A_1^n Summary

Xiaochao Zheng, University of Virginia

5. Are the responsibilities for carrying out each job identified, and are the manpower and other resources necessary to complete them on time in place? (yes, see previous talks from today)

8. Has readiness for expedient analysis of the data been demonstrated? (see next talk). What is the projected timeline for the first publication? (this talk)

9. What is the status of the specific documentation and procedures (COO, ESAD, RSAD, ERG, OSP's, operation manuals, etc.) to run the experiments? – yes there is a draft for every required document, see wiki page

Preparation, Running, and Analysis Manpower Overview

- JLab polarized 3He target lab:
  - currently "run" by Kai Jin and Nguyen Ton (UVa/Zheng);
  - Mingyu Chen (UVa), Junhao Chen (W&M), and possibly more students will be on-site and trained as target experts starting summer 2018.

- six PhD students:

✔ A1n: Mingyu Chen (UVa/Zheng), Melanie Rehfuss (Temple U/Meziani), 1 TBD (Columbia/Hughes)

✔ d2n: Junhao Chen (W&M/Averett), Shuo Jia (Temple U/Meziani), 1 TBD (Kentucky/Korsch)

✔ 1 TBD (China)

- postdoc: Temple, UVa, W&M, JLab

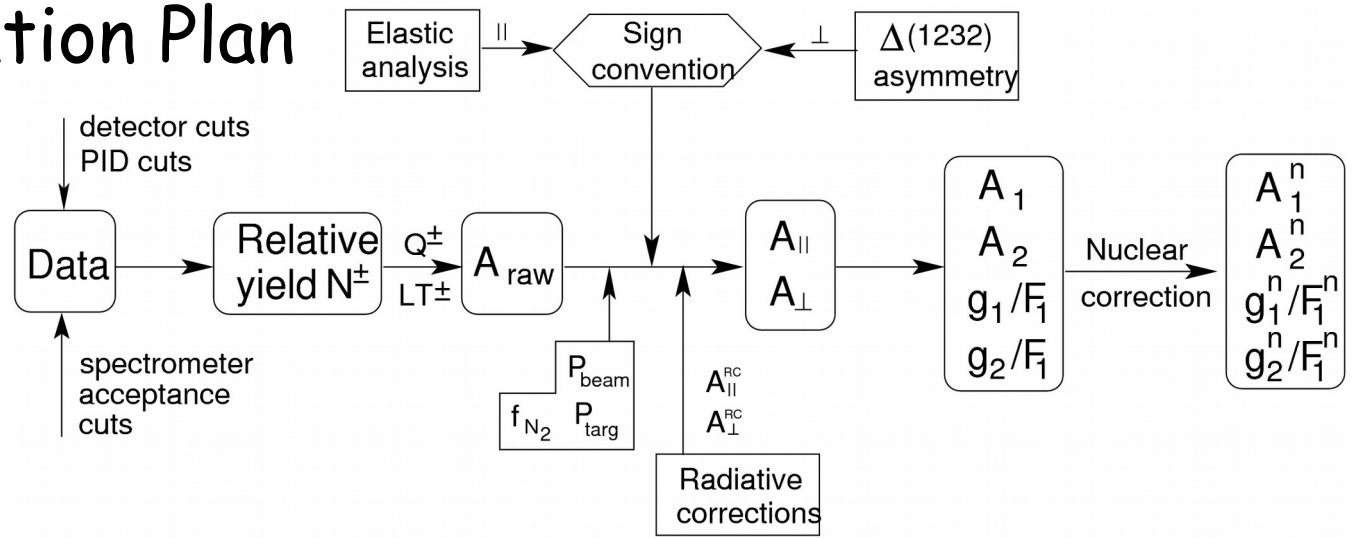
A_1^n / d_2^n Timeline Overview

A1n/d2n TimeLine

month	year	Installation	Beamline			Target cell production	JLab Target Lab	UVa Target Lab	W&M Target Lab
4	2018	install cables, optical fiber, complete platform fabrication				5 cells order placed	Making things to work for Hall C; polarimetry; density measurement; full characterizatio n of new cells	Fabricate/fill and initial testing of new cells; EPR k0 study	Making reference cell system; EPR k0 study; (testing new cells if needed)
5			Moller prep						
6				Beamline mod. for target	fast circular raster				
7									
8									
9						order 5 more cells			
10			Moller test-out						
11									
12									
1	2019								
2									
3		preparation						Testing new cells if needed	(testing new cells if needed)
4		Target installation (conservative)							
5									
6							move to Hall		
7									
8									
9									
10		Running: d2n, A1n 12.5 deg							
11									
12									
1	2020	Target rotation							
2		Running: A1n 30 deg							
3									
4									

Analysis and Publication Plan

- online scripts for PID, counting electrons and forming asymmetry
- Preliminary asymmetries expected within 1 month from end of run;



period	student #1	student #2	student #3
months 1-2	making good prod. run list	making good prod. run list	detector calib., fiducial cuts and efficiencies
months 3-4	optics calibration	detector PID cuts and efficiencies	target polarimetry analysis
by month 6	optics calibration / simulation	elastic and Delta analysis	target polarimetry analysis
by month 12	dilution and density/ relative cross sections	forming asymmetries – data set 1/2	forming asymmetries – data set 2/2
by month 18	radiative corrections	nuclear correction + finalizing systematics	nuclear correction + finalizing systematics

- draft publication (short) within 18 months of end of run → another 12 months to write the long archival paper

2014 Public Media Articles on 6 GeV A_1^n Results

- CERN Courier
  http://www.cerncourier.com/main/article/44/10/16
- APS — DNP website
  http://dnp.nscl.msu.edu/current/spin.html
- Physics Today Update
  http://www.physicstoday.org/vol-57/iss-2/p9.shtml
- Science On-line article
  http://sciencenow.sciencemag.org/cgi/content/full/2003/1223/2
- Science News article
  https://www.sciencenews.org/article/topsy-turvy-neutrons-and-protons-quarks-take-wrong-turns
- Physics News Update:
  http://www.aip.org/enews/physnews/2003/split/666-1.html

News: Physics

Topsy Turvy: In neutrons and protons, quarks take wrong turns

By Peter Weiss 8:43am, December 23, 2003

Physicists peering inside the neutron are seeing glimmers of what appears to be an impossible situation. The vexing findings pertain to quarks, which are the main components of neutrons and protons. The quarks, in essence, spin like tops, as do the neutrons and protons themselves.

Now, experimenters at the Thomas Jefferson National Accelerator Facility in Newport News, Va., have found hints that a single quark can briefly hog most of the energy residing in a neutron, yet spin in the direction opposite to that of the neutron itself.

"That's very disturbing," comments theoretical physicist Xiangdong Ji of the University of Maryland at College Park.

SCIENCE NEWS

- **The JLab Hall A data were quoted by the 2007 NSAC long range plan as one of "the most important accomplishments since the 2002 LRP";**
- The 12 GeV A1n is a **flag-ship**, high impact experiment using JLab 11 GeV.

- We have developed a plan to run/complete this experiment in the soonest time frame possible while keeping the significance of the physics outcome