

YerPhi—Jlab Collaboration

Jlab Activities

Current Status

V.Tadevosyan

Spring 2018 run period ended beginning of May.

Fall 2018 run period was planned to start August 22, postponed until September 26 due to accelerator issues (vacuum and cryogenics failure).

Priorities:

- Study regimes of 12 GEV CEBAF operation
- Increase efficiency of beam delivery (to ~94%), reduce trip rate
- Study new base setup detectors (CLAS 12, SHMS, GlueX)
- Take physics data, deliver prompt publications.

Fall 2018 run period, physics

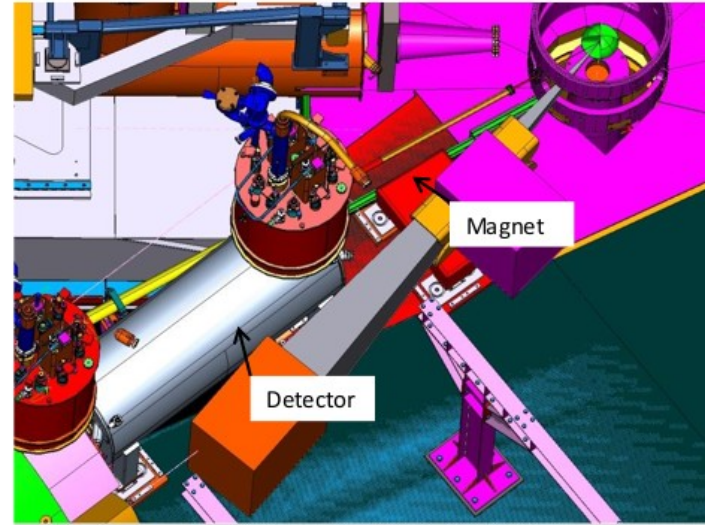
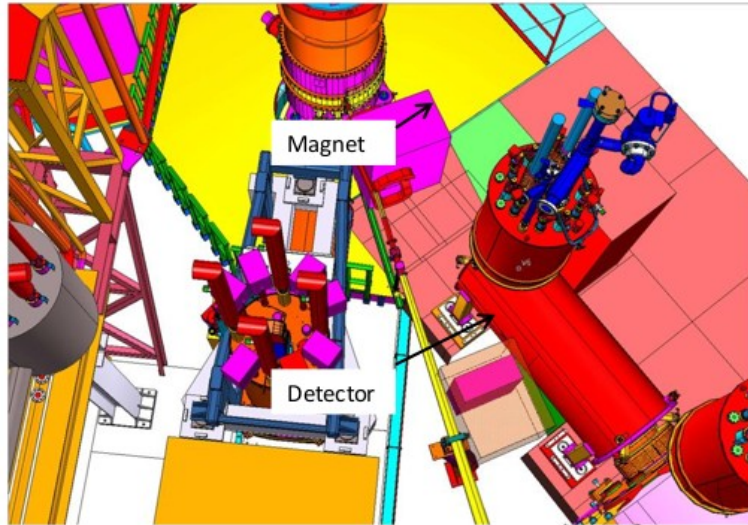
- Hall A: Tritium target experiments
 - E12-11-112 (2N and 3N SRC studies, isospin dependence)
 - E12-17-003 (study of Λn interaction via K^+ electroproduction on ^3H)
- Hall B: Run group A, Run group K
- Hall C:
 - E12-09-011 “Kaon LT” (K^+ electroproduction cross sections, L-T separation, Q^2 scaling)
 - E12-09-017 “ p_T SIDIS” (π , K SIDIS electroproduction, testing fragmentation process)
 - E12-09-002 “ π^+/π^- SIDIS” (charge symmetry breaking in quark distributions)
- Hall D: E12-06-102 “GlueX” (photoproduction of hybrid mesons); detector tests

Fall run period till Christmas (Dec. 25).

Spring 2019 run period to start by end of January.

Hall C Neutral Particle Spectrometer (NPS) project

- Aimed at detection of neutral particles (π^0 , γ), *not* a base equipment
- Extend SIDIS measurements to the neutral particle domain, render opportunity for Compton scattering measurements, exclusive π^0 production.
- 6 PAC approved NPS experiments (π^0 SIDIS, DVCS and exclusive π^0 , WACS ...)
- Consists of PbWO_4 electromagnetic calorimeter, 0.3 Tm sweeping magnet
- Cantilevered from or installed on the SHMS platform
- Coincidence measurements in pair with HMS



The NPS setup cantilevered off SHMS carriage (left) and mounted on the platform (right). The 2 installations ensure $5.5^\circ - 30^\circ$ and $25^\circ - 60^\circ$ angular ranges accordingly.

