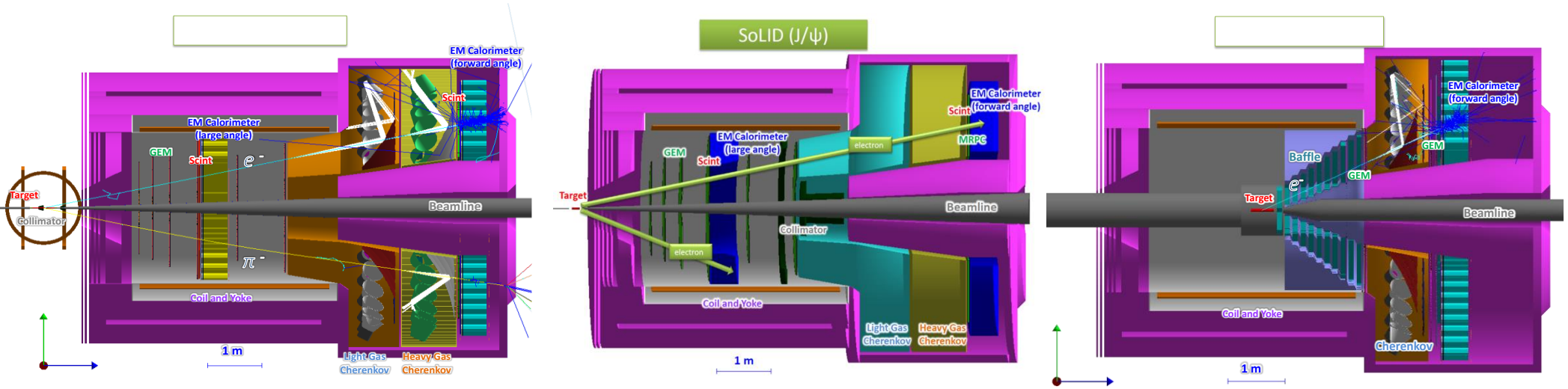
- Precision 3D imaging of the nucleon in the valence region (GPDs, TMDs). Unique, critical to NP science mission but complementary to EIC.
- Exploring the origin of the proton mass and confining color forces. Mass and scalar energy distributions in the proton. Unique, critical to NP science, but complementary to EIC.
- Search beyond the Standard Model of Particle Physics. Unique and complementary to MOLLER



Luminosity Frontier in the Valence Region

- DOE/JLab supported pre-R&D activities on cutting-edge technologies.
- Enhanced credibility of the design with greatly reduced cost/schedule risks
- Scientific excellence and students training ground with a growing impactful science portfolio

Approved SoLID Experiments



A) SIDIS: (3) Transversely Polarized ^{3}He (n): Transversity, Sivers, Pretzlosity TMDs
Rating A Longitudinally Polarized ^{3}He (n): Worm-gear TMDs
Transversely Polarized Proton: Transversity, Sivers, Pretzlosity TMDs

B) Threshold J/ψ: **Rating A** Gluon Field, Proton Mass, Gluon Radius

C) Parity: **PVDIS**: **Rating A** Test Standard Model & Nucleon Structure
Beam Normal SSA **Rating A-** 2-photon Effects
PVEMC **Conditional Approval** Isospin EMC Effects

D) DDVCS: **Rating A (C1 Conditional)** GPDs

E) Run group experiments (8) approved for **GPDs, TMDs, and Spin**

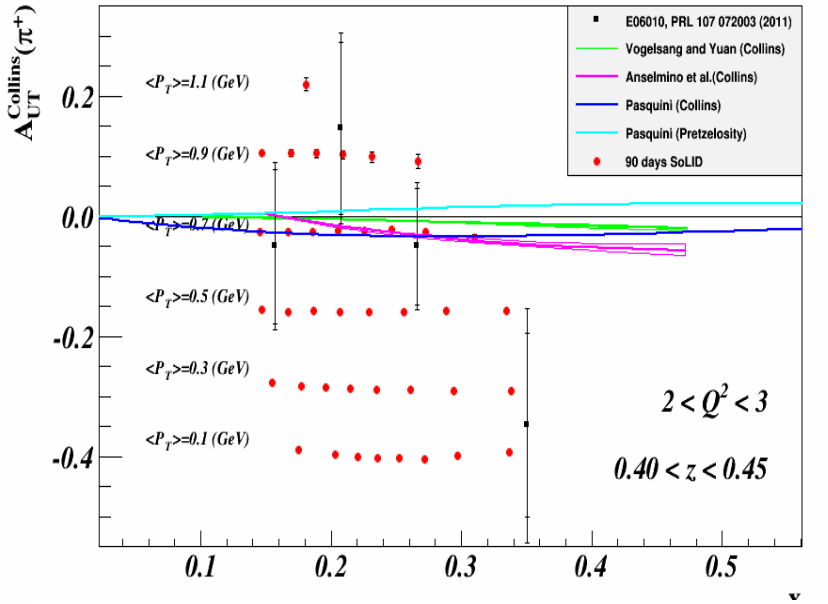
SoLID-SIDIS: Precision Mapping in Multi-Dimension

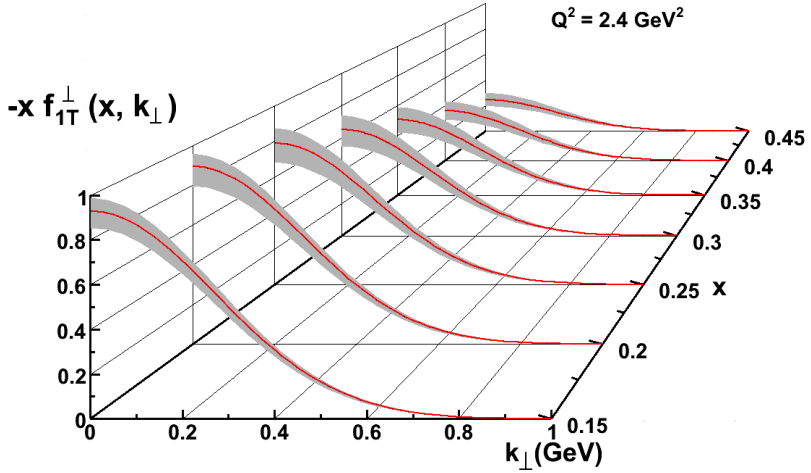
SoLID-SIDIS program: Large acceptance, Full azimuthal coverage + High luminosity

- 4-D mapping of asymmetries with precision
- Constrain models and forms of TMDs, Tensor charge, …
- Lattice QCD, QCD dynamics

4-D binning for the first time!

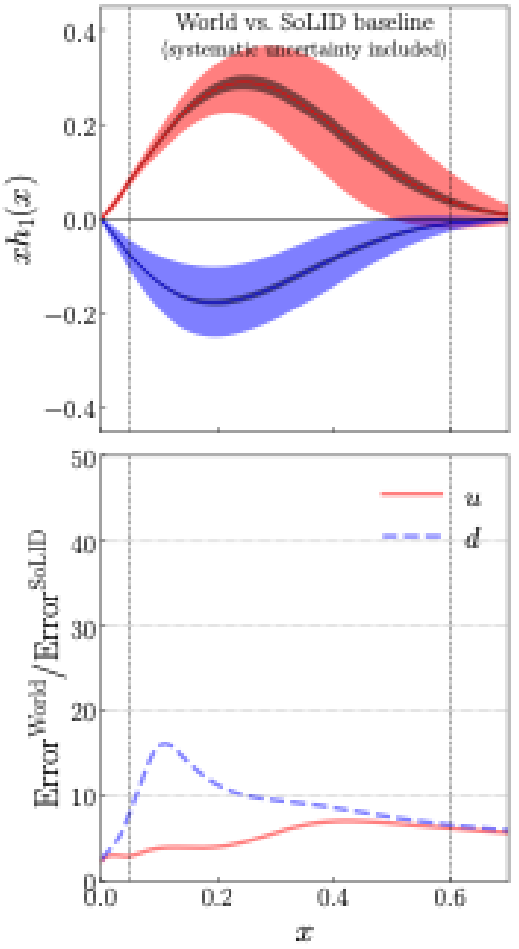
- **More than 1400 bins in x, Q^2, P_T and z for 11/8.8 GeV beam.**





- **Sivers:** Confined quark motion
- Quantum correlations between nucleon spin and quark motion
- QCD dynamics

