

Chinese Collaboration at JLab

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Outline

1. Current collaborations

- Participated and approved proposals
- Participated experiments
- Progress of collaboration

2. 12GeV upgrade opportunities

- Participate in JLab 12GeV upgrade and physics
- GEM detectors in Transversity and PVDIS
- Fund application



Current Collaborations



Current Collaborations

- July 2002, CIAE and USTC signed MoU with JLab
- PKU(B. Ma) and TSU(P. Zhuang) collaborated with JLab by Duke Uni.(H. Gao)
- Lanzhou Uni. has collaboration with JLab Hall A and Hall C
- IMP, IHEP, Nanjing Uni., Shandong Uni., Huangshan Uni. and Huazhong Uni. of Science and Technology collaborated with JLab in theories and (or) experiments



China Group Participated and Approved Proposals

**E01-015, E03-004, E03-009, E04-002,
E04-114, E05-115, E05-015, E05-110,
E06-010, E06-011, E06-014,
E12-06-110, E12-06-120,
E12-10-006, E12-10-007...**

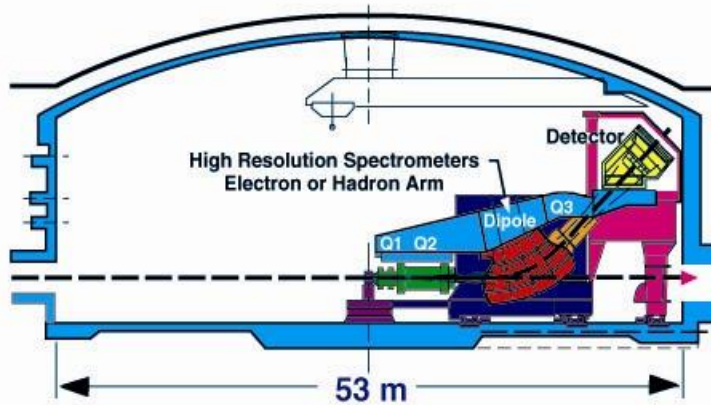


Chinese Group Participated Experiments

**E94-107, E99-115,
E00-114, E00-110, E03-106,
E05-015(E06-010), E05-110 ...**



SIMULTANEOUS COMPLEMENTARY EXPERIMENTS

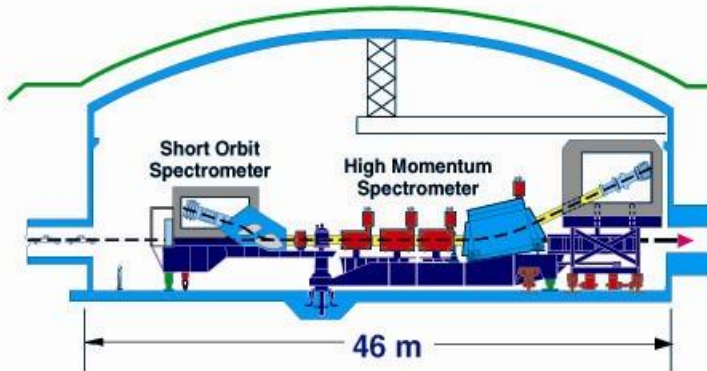
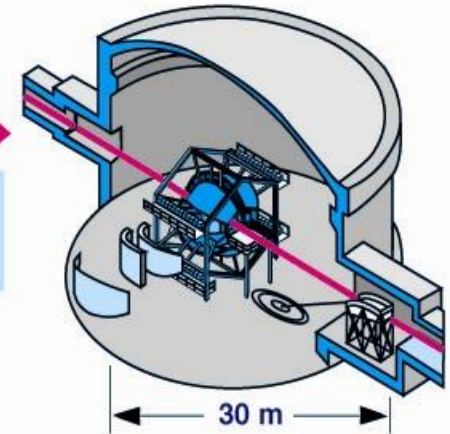


◀ HALL A

Pair of identical High Resolution Spectrometers (HRS²)

HALL B ▶

CEBAF's Large Acceptance Spectrometer (CLAS) and Bremsstrahlung Photon Tagger



◀ HALL C

High Momentum Spectrometer (HMS) and Short Orbit Spectrometer (SOS)