NPS, current status

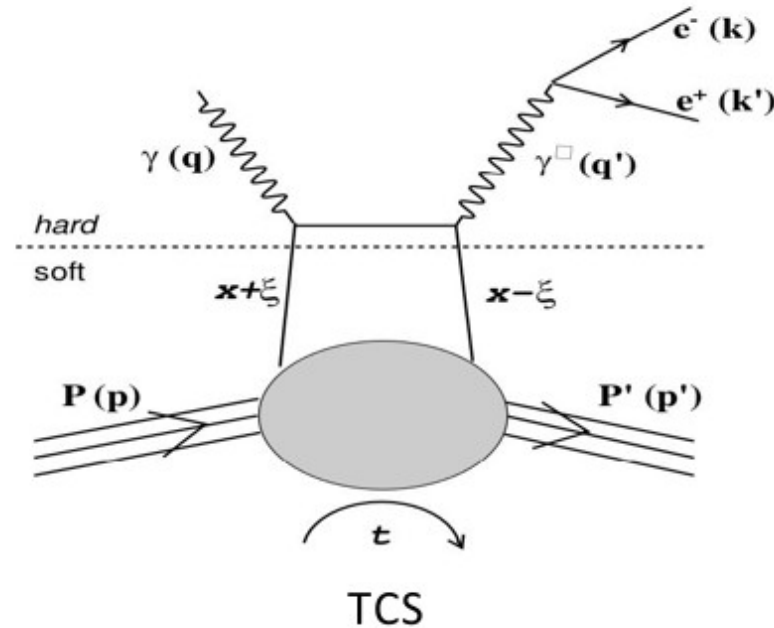
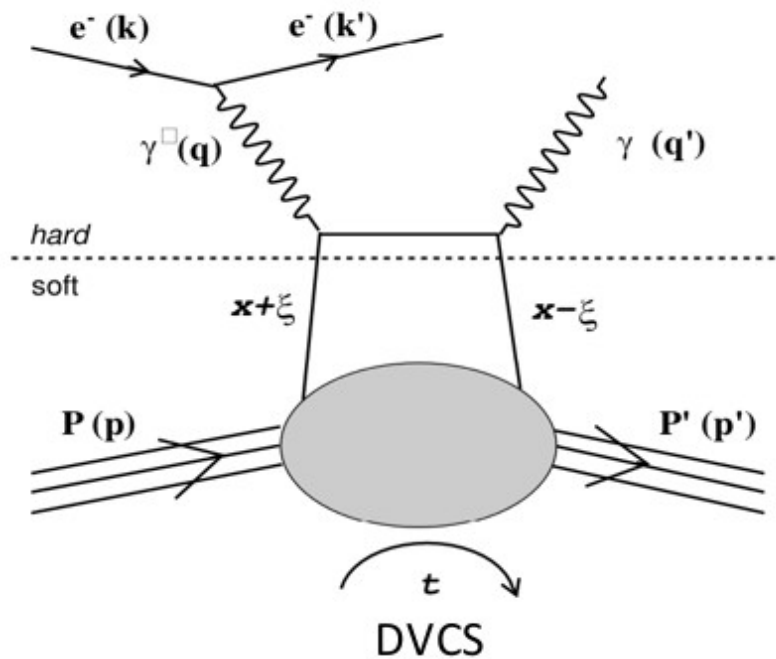
- ✓ Magnet parts procured, machined, delivered to Jlab.
- ✓ Magnet assembly, tests, field measurements about to start.
- ✓ More than 300 PbWO_4 crystals acquired (SICCAS, CRYTUR), bench tested.
- ✓ Few hundred 1" Hamatsu PMTs acquired, being tested.
- ✓ PMT bases are being procured, acquired.
- ✓ Design of the NPS enclosure and cable connections in progress.



CompCal prototype in Hall D (NPS related)

- Joint HallD – NPS project.
- A prototype for replacement of the GlueX forward calorimeter.
- 12x12 assembly of lead tungstate modules.
- 144 PbWO_4 crystals borrowed from NPS.
- Module design similar to HYCAL calorimeter in PRIMEX.
- Fully assembled, to be moved into the hall in November.
- Tests under the beam conditions in December.

