
PREX-2/CREX Summary

PREX will run in Fall 2016

Here are some things we need to do to be ready

“Formal Path”

- Frozen design of shielding, collimation, and target
- Review of this design (frozen, but not necessary detailing) early 2015
 - *(tentative F-16 schedule comes April '15, firm F-16 in fall 15)*
- Optics targets plan
- Moller installation
- Compton laser power
- Septum coils - testing
- Accelerator half-energy issues, beam matching, adiabatic damping, ISM studies, injector studies

Also, much work along the “Technical path”

Technical Path for PREX

- **PARITY DAQ - parasitic running in 2015**
 - Beam current monitor - Qweak receiver boards.
 - Cavity BPM readout (Bob, +?)
 - Fast event transfer to online monitor/feedback
 - Analysis, analysis chain
- **Moller polarimetry measurement**
 - 1 GeV optics, simulation, commissioning (Jim, Oleksandr, +?)
- **Compton polarimetry** (JLab, UVa, CMU)
 - photon detector, DAQ, analysis chain
- **Spectrometer Optics Design**
 - Significant changes to design not expected, tools to keep track (Nickie, Seamus, Nilanga)
- **Q1 collimator** (Nickie, Seamus, Nilanga)
 - Simplified or improved for acceptance
- **Modulation** (UVa, SU)
 - Replace hardware: magnets on beamline, TRIM card cabling, function generator boards.
 - Fix undesirable Qweak modifications.
 - Early test desirable!
- **Detectors** (ISU, SBU)
 - improvements on previous design
 - Linearity studies!
 - Blind tubes in spectrometer hut?
- **Analysis Chain** (UVa, +?)
 - online monitoring, prompt, post decoding, summaries.
- **Beamline Optics Design** (Jay, +?)
 - Avoid mixing energy with difficult-to-measure "angle".
- **Source laser optics** (UVa, JLab)
 - QPD and linear array tools
 - configuration procedure
 - hardware evolution
- **High-rate scattered beam monitor**
 - (SBM?) diagnostic detector (Mark Pitt)

CREX

Less likely to run first - Not as developed, not as tested

Optics simulation - septum decision, target size

Q² measurement / pointing

Target Design

Radiation / Collimation issues - engineering plan?

Beam test during PREX-II (Test target, A_T measurement plan)

Critical Path for PREX

Highlights that are visible from the here and now

Spring 2015 -

- **Formally Request design and engineering**
- **support weldment redesign**
- **Design vacuum system, beam collimator for ALARA deinstallation**
- **Beamline magnetic shielding**
- **Neutron shielding design and engineering**
- **Activation study, dose rate predictions**
- **Tune simulation presentation for review (PS simulation?)**

REVIEW!

- **PARITY DAQ - parasitic running in 2015**
- **Moller installation**
- **Compton light source progress**

Vacuum + ALARA disassembly

Stainless Steel sieve box, vacuum connections, etc.

(CREX track envelopes compatible with PREX septum pipes?)

Collimator

Beamline magnetic shield (Juliette, Rakitha, Kent +?)

Activation Study

Plan for disassembly. Al, Rakitha, Kent

+ Ed Folts,

+ Roger Carlini,

+ ?

Shielding

Finish the optimization of shielding
Water shield design

Design and engineering

Target Ladder

Optics Pointing Target down-select & design

GPM Arm optics targets design and engineering

Lead target components

Alternatives

Pb-C-Pb sandwich

C vs Diamond

Target Survey plans

(viewport in scattering chamber? Shielding interference?)

Moller polarimeter

- **Magnet mapping** (Joe Myers - no longer Ken Bagget) when it arrives. (Sasha will coordinate)
- Quadrupole Power supplies stability. (Sasha, plus plan for Hall probe measurement in the summer)
- slow controls for target ladder and DAQ interface
- Moller targets - how to acquire / qualify
- summer '15 -install magnet, **demonstrate beam alignment**. (Roman making cage for alignment. Standard cartridges?)

- 1GeV optics configuration
- Simulation (not moving, no manpower)

Globally: local point person required. Sasha not here continuously.

Compton polarimeter

Laser:

- Recover high power lock
- Laser polarization precision determination

Photon detector

DAQ

Presently no students, only part-time postdoc!

Accelerator

Beam delivery at half-power

Matching procedure

injector spin manipulator studies

Beam spot size diagnostic

Recover Feedback control

Plan for fast spin flip (important for scheduling with other halls)

UVa laser lab studies (including copy of JLab switch to qualify)

Spectrometer Optics Design

Q1 design

Q² pointing target study

SOS quad study

(collimator in operational HRS-Q1 to match?)

