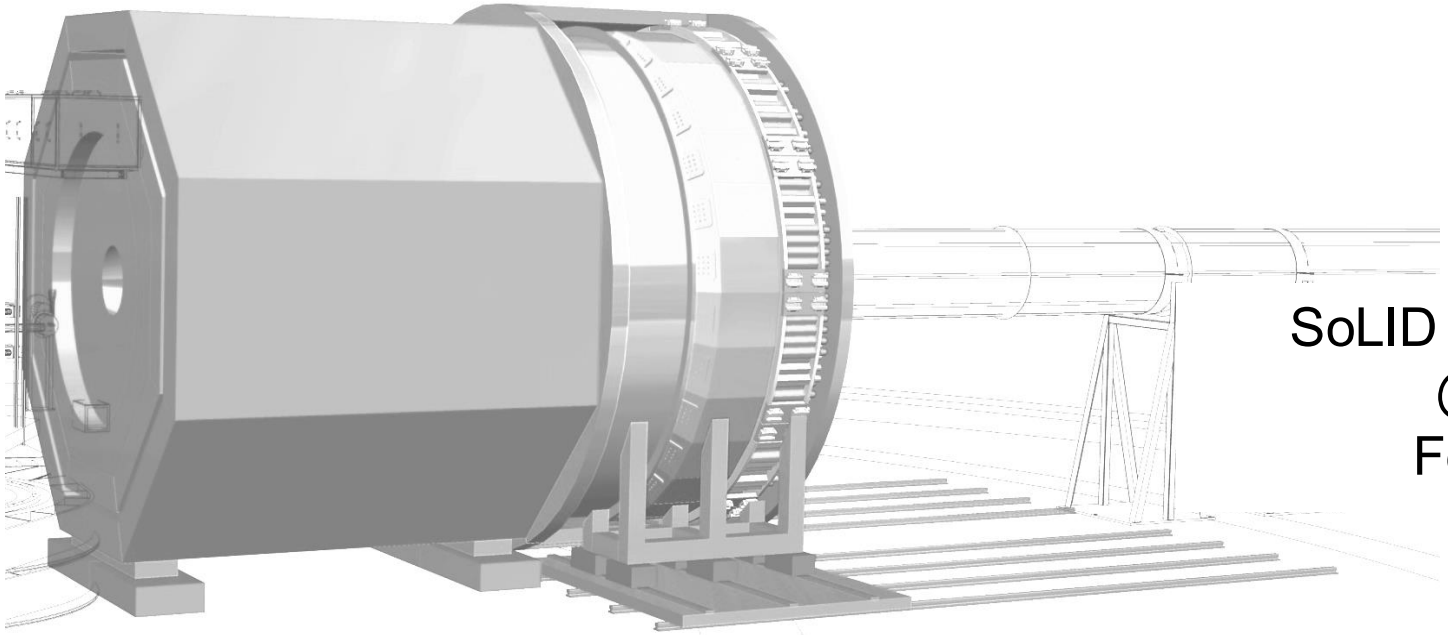
SoLID Update



SoLID Collaboration Meeting
@ Jefferson Lab
Feb. 19-20, 20256

Jian-ping Chen
Jefferson Lab

SOLENOIDAL LARGE INTENSITY DEVICE

Outline

1. Overview

2. Recent Developments

    i. Increased Physics Interests
    ii. SoLID pre-R&D Activities: Beam Test in Hall C
    iii. Funding Opportunities with DOE New Initiatives
    iv. Recent Events

3. Plan for the Next Steps

Overview

1. 2010- Now: Scientific Cases Developed with 3 Main Physics Programs
   SIDIS, TMD; PDVIS, Test SM; J/psi, Proton Mass/Gluon Field
2. 2014- Now pCDR Developed with Realistic Cost Estimations
   Multiple JLab Director's Reviews, DOE Science Review
3. 2015 Long-Range Plan: Strong Endorsement, One of the MIE Recommendations
4. 2023 Long-Range Plan: Strong Endorsement, Highlighted Multi-Times
   Recommendation 1 in QCD Town Meeting; Recommendation 4 in LRP Report
5. 2024 DOE Facility Review: Readiness: A – Ready to be launched
6. 2025 NSAC Subcommittee on International Benchmarking
7. 2024-2025 JLab cost sharing plan: Presented to / Discussed with DOE/NP
   DOE wants SoLID to get CD0 first
8. 2025 Scientific Cases Expanding: 4th main Physics Program GPD (new DDVCS)