Participated Experiments in Hall A



Longitudinal Spin: E97-110, Small Angle GDH Sum Rule Experiment on the Neutron (^3He)

Haijiang Lu was leading the effort of the analysis of the first period data:

- Gas Cherenkov Detector Calibration Correction
- Calorimeter Counter Calibration Correction
- Particle Identification and Its Efficiency
- Nitrogen dilution effect



Nucleon property in nuclear medium: E05-115, Coulomb Sum Rule experiment (1)

Dates: Oct. 23, 2007 -Jan. 16, 2008 Data taken: about 3TB over 7000 runs

Xinhu Yan (USTC) is a PhD student on the experiment:

- Installation and calibration of NaI detector
- Geant4 simulation



Nucleon property in nuclear medium: E05-115, Coulomb Sum Rule experiment (2)

- Cross section calculation is on going:

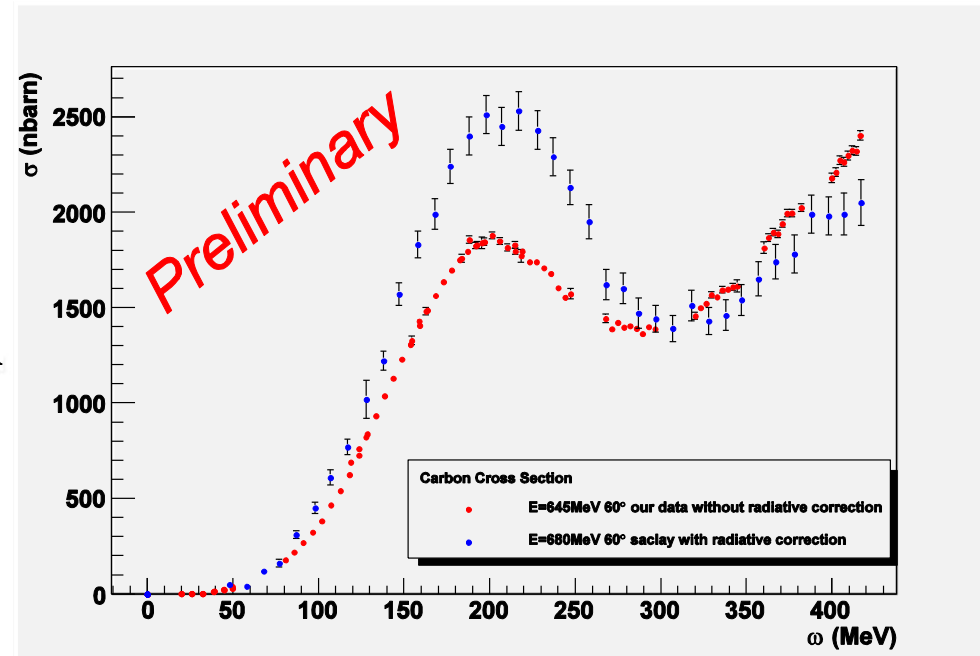
60° Carbon Target

Red point: $E=646\text{MeV}$

Hall A data without radiative correction

Blue point: $E=680\text{MeV}$

Saclay data with radiative correction



Transverse Spin: E06-010, Neutron Transversity Experiment with a polarized ^3He target (1)

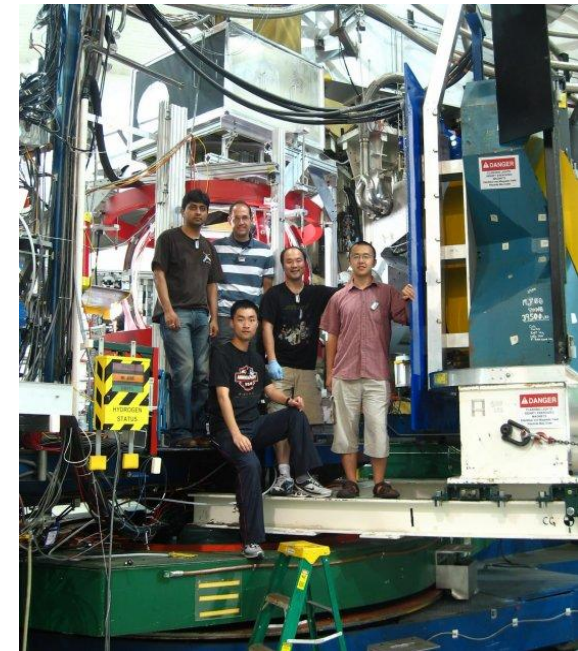
Lanzhou, PKU, CIAE and USTC all participated in the experiment:

Yi Zhang (Lanzhou) is a PhD student on the experiment.