Transversity



SoLID Impact on Tensor Charge

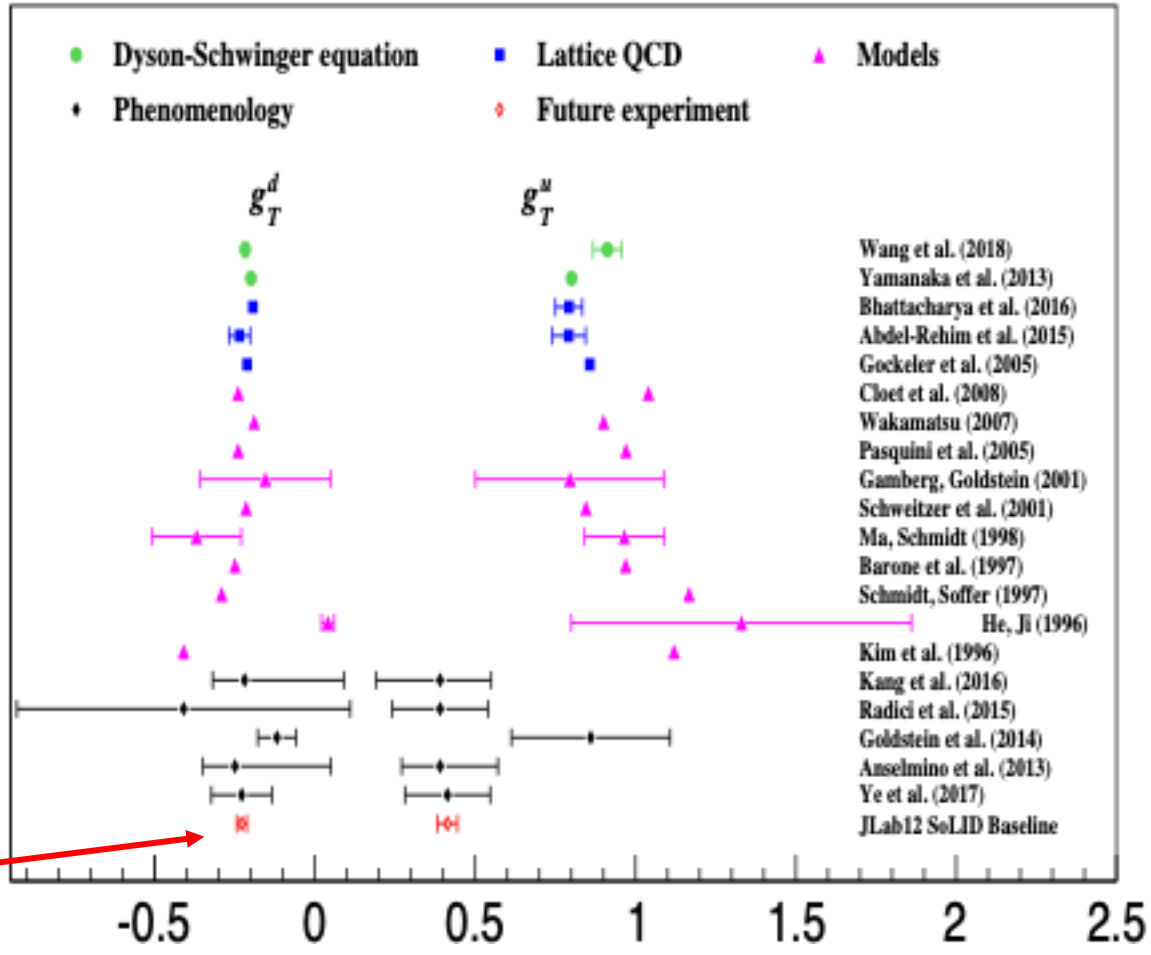
Definition

$$\langle P,S|\bar{\psi}_q i\sigma^{\mu\nu}\psi_q|P,S\rangle = g_T^q\,\bar{u}(P,S)i\sigma^{\mu\nu}u(P,S) \quad g_T^q = \int_0^1 [h_1^q(x) - h_1^{\bar{q}}(x)]dx$$

- A fundamental QCD quantity: matrix element of local operators.
- Moment of transversity distribution
- Valence quark dominant.
- Precision calculations available from lattice QCD.

- Probe new physics combined with EDMs

$$d_n = g_T^d\, d_u + g_T^u\, d_d + g_T^s\, d_s$$

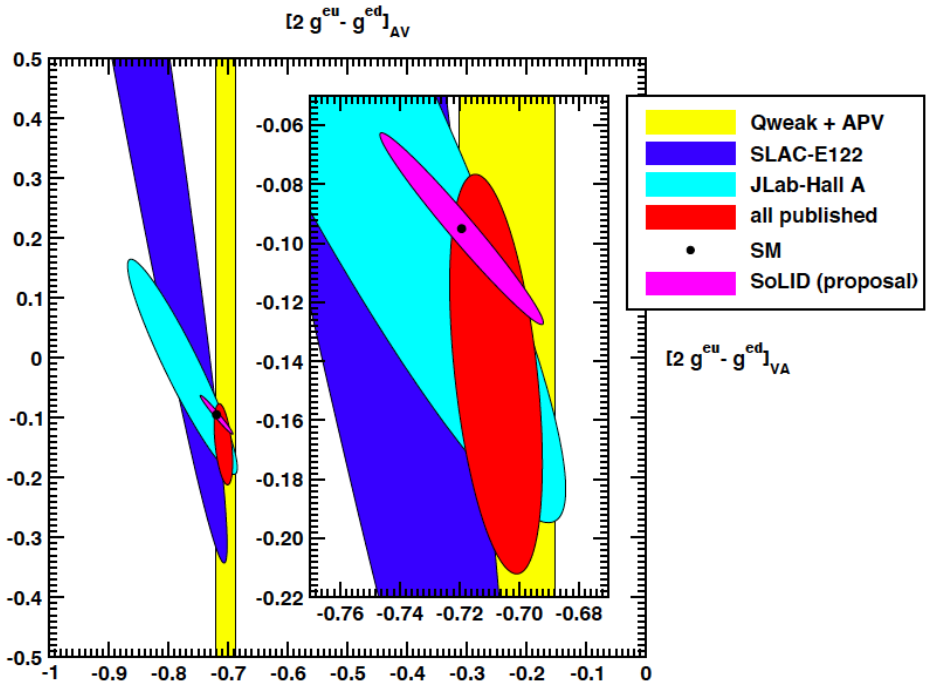


SoLID Projections

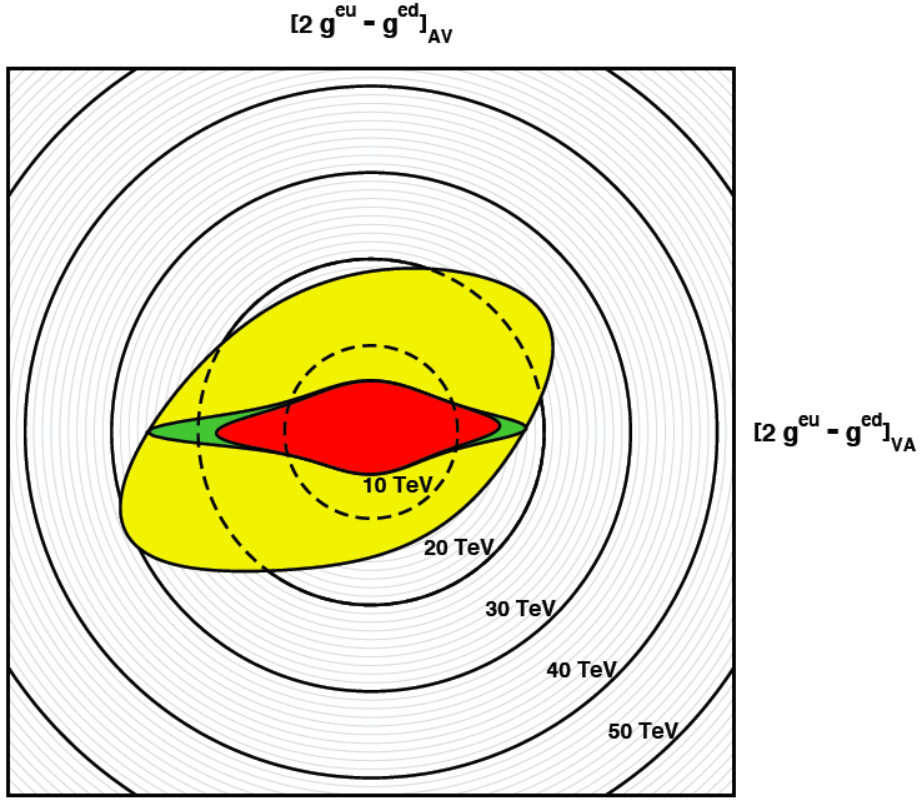
SoLID-PVDIS: Precision Test of Standard Model

SoLID makes a unique contribution to the SMEFT program.