GEM configuration and frames (readout, etc)

CREX:

septum magnet study,

Focal Plane footprint

Parity DAQ / Parasitic studies

- **PARITY DAQ - parasitic running in 2015**

- Beam current monitor - Qweak receiver boards.
- Cavity BPM readout
- Fast event transfer to online monitor/feedback
- Analysis, prompt chain

Note: unlike every other parity run-period, we are not following a ^3He asymmetry expt - we need to be ready for our run without a long, easy warmup!

- **Injector DAQ - needed soon (summer 2015)**
- **Slow controls (green monster, IP socket?, Beam modulation, Feedback)**
- **Beam monitoring: New striplines / new stripline receivers?**

Detectors

- Have original PREX-I detectors available as backup
- two detectors in series (like PREX-I)
- Spectrometer ray envelope for design select
- optimization (lightguide vs longer quartz - rescattering background?)
- “Qweak” vs “happex” readout chain
- Counting mode vs integrating mode, remote switch?
- Linearity studies (laser vs. LEDs?)

Analysis Chain

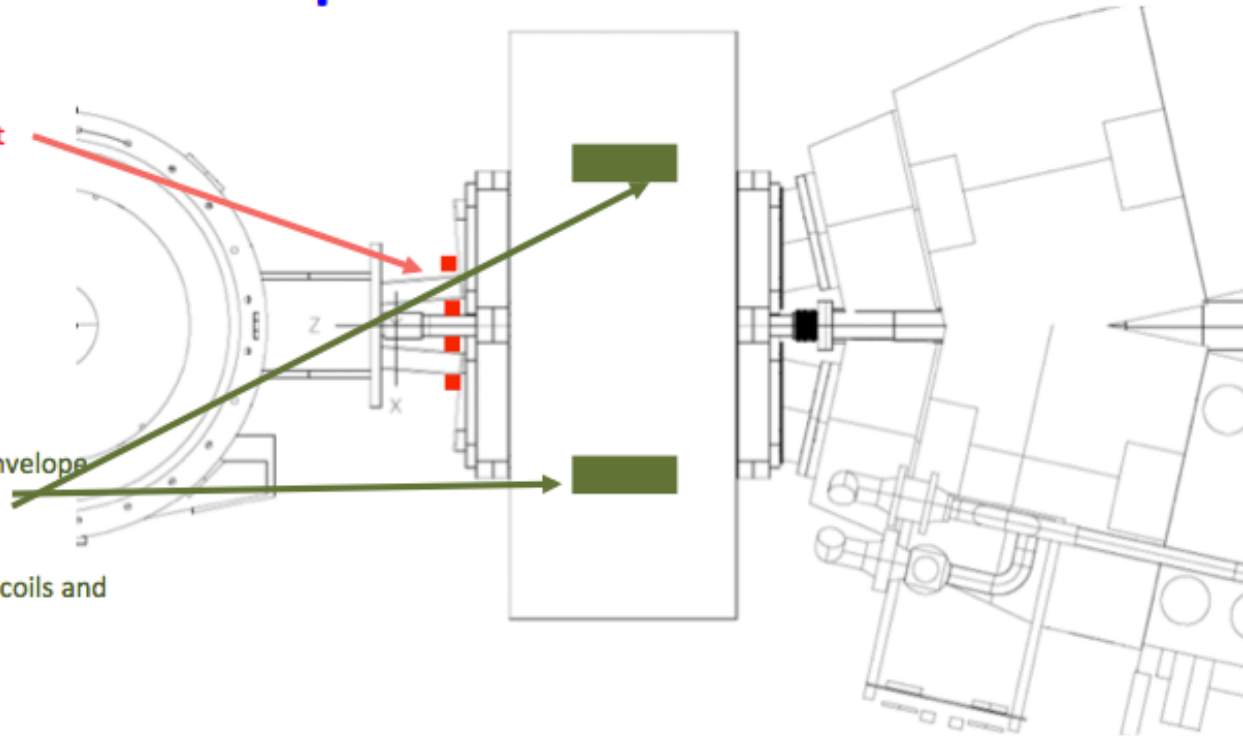
2009/2010 - patched together from H-II era. Must be prepared with some foresight this time

WAC process, summaries, etc.

SBM

“Tungsten plug” sensitive
Upstream face of septum magnet
4 detectors total

“Moller scatters” sensitive
At location of scattered Moller envelope
in septum magnet
2 detectors total
Perhaps fit in small gap between coils and
vacuum box?