PKU group did a simulation.

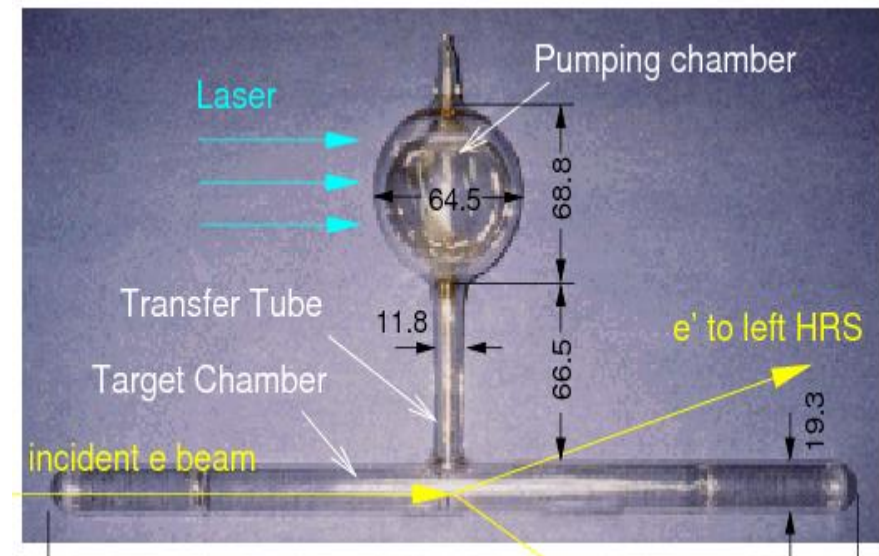
CIAE got a fund on Transversity from NSFC.

Li Ye (CIAE) did analysis of data as Master thesis.



Transverse Spin: E06-010, Neutron Transversity Experiment with a polarized ^3He target (2)

- Gas density measurement of ^3He target
- Target analysis
- Cross check is on going
- Zhangyi Will focus on physics
(Pretzelosity) analysis in next
few monthes



Participated Experiments in Hall C



Hypernuclear Experiment : E02-017, Direct measurement of the lifetime of heavy hypernuclei

Lanzhou group has several students and played an important role. CIAE also part of the effort earlier.

- **Experimental status**

Data collecting of this experiment was done from Sept. 18th to Nov. 2nd, 2009. The effective data time is about 680 hours.

- **Data analysis (Xinyu Qiu, Lanzhou)**

The detector calibration is on the way, hope this can be done in the next couple of days, and ready to go into the crucial stage – timing calibration – get the lifetime of hypernuclei.



Form Factor: E04-019, A Measurement of the Two-Photon Exchange Contribution in e-p Elastic Scattering Using Recoil Polarization (GEp-2 γ)

Wei Luo (Lanzhou) is a Ph.D student on the experiment:

- Identifying π^0 with two different methods give consistent polarization results
- Preliminary results for the polarization components in π^0 photo-production are consistent with results of dedicated experiment at the energies of GEp-2 γ kinematics.
- First measurement of π^0 photo-production polarization components in range of $5.0 \text{ GeV} < E_\gamma < 5.7 \text{ GeV}$.