Improvement in couplings



Improvement in energy reach for electron-nucleon couplings



Unique sensitivity to

- **lepto-phobic Z', dark boson Z_d**

Also provides precision study of

- **charge symmetry violation**
- **high-twist effects**
- **d/u at high-x**

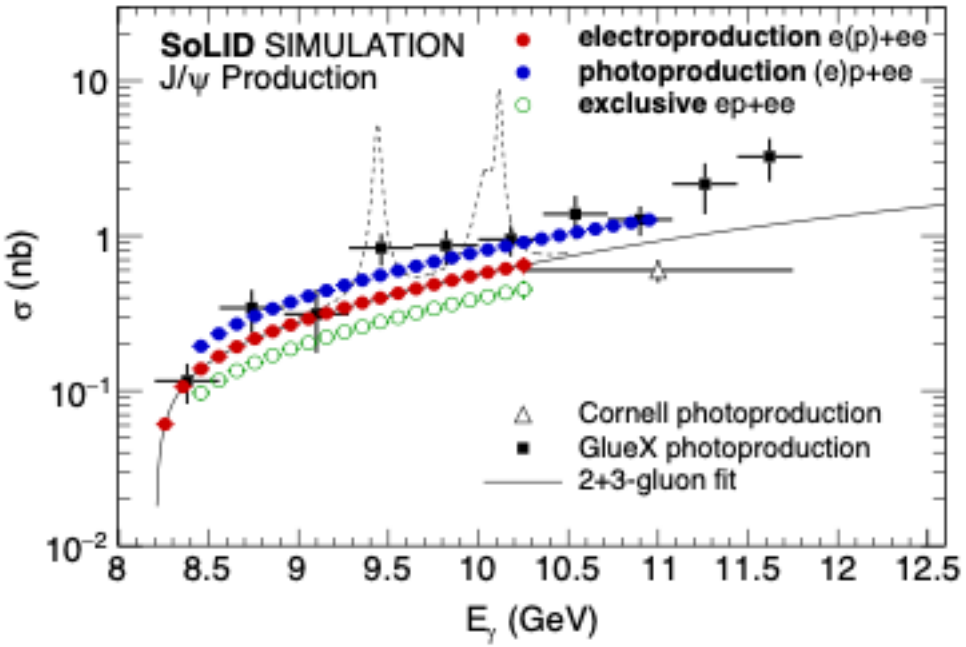
Published data

Published data + P2

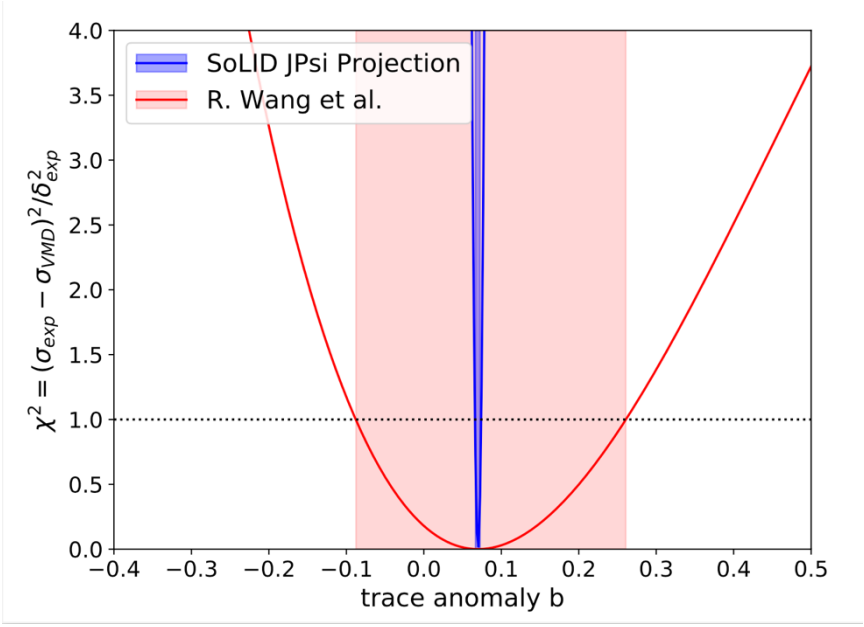
Published data + P2 + SoLID

SoLID-J/ψ: Gluon Field, Radius and Proton Mass

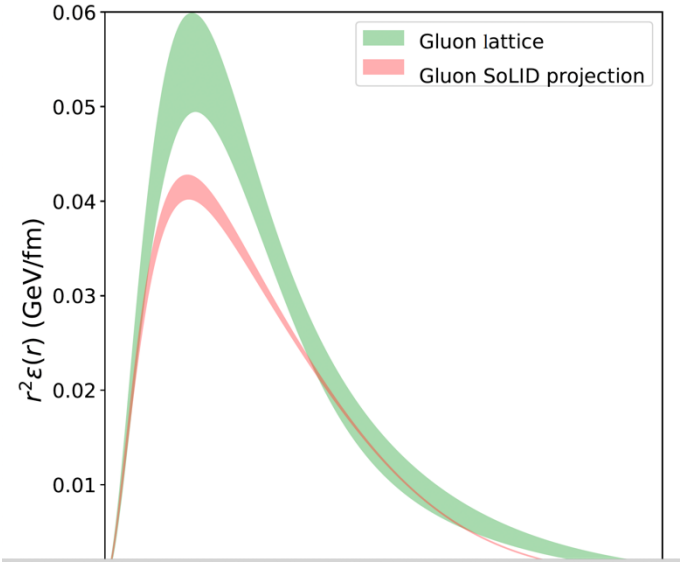
SoLID precision projection



Gluon (trace anomaly) contribution to proton mass



Gluon Radius



S. Joosten, Z.E. Meziani, PoS 308 (2017)

Gryniuk, Joosten, Meziani, and Vanderhaeghen, PRD 102, 014016 (2020) (for update)

GlueX on J/ψ Ali et al., PRL 123, 072001(2019)

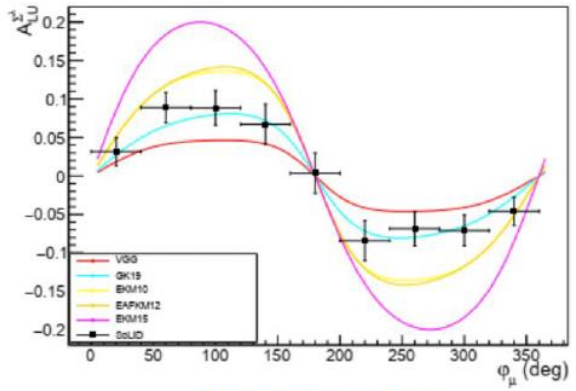
M. Boer, et al., arXiv: hep-ph2512.15064 (2025)

SoLID-GPD Program: DDVCS and more

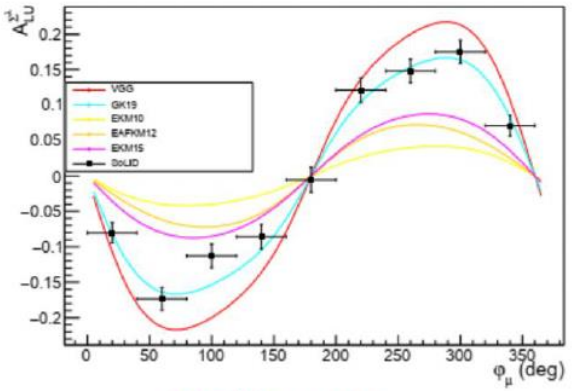
- DDVCS with SoLIDμ (SoLID+muon detector): C1 approval with A rating
  (another DDVCS proposal with μCLAS12: C1 approved with A rating)
- Deep Exclusive Meson Production: approved run-group experiment
- TCS (Time-like Compton Scattering): approved run-group experiment

Double Deeply Virtual Compton Scattering (PR12-25-010)

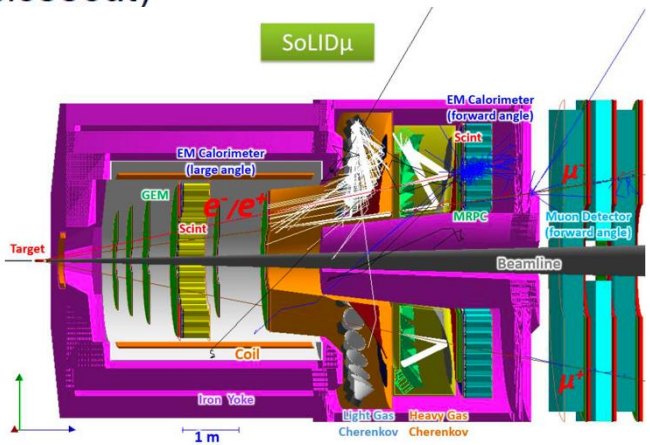
- C1 Conditionally approved with A rating
- First ever DDVCS to access the full kinematic space for extracting GPDs
- A breakthrough physics program (from PAC53 closeout)