- Downstream SBM: Qweak ‘unity gain’ PMT and readout chain
 - Upstream SBM: investigate promising locations
- Note: might be helpful for parasitic beam tests

Mark Pitt

Work to do

Formal path - speed is now critical

Technical path: a lot of work. More hands (students, PD) needed.

Students: Tyler, Caryn

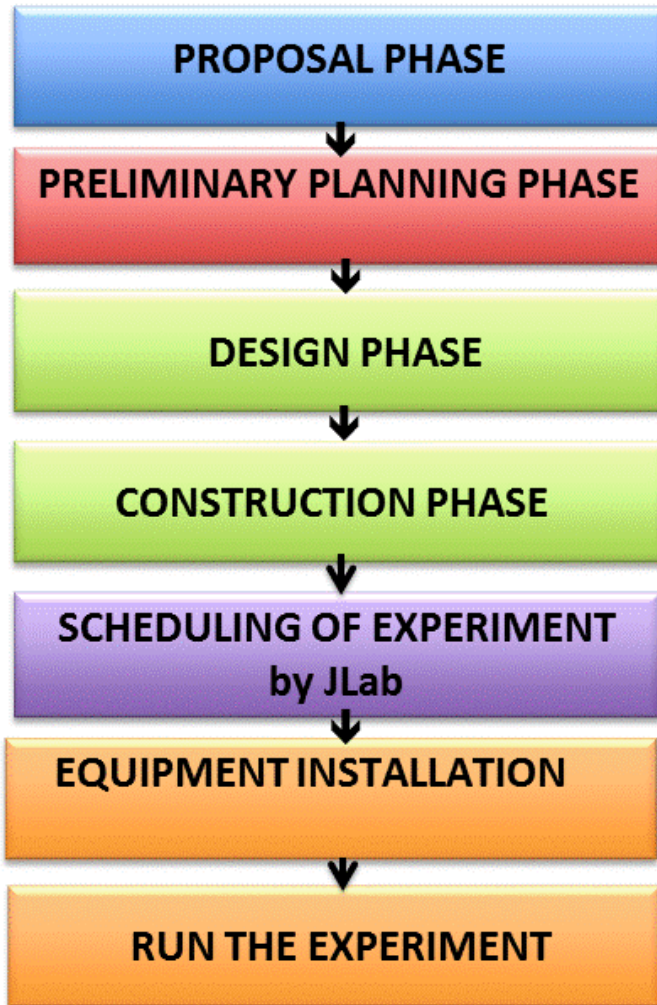
PD: Rakitha, Nickie, Ciprian



Revive/Requalify

- **PARITY DAQ** (Michaels)
 - 4 crates, fast (low capacitance) cabling. Noise performance.
 - Fast event transfer to online monitor/feedback
 - switch to counting mode
- **BCM** (?)
 - Critical reliance on “old” 1 MHz down-converter
 - New electronics may prove as good. Beam studies?
- **Spectrometer Optics Design** (Nickie)
 - Significant changes to design not expected
- **Detectors** (SBU, ISU)
 - Previous design works, but improvements possible.
 - Linearity studies!
- **Modulation** (UVa, SU)
 - Undesirable modifications to interface for Qweak. recover.
 - Replace magnets on beamline
 - Revive control software and analysis software
- **Analysis Chain** (Michaels, UVa, +?)
 - online monitoring, prompt, post decoding, summaries.
- **Beamline Optics Design** (Benesch?, UVa, SU)
 - Control phase space to avoid mixing energy with difficult-to-measure “angle”.
- **Septum**
 - Previous design - replacement coils ordered. Testing.
- **Q1 collimation** (Michaels?)
 - Previous design? Simplified or improved for acceptance?

Path to PREX Scheduling



http://www.jlab.org/user_resources/PFX/NP-PFX/index.html

We are aiming for 2nd-half FY16 (summer/fall 2016).

This is before Hall B and C are planned to be up and running with new spectrometers, therefore minimizing the pain of 6 GeV max. energy.

Tentative Fall 2016 schedule: to be posted April 2015

Firm Fall 2016 schedule: to be made Fall 2015

beam request memo:

"...you can only request scheduling when construction of all major components of the experiment are (near-)completed, as at this stage the experiment layout and components are considered frozen, and any design modifications will require a change control,...." http://www.jlab.org/exp_prog/experiment_schedule/beamreq.html

As I understand Thia's comments, we need to:

- freeze design of shielding, target by June.
- show (readiness?) for polarimetry, septum coils

- **review of shielding "early 2015".**
- **What standard/threshold/mechanism for other topics?**
- **Comprehensive review? When?**

If there are still other reviews to take place, can we still be considered in April '15 (for Tentative Fall '16)?