Timelike Compton Scattering (TCS) Proposal

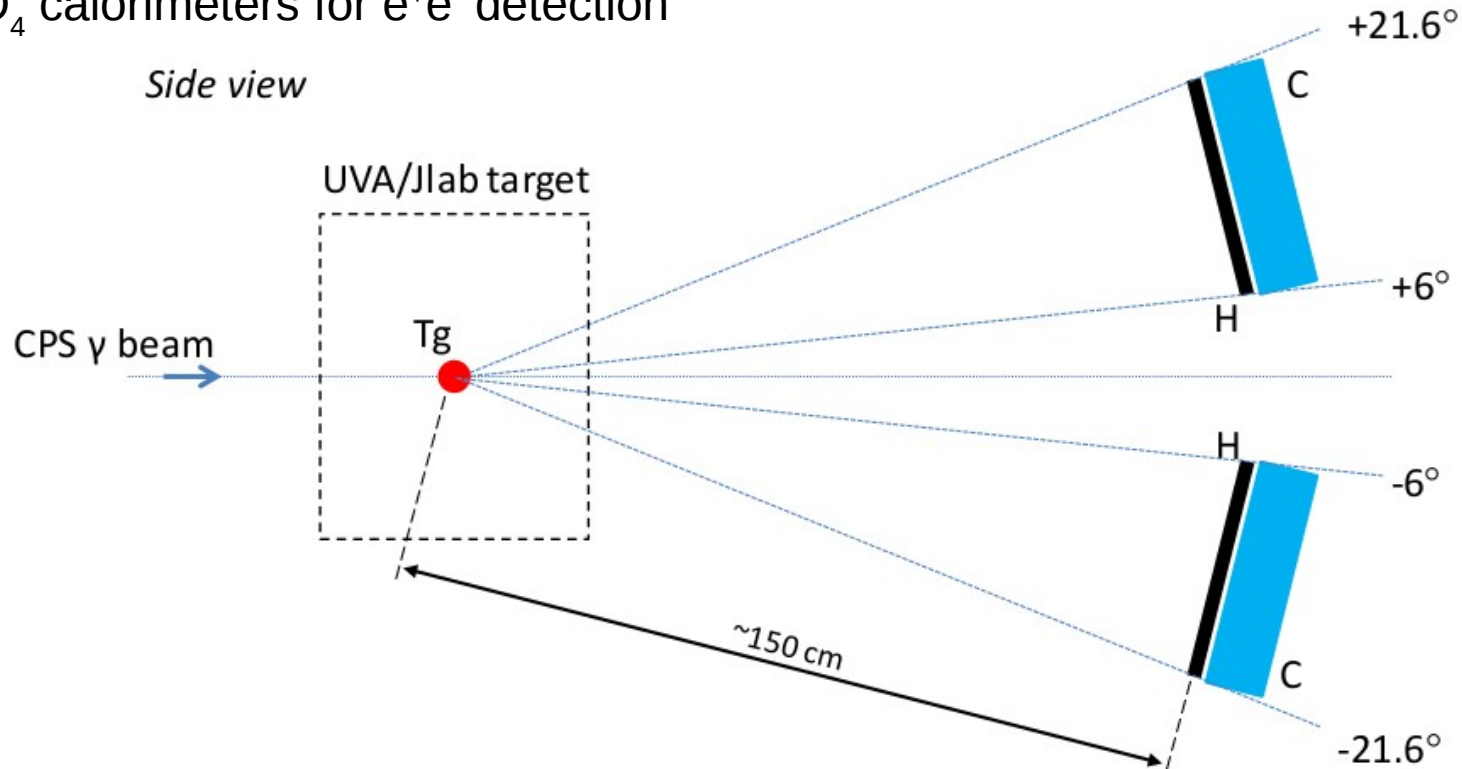


TCS mirrors DVCS, the golden channel for studying GPDs.

TCS with transverse target spin asymmetry access GPD E (related to the quark orbital angular momentum).

TCS proposal, proposed experimental setup

- Untagged bremsstrahlung photon beam from Compact Photon Source (CPS)
- Transversely polarized UVA NH_3 target
- A set of GEM trackers (not shown in the sketch)
- Scintillator hodoscopes (proton detection)
- PbWO_4 calorimeters for e^+e^- detection



Hall C TCS status

- Presented before JLab PAC 46 in July 2018
- Conditionally approved, with C2 status:

Summary: The PAC thinks that the physics case of the proposal is strong and nicely complements the extensive program of GPD-related measurements at JLab. However, the goals were not clear, and the proposal should better identify these goals, and at the same time put the experiment in a broader context of other DVCS and TCS measurements. This is necessary in order to estimate more reliably the impact on GPD extractions. An updated proposal should provide a thorough description and simulation of the event selection, including an estimate of the effect from other final states that survive the selection criteria due to the finite energy resolution. The technical questions from the TAC report also need to be addressed.

Extensive simulations needed to address raised by PAC issues.

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