9. Pre-R&D Activities: User/JLab pre-R&D on all subsystems
   (magnet, Cherenkov, ECal, GEMs, MRPC,…)
   DOE/JLab Supported Pre-R&D 2019-2021 (Cherenkov,….); 2022-2024 (ECal,…);
   New Beam Test (2026)

Recent Developments

- Scientific Cases Expanding; 2025 PAC
  - New DDVCS conditional (C1) approval with A rating
    - → 4th main Physics Program - GPD
  - Run-group proposal SIDIS cross sections approved
  - Polarized Sea/PDFs encouraged/feedback at last SoLID collaboration meeting
    - Submitted run-group proposal to be reviewed Friday Afternoon (Ching Him)

- New Beam Test, focusing on tracking options/readout (high-rate environment)
  - 2026 Run Period in Hall C (Eric)

- Develop Cutting-edge Technology and Seeking New Funding Opportunities (next 2 slides)
  - AI/ML (Klaus)
  - New ASIC Readout for MPGD/Tracking System (Gianluigi/Alexandre)

- DNP Town Meetings: Updates since last LRP
  - Global picture and funding situation

- Recent JLab Events
  - Government Shut Down: Oct-Nov. 2025
  - Division Leadership Change: Dec. 2025
  - VSP/ISP: Late Jan. 2026
  - New Contract: Announce in March, Take effect in June 2026

AI/ML for SoLID/JLab

- AI/ML for last beam test: PID detectors (Cherenkov, ECal) (UVa group/Zhiwen)
- AI/ML for tracking: de-noising (Gagik)
- SoLID as self-driving detector (Klaus)
- Possible AI/ML proposal for future (Gagik, also Alexandre/Zhiwen/Xiaochao)
- Genisis Mission, future opportunitie
- AI for particle physics whitepaper

Building an AI-native Research Ecosystem
for Experimental Particle Physics:
A Community Vision

February 12, 2026 - Version 0.81 (draft)

Jefferson Lab AI effort

Gagik Gavalian

February 18, 2026

Abstract

The SoLID detector at Jefferson Lab is designed to operate at extremely high luminosities, producing data rates that far exceed the capabilities of traditional reconstruction algorithms. Incorporating modern AI techniques into the detector-reconstruction workflow is therefore essential for achieving

R&D on Readout for Tracking (MPGDs)

- Current readout for GEMs based on aging APV25 chips
- Looked into modern readout options

  Readout based on VMM chips: R&D for last 3 years
  Salsa option (EIC's choice): rate capability not good enough

- New ASIC design (Gianluigi/Alexandre's talks)

Whitepaper

Designing an Application-Specific Integrated Circuit for Gaseous Detector Applications—ASGAD

Alexandre Camsonne, Jian-ping Chen, Gianluigi De Geronimo, Klaus Dehmelt, Cynthia Keppel

March 2025

JLab Director Jens Dillion @ DNP Town Meeting

Jefferson Lab

Looking Forward

FY2026

- Funding for DOE Office of Science Passed (Water & Energy Bill)
- Fully Funded for FY26 - No risk of Government Shutdown for DOE
- Planned 24 weeks of CEBAF Operations / 22 Weeks of Physics
- MOLLER, EIC, HPDF & Genesis Mission…

… and Beyond (this is what we presented in ~~2022~~ 2024, and we will update guided by the community)

Notional CEBAF and EIC Efforts on One Chart

- Accelerator team has worked up an early schedule and cost estimate
  - Schedule assumptions based on a notional timing of when funds might be available (near EIC ramp down based on EIC V3 profile)
  - For completeness, Moller and SoLID (part of 12 GeV program) are shown; positron source dev shown
- EIC Project is shown

Activities	Fiscal Year																		
	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Moller (MIE, 413.3B, CD-2/3)																			
SoLID (LRP, Rec 4)																			
Positron Source (R&D)																			
CEBAF Upgrade preCDR/preplan																			
Positron Project (potential)																			
Transport e+																			
22 GeV Development (R&D)																			
22 GeV Project (potential)																			
EIC Project (V4.2, CD-1, CD-3A)																			
CEBAF Up																			

Plan for the Next Steps

- SoLID Collaboration with Support from JLab, continue working with DOE/NP to Move SoLID Forward
  - Be ready when time comes
  - possible follow-up on LRP?

- With JLab Support, continue pre-R&D
  - Beam test (tracking option/readout) under high-rate environment
  - ASIC readout for GEM/MPGDs
  - AI/ML proposal
  - pre-R&D on other detectors/magnet

- Continue subsystem/software development
  - Software development, synergy with EIC
  - Stream Readout
  - …….

- Continue make scientific case to the community