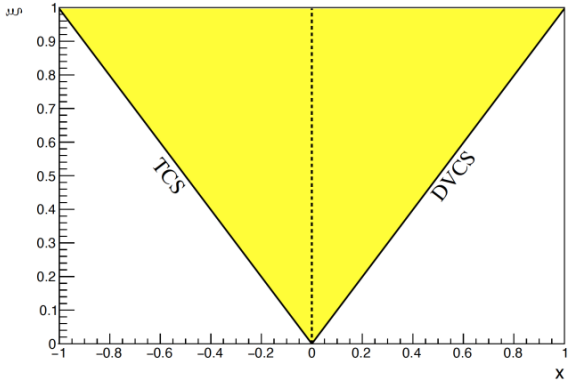


DVCS-like region



TCS-like region





SoLID Apparatus

SoLID Apparatus

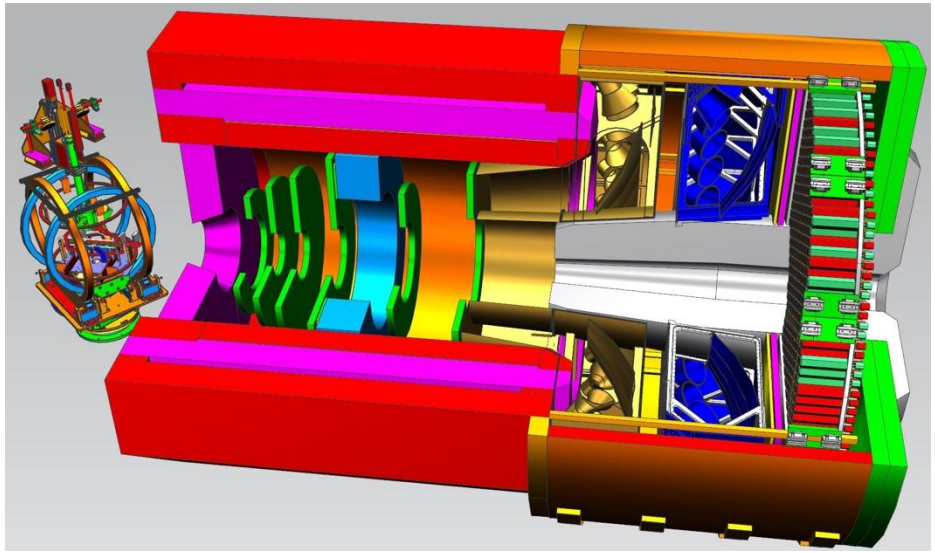
Challenging Requirements

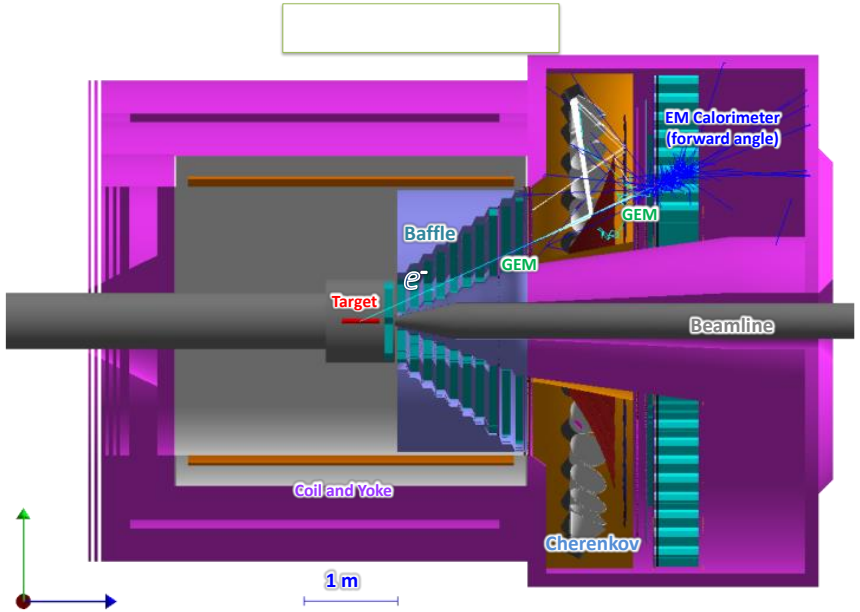
- High Luminosity (10^{37}-10^{39})
- High data rate
- High background
- Low systematics
- High Radiation
- Large scale

Modern Technologies

- Micro-pattern Gaseous Detectors, Advanced Readout (Microelectronics)
- Shashlik Electromagnetic Calorimeter
- High Performance Cherenkovs
- MRPC
- Pipeline DAQ, Streaming Readout
- Rapidly Advancing Computational Capabilities
- AI/ML essential to meet the challenge
- First test of a self-driving detector

Polarized ^{3}He (``neutron") @ SoLID

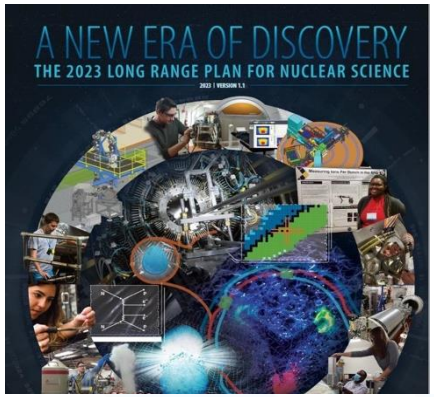




SoLID: training, testing, proving ground for the EIC

New Approach: SoLID-LIte

NSAC Long Range Plan & Strong Community Support



1 | EXECUTIVE SUMMARY

RECOMMENDATION 4

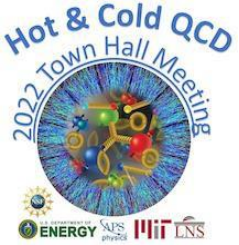
We recommend capitalizing on the unique ways in which nuclear physics can advance discovery science and applications for society by investing in additional projects and new strategic opportunities.

Today's investments enable tomorrow's discoveries, with corresponding benefits to society. We underscore the importance of innovative projects and emerging technologies to extend discovery science, which plays a unique role in supporting national needs.

1.3.1. Opportunities to Advance Discovery

Strategic opportunities exist to realize a range of projects that lay the foundation for the discovery science of tomorrow. These projects include the 400 MeV/u energy upgrade to FRIB (FRIB400), the Solenoidal Large Intensity Device (SoLID) at Jefferson Lab, targeted upgrades for the LHC heavy ion program, emerging technologies for measurements of neutrino mass and electric dipole moments, and other initiatives that are presented in the body of this report.

NSAC 2023 LRP Town Meetings – QCD



Recommendation 1: Capitalizing on past investments *(Yes: 335; No: 3; No Answer: 4)*

The highest priority for QCD research is to maintain U.S. world leadership in nuclear science for the next decade by capitalizing on past investments. Maintaining this leadership also requires recruitment and retention of a diverse and equitable workforce.

We recommend support for a healthy base theory program, full operation of the CEBAF 12-GeV and RHIC facilities, and maintaining U.S. leadership within the LHC heavy-ion program, along with other running facilities, including the valuable university-based laboratories, and the scientists involved in all these efforts.

This includes the following, unordered, programs:

- The 12-GeV CEBAF hosts a forefront program of using electrons to unfold the quark and gluon structure of visible matter and probe the Standard Model. We recommend executing the CEBAF 12-GeV program at full capability and capitalizing on the full intensity potential of CEBAF by the construction and deployment of the Solenoidal Large Intensity Device (SoLID).

Budget Reality

- SCAC Facility Subcommittee Prioritize Projects from HENP, BES, BER, FS, ASCR
  Total Proposed > $22B, budget possibilities $2B, $4B, $6B for next decade !

Projects to Be Prioritized — and Why

A document on the SCAC website lists projects under construction and proposed projects. The subcommittee will focus on proposed projects. We are also invited to identify gaps.

OUR CHARGE SUGGESTS:

It may facilitate the work of the advisory committee to consider prioritization in the context of budget opportunities. For example, if either $2B, $4B, or $6B is available for new facilities and upgrades over the next decade, what would be the highest-priority facilities to include?

Total proposed: **>$22B**

New Approach: SoLID-Lite

Can we do significant portion of SoLID physics with a fraction of full cost?
@ a level of typical large scale JLab experiment

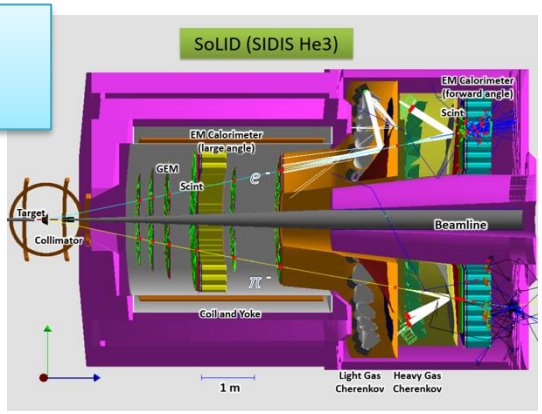
Staged approach:
Start with J/ψ
Then SIDIS 3He
Then …

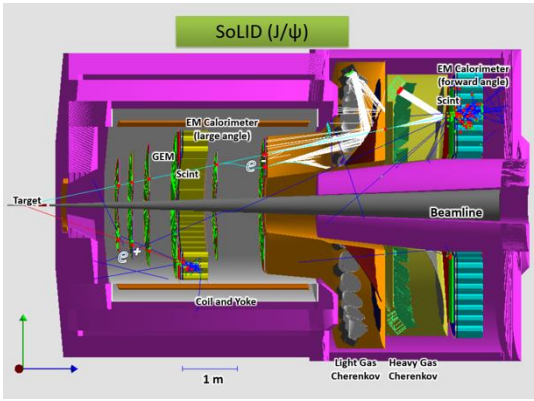
1. **Use CLEO magnet as it was** for J/ψ, add field clamping for SIDIS, …
2. **Re-use existing detectors**
   good news: BNL detectors available **sPHENIX**
   STAR and STAR Forward Upgrade
   ECals: cover more than SoLID needs
   GEMs: readout system
   Vertex Detector: Recoil detector for SoLID
   HCal: muon detection
   TOF: pion/K PID
   DAQ
3. **Cherenkov: Canadian funding** (U. Regina)
4. Initial configuration: large angle region full size, forward region ~ ¼ size
5. Upgradable

SoLID Light option (preliminary)

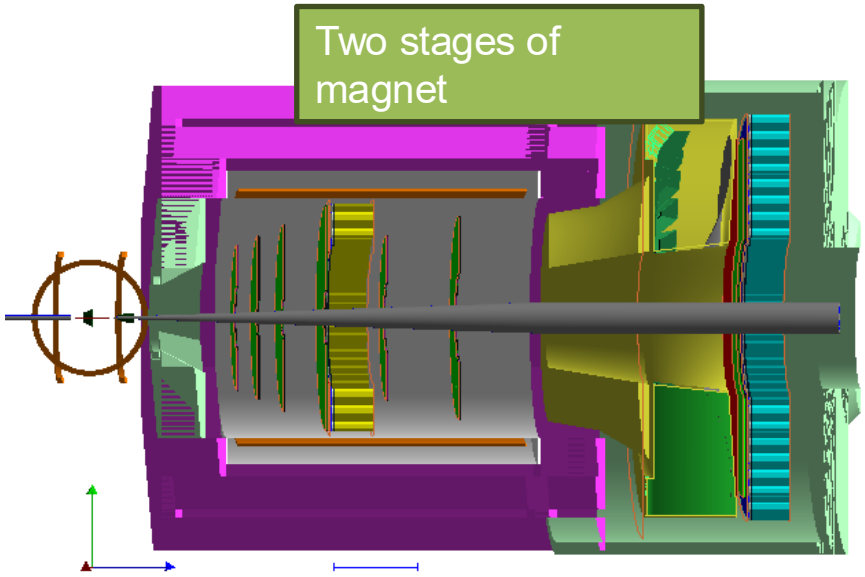
- SoLID full with forward angle (FA) and large angle (LA) detectors
- SoLID light option (one example “4seg24degFA”)
  - Works for both SIDIS He3 and JPsi
  - **Reduce FA into 4 segments of 24 deg each while keeping LA full**
  - Solenoid magnet using CLEO iron (purple) without modification for JPsi, then add front piece and endcap (green) for SIDIS, no magnet endcap nose
  - One Cherenkov with CO2, maybe reuse sPHENIX ECAL