Participated Experiments in Hall B

- **Nstar program:** IHEP is collaborating in joint physics/data analysis.
- **PrimEx(Precision Measurement of the π^0 Lifetime):** CIAE, IHEP.
- **EG4 (The GDH Sum Rule with nearly real photons and the proton g_1 structure function at low momentum transfer):** CIAE participated in data taking



Progress of Collaboration

- **Regular collaboration meeting: 1-2 year**
- **Set up collaboration board: in Lanzhou, Aug. 2009**
- **JLab became an official member of the US-China High Energy Collaboration Agreement since Dec. 2009 and most of our collaborative activities are in the planned program for the coming year.**

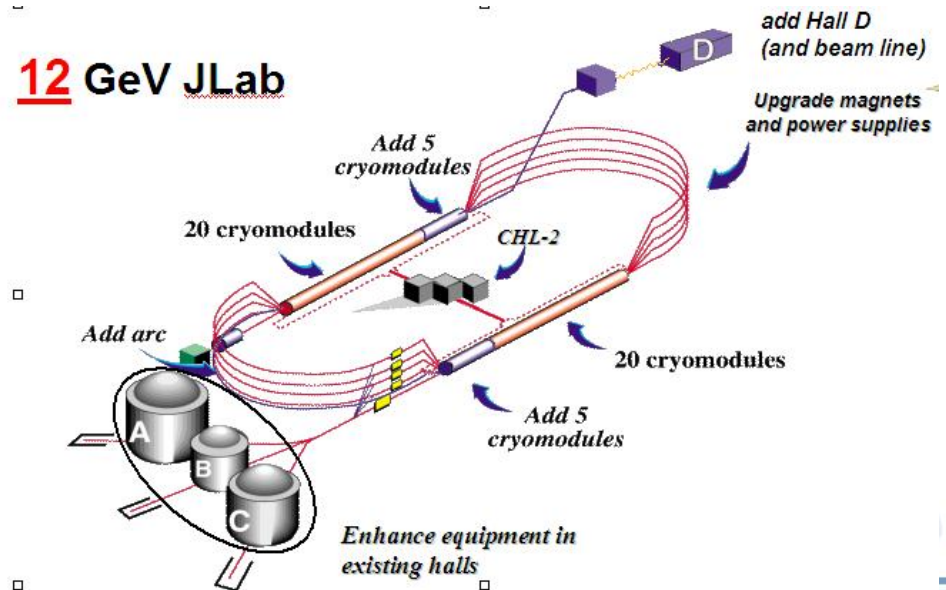


12GeV Upgrade Opportunities



JLab Upgrade Plan

- Upgrade accelerator to 12 GeV max. energy
- Build a new hall for meson spectroscopy (Hall D)
- Upgrade existing 3 halls for higher beam energy