SoLID full

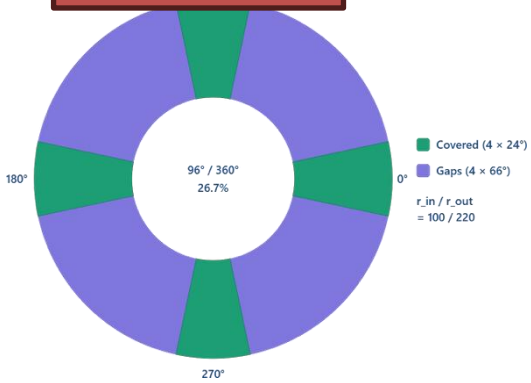




Two stages of magnet



4seg24degFA



SoLID-Lite Experiment at JLab

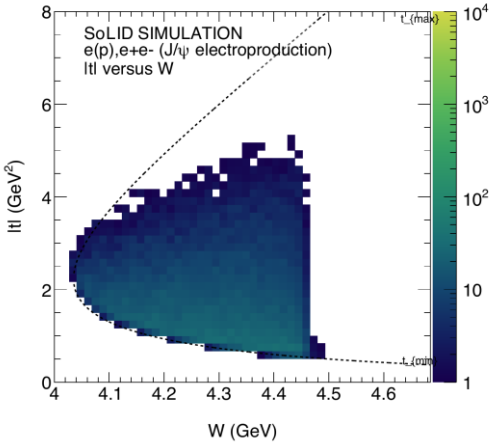
SoLID-Lite
SOLENOIDAL LARGE INTENSITY DEVICE

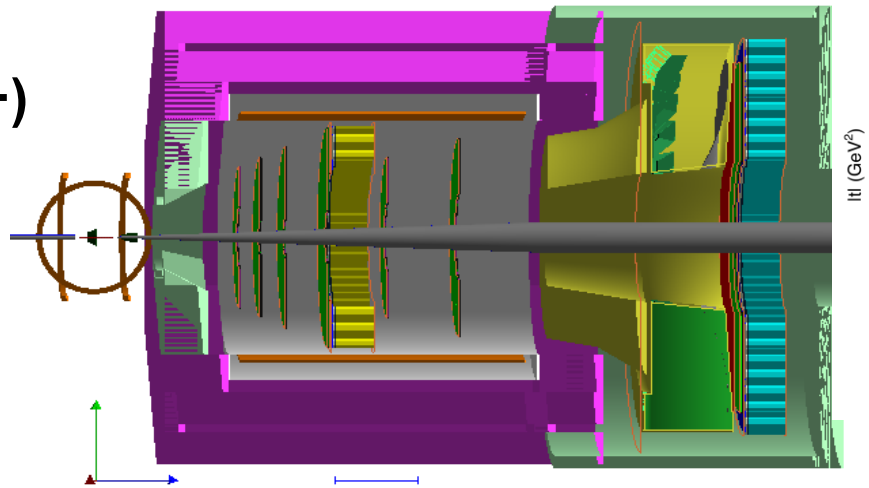
Ultimate experiment for near-threshold J/ψ production

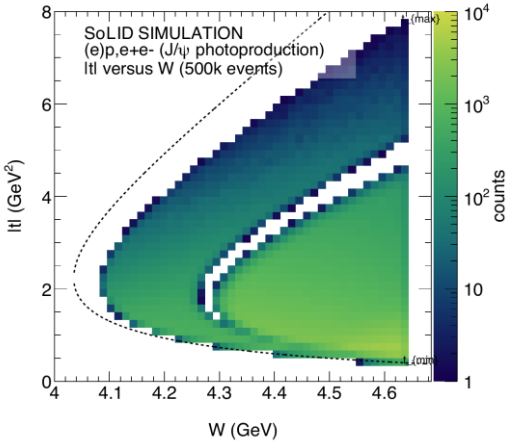
- Large-acceptance spectrometer
- Double luminosity (possible with lower number of channels):

  50 days of **6μA** beam on a **15cm** long LH2 target (2 x10^{37}/cm^2/s)
- Ultra-high luminosity: 86.4ab^{-1}
- 4 channels:
  - **Electroproduction (e, e-e+)**
  - **Photoproduction (p, e-e+)**
  - **Inclusive (e-e+)**
  - **Exclusive (ep, e-e+)**



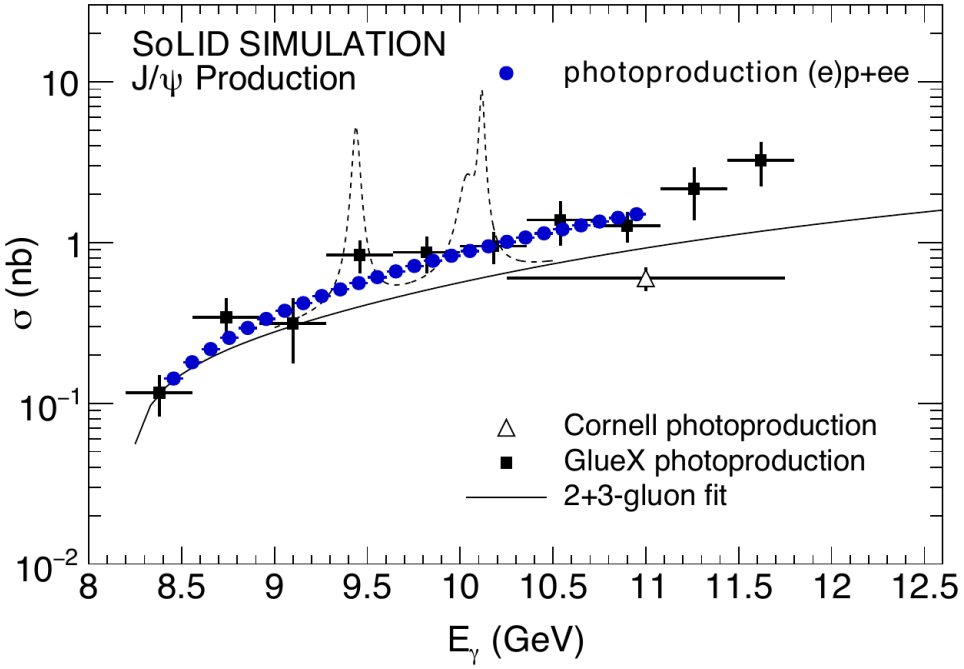


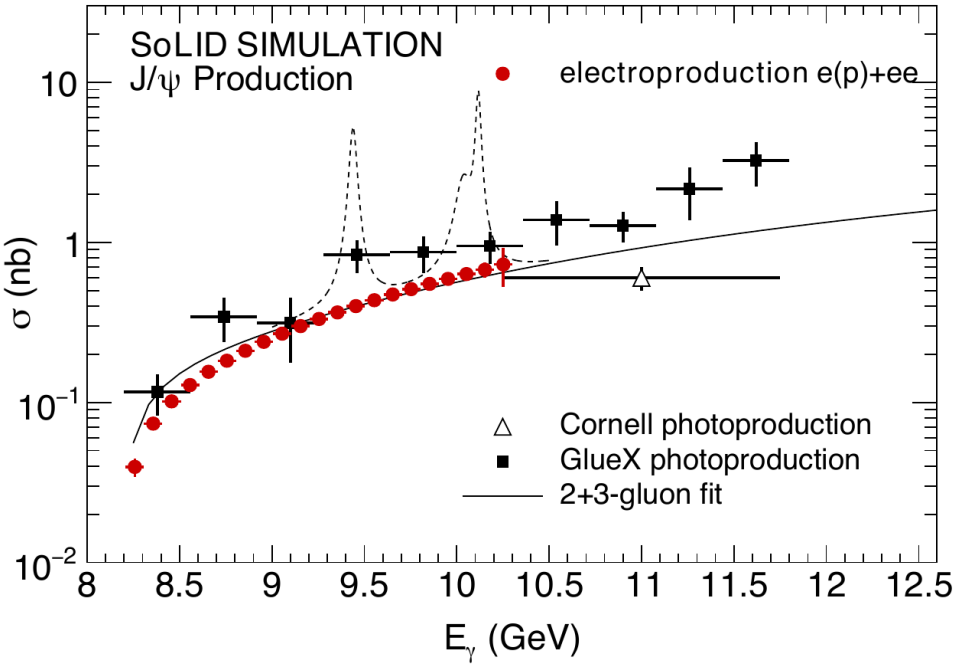




SoLID-LITE experiment at JLab

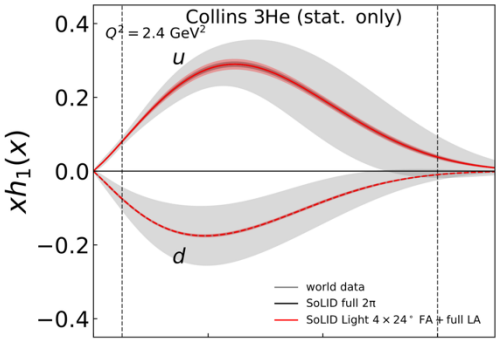
Precision measurement of J/psi near threshold