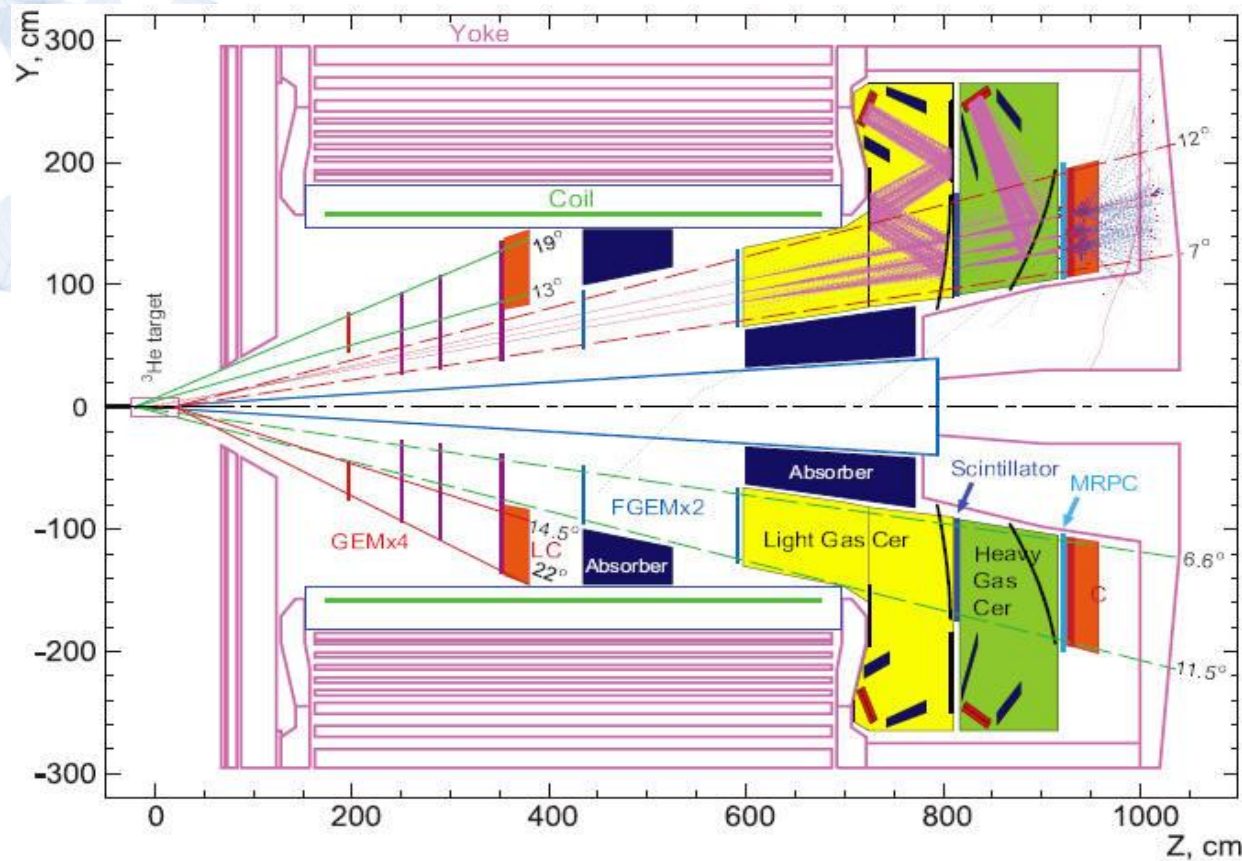


JLab 12GeV Proposals collaborated with China group

- **Transversity (11GeV and 8.8 GeV, E12-10-006) and PVDIS (11GeV, E12-10-007) with SOLID: Hope to get Chinese collaboration to play a major role. Contribute to detectors (GEM, MRPC, ...) and physics.**
- **Hadronization proposal**
- **A number of other proposals in spin structure, hypernuclear and hadron spectroscopy: USTC/CIAE/Lanzhou/IHEP.**

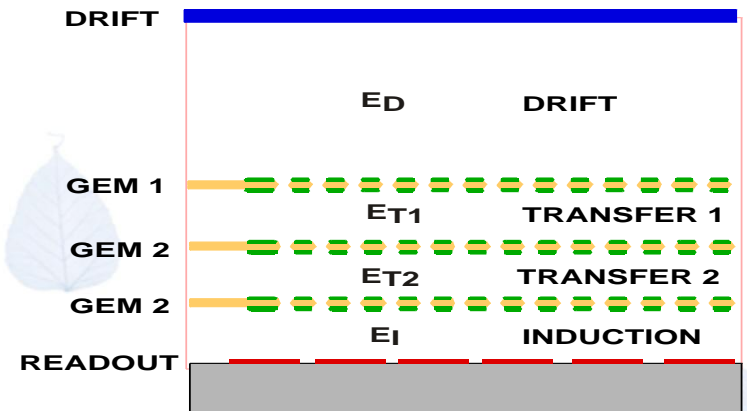


Transversity Experiment Layout of the SoLID based on the option of CDF magnet



GEM Detector in Transversity and PVDIS

- The total required surface area including all six layers GEM detectors for transversity experiment is less than 18 m², which is smaller than that in the PVDIS (23 m²) experiment.
- The 2nd to 6th chamber of transversity experiment will be reconfigured from the PVDIS GEM detectors. The first chamber needs to be built for the transversity experiment.



Micro-Pattern Detectors (MPD) in China

- USTC and TSU: MRPC for STAR experiment
- CIAE: RPC for PHENIX experiment
- IHEP and PKU : Cathode strip detector for CMS experiment
- Lanzhou and IMP: Micromegas R & D
- ...



Fund Application

❖ **973 fund: Ministry of Science and Technology (MOST)**

5 years, ~ 10 million RMB in total

MOST collects 973 outline in every November

MOST issues 973 outline in next January

submit fund application in next March every year

❖ **Key fund for International collaboration: NSFC**

3-4 years , ~ 2 million RMB in total

submit fund application in March every year



**China group had good collaboration
with JLab before, and we will make it better
in the future!**

Thanks!