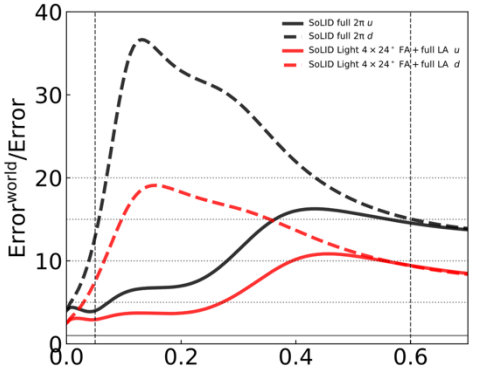


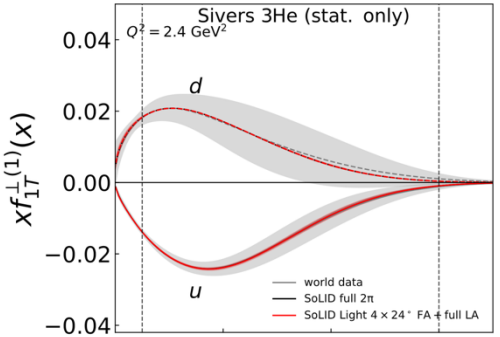


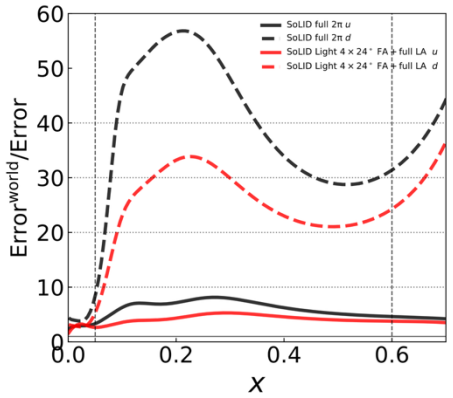
SoLID Light, SIDIS He3

- Compare TMD fitting error for SoLID full and SoLID light with same binning and stat error only
- Assume 4x luminosity, the same as SBS target and current
- Error ratio reduced by ~2x

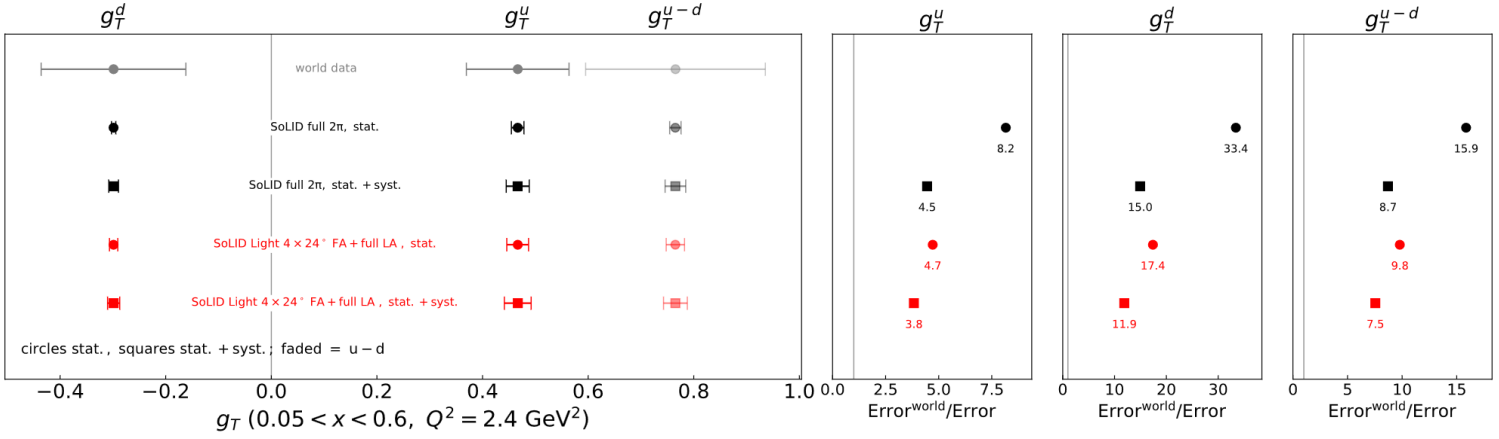








SoLID Light uses the same bins as full 2π, and 4× lumi



SoLID Light uses the same bins as full 2π, and 4× lumi

Summary

- JLab 12 GeV spin program, A1n @ high-x: polarized valence quark non-perturbative dynamics of QCD
- Future spin program: precision valence and sea quark

- SoLID: A **large acceptance** device which can handle **very high luminosity** to allow full exploitation of JLab 12 GeV potential

→ pushing the limit of the intensity frontier for Cold QCD

- SoLID has a rich and vibrant science program complementary and synergistic to the proposed EIC science program

Three pillars on 3-d (TMDs/GPDs), PVDIS and J/ψ production

- New approach: **SoLID-Lite**, staged and re-using existing detectors, maintaining high-precision, high-impact.

Backups

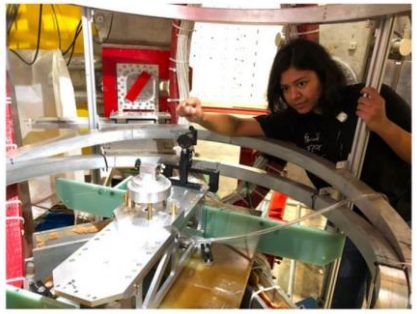
Hall C 12 GeV A_1n/d_2n Collaboration

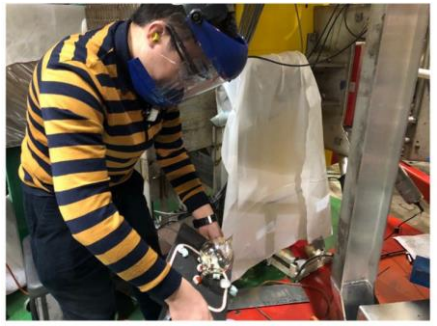
PhD (all graduated) People Spokespeople

D. Androic, W. Armstrong, T. Averett, X. Bai, J. Bane, S. Barcus, J. Benesch, H. Bhatt, D. Bhetuwal, D. Biswas, A. Camsonne, G. Cates, J-P. Chen, J. Chen, M. Chen, C. Cotton, M-M. Dalton, A. Deur, B. Dhital, B. Duran, S.C. Dusa, I. Fernando, E. Fuchey, B. Gamage, H. Gao, D. Gaskell, T.N. Gautam, N. Gauthier, C.A. Gayoso, O. Hansen, F. Hauenstein, W. Henry, G. Huber, C. Jantzi, S. Jia, K. Jin, M. Jones, S. Joosten, A. Karki, B. Karki, S. Katugampola, S. Kay, C. Keppel, E. King, P. King, W. Korsch, V. Kumar, I. Li, R. Li, S. Li, W. Li, D. Mack, S. Malace, P. Markowitz, J. Matter, M. McCaughan, Z-E. Meziani, R. Michaels, A. Mkrtchyan, H. Mkrtchyan, C. Morean, V. Nelyubin, G. Niculescu, M. Niculescu, M. Nycz, C. Peng, S. Premathilake, A. Puckett, A. Rathnayake, M. Rehfuss, P. Reimer, G. Riley, Y. Roblin, J. Roche, M. Roy, M. Satnik, B. Sawatzky, S. Seeds, S. Sirca, G. Smith, N. Sparveris, H. Szumila-Vance, A. Tadepalli, V. Tadevosyan, Y. Tian, R. Trotta, A. Usman, H. Voskanyan, S. Wood, B. Yale, C. Yero, A. Yoon, J. Zhang, Z. Zhao, X. Zheng, J. Zhou

Institutions

A.I. Alikhanian National Science Laboratory; Argonne National Laboratory; Artem Alikhanian National Laboratory (AANL).; Christopher Newport University; Duke University; Florida International University; Hampton University ; James Madison University ; Jefferson Lab; Kent State University; Mississippi State University; Ohio University; Old Dominion University; Rutgers University; Syracuse University; Temple University; The College of William and Mary; Univ. of Ljubljana; University of Connecticut; University of Kentucky; University of Kentucky; University of New Hampshire; University of Regina; University of Tennessee; University of Virginia; University of Virginia; University of Zagreb





M. Chen

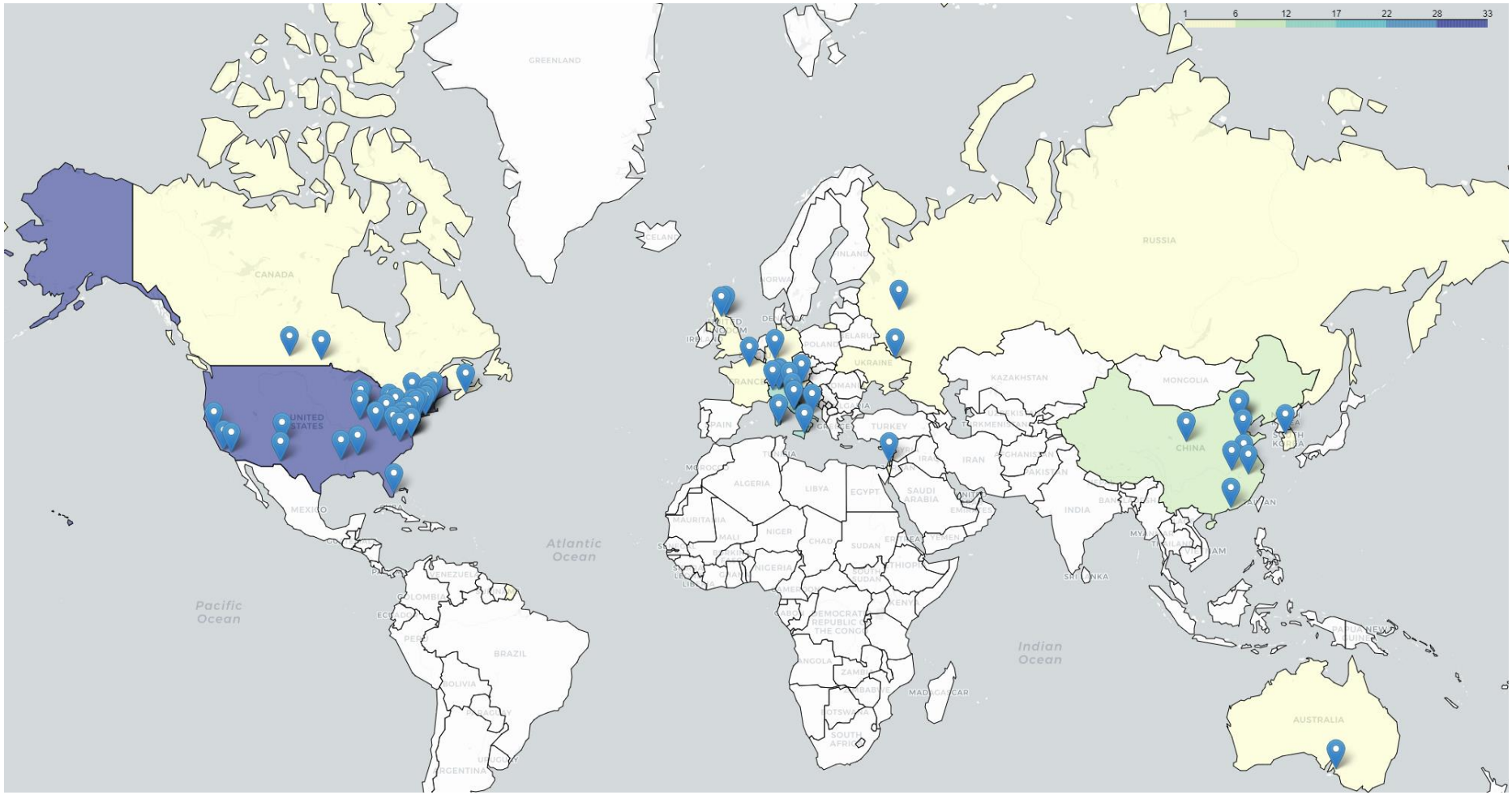


M. Rehfuss



Strong Collaboration

- 270+ collaborators, 70+ institutions from 13 countries
- Large international participations and anticipate contributions
- Strong theory support



full list available at https://solid.jlab.org/collaboration/full.html

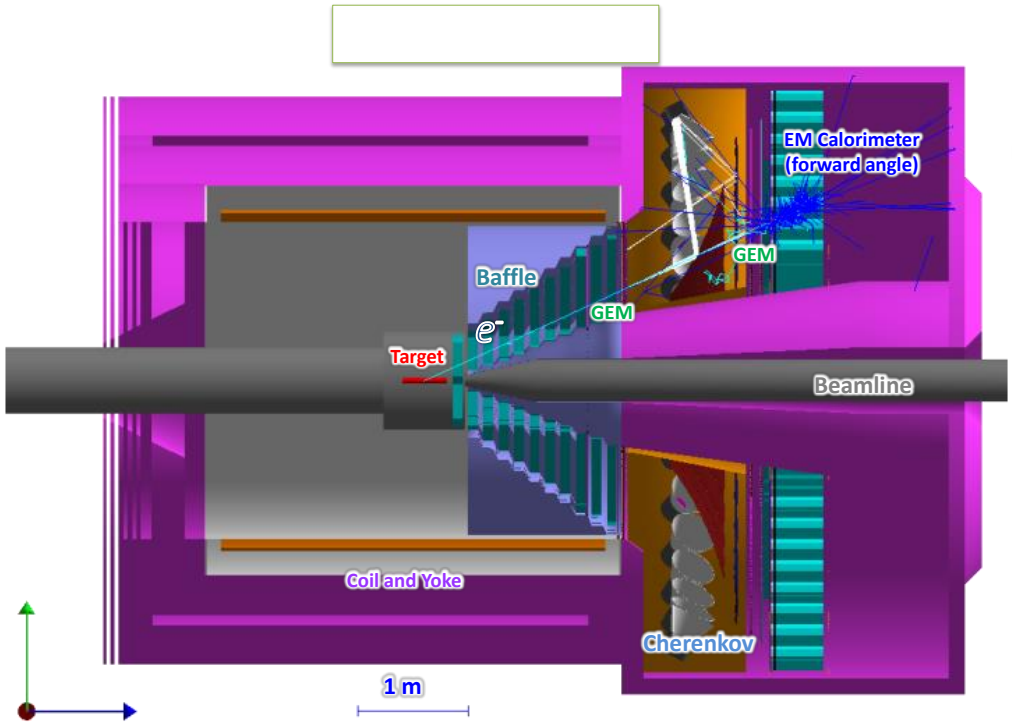
Current Plan for SoLID-Lite

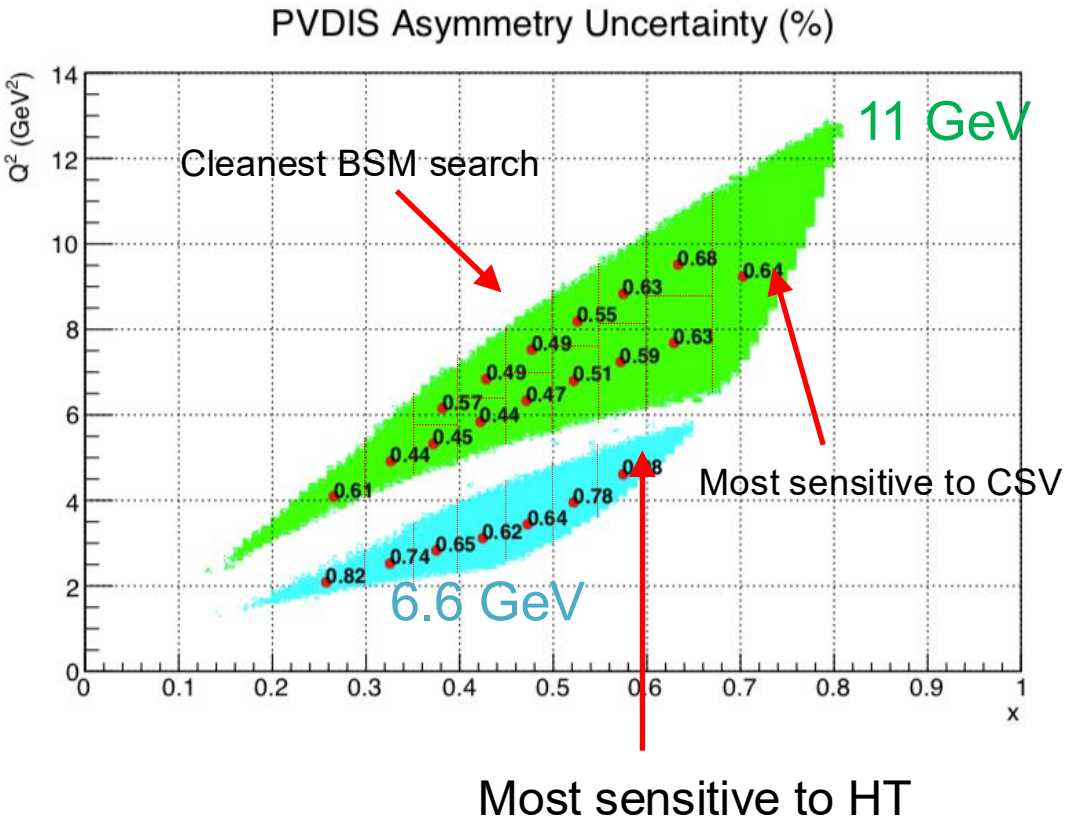
- Complete simulations for J/ψ and SIDIS
- Gathering information, discuss with BNL experts
  get samples, find out modifications and testing performance
- JLab already started contacting BNL management
  plan a trip to BNL to find out which ones are worth and available to bring back to JLab
- Cost exercise, conceptual design, initial engineering
- Simulations, find out physics impacts
  → PAC to review SoLID-Lite experiments
- JLab management discussed with DOE
  DOE likes our approach
  Suggest using a **new name** (SoLID associated with proposed DOE project)

SoLID-PVDIS

SoLID@JLab: Extraordinary opportunity to do the ultimate PVDIS measurement

<u>Strategy:</u> sub-1% precision over broad kinematic range:
sensitive Standard Model test *and* detailed study of hadronic structure contributions



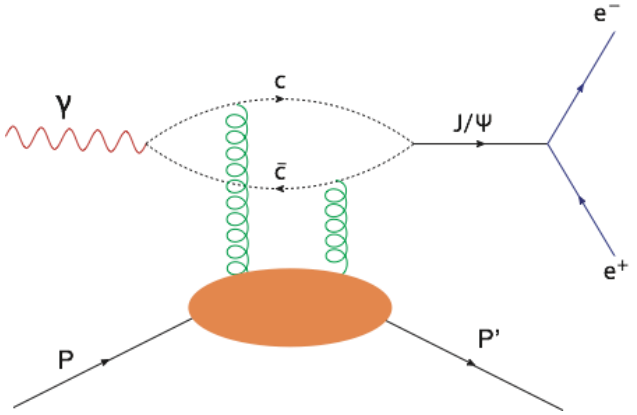


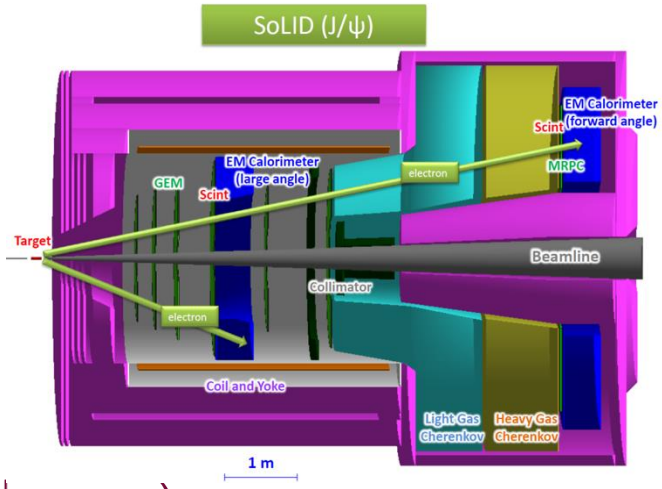
SoLID-J/ψ: Experiment E12-12-006

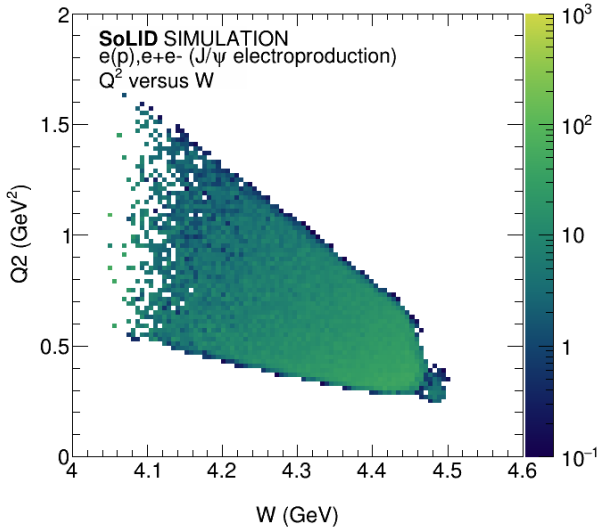
- 50 days of $3\mu A$ beam on a 15 cm long LH_2 target at $1 \times 10^{37} cm^{-2} s^{-1}$

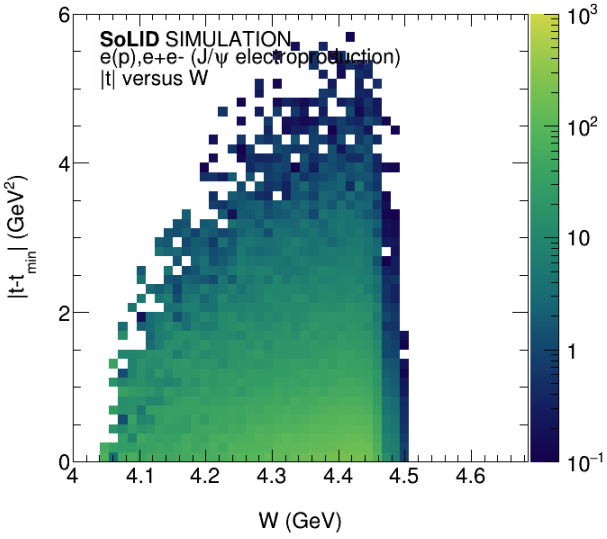
  10 more days include calibration/background run

- SoLID configuration overall compatible with SIDIS
  - **Electroproduction trigger**: 3-fold coincidence of e, e^-e^+
  - **Photoproduction trigger:** 3-fold coincidence of p, e^-e^+
  - **Additional trigger:** 4-fold coincidence of ep, e^-e^+
  - And (inclusive) 2-fold coincidence e^+e^-









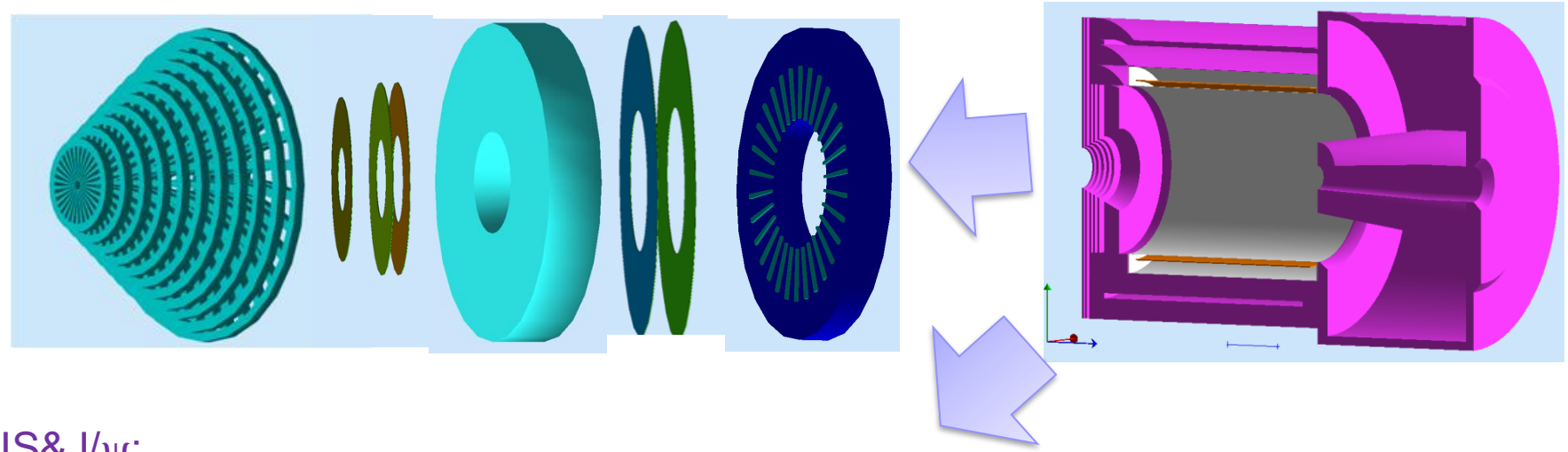
$$e^- + p \longrightarrow e^- + p + J/\psi\,(e^+ + e^-)$$

$$\gamma + p \rightarrow p' + J/\psi(e^- + e^+)$$

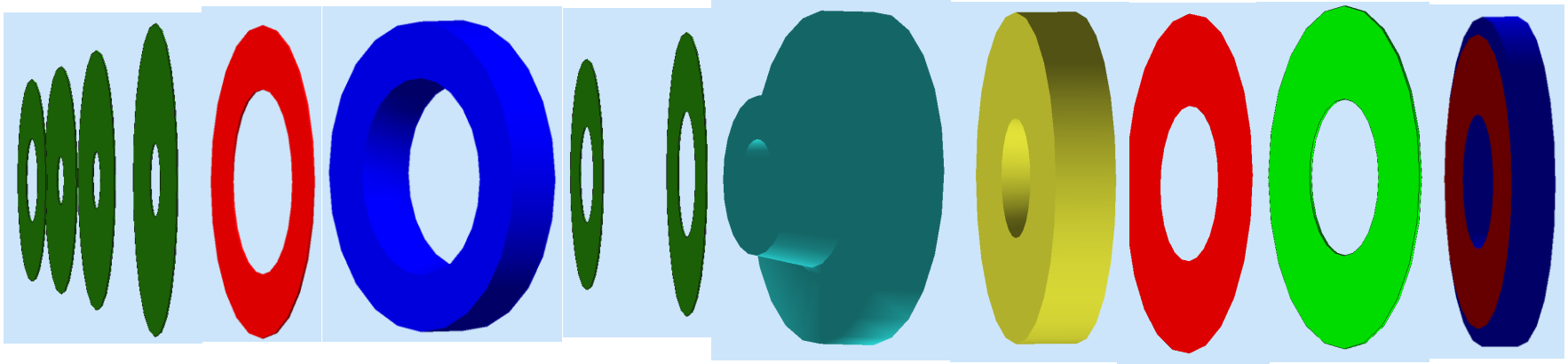
SoLID Detector Subsystems

Uses full capability of JLab electronics

PVDIS: Baffle 3xGEMS LGC 2xGEMs EC



SIDIS&J/ψ:
4xGEMs LASPD LAEC 2xGEMs LGC HGC FASPD (MRPC) FAEC



Pre-R&D items: LGC, HGC, ECs, GEM's, DAQ, Magnet, MRPC