

# Accelerator Parity Quality Beam

## PQB To-do List

Tuesday, March 24, 2015

# Schedule

- PREx-II is tentatively scheduled for Hall A in Spring 2017 (not according to any official schedule. Informally – this would be the earliest possible).
- C-REx is tentatively scheduled for Hall A in Fall 2017.
- Møller is planned for Hall A in 2020.
- 4-Hall operation and/or multiple A/B/C 5<sup>th</sup> pass requires 249.5 MHz bunch rep rate, and 2x charge density; approaches QWeak levels at injector.

# Upcoming Parity Violation Experiments

Experiment	Energy (GeV)	Pol (%)	I ( $\mu\text{A}$ )	Target	$A_{\text{pv}}$ (ppb)	Maximum Charge Asym (ppb)	Maximum Position Diff (nm)	Maximum Angle Diff (nrad)	Maximum Size Diff ( $\delta\sigma/\sigma$ )
<b>PREx-II</b>	1.0	90	70	$^{208}\text{Pb}$ (0.5mm)	$500\pm 15$	$100\pm 10$	$1\pm 1$	$0.3\pm 0.1$	$10^{-4}$
<b>C-REx</b>	2.2	90	150	$^{48}\text{Ca}$ (5mm)	$2000\pm 42$	$100\pm 10$	$1\pm 1$	$0.3\pm 0.1$	$10^{-4}$
<b>Møller</b>	11.0	90	60	$^1\text{H}$ (150 cm)	$35.6\pm 0.74$	$10\pm 10$	$0.5\pm 0.5$	$0.05\pm 0.05$	$10^{-4}$

# Laser Table

Task	Sub Tasks	Date	Task Description
<b>2 kHz Helicity Reversal</b>		PREx	Requires 10 $\mu$ s settle time – No ringing (not required for PREX, but hoped to test at this time). No Kerr Cell.
	RTP Pockels Cell		Buy test crystals to characterize, design RTP quarter-wave system.
	KD*P re-design		Model E-field to maximize PC uniformity, buy a properly engineered, one with the correct cell-diameter-to-laser-beam-diameter aspect ratio
<b>Pockels Cell Stewart Platform</b>		Fall 2015	For remote optimization using e-beam. Assemble, build control software, qualify summer 2015

# Injector

Task	Sub Tasks	Date	Task Description
Revive Injector Parity DAQ			
Improve 2-Wien Flip Optics		PREx	
Injector Matching		PREx	Maximize damping
Helicity-correlated Beam Size Monitor		PREx	Looking for ideas!
Upgrade Helicity Magnet controls		PREx	
Locate Helicity Magnets to span $(x,x')$ and $(y,y')$ to minimize both position and angle		Fall 2015	
Augment helicity steering dipoles with helicity size quads		PREx	
Share Injector apertures' current read-back with parity DAQ		Fall 2015	
Møller Feedback to minimize transverse polarization			Once a shift, adjust Wien angle

# Accelerator

Task	Sub Tasks	Date	Task Description
<b>Study Depolarization at Higher Passes</b>			
	Energy stability and precession to Hall		
<b>Synchrotron Radiation</b>			
	Depolarization		
	Energy spread and energy tails		Clipping might be spin dependent
	Polarization dependence		
	Adiabatic damping		
<b>Møller (<math>g-2</math>) Spin rotation</b>			Change beam energy by 100 MeV (few reversals)

# Hall A

Task	Sub Tasks	Date	Task Description
<b>Revive Hall A Parity DAQ</b>			
<b>Beam Halo</b>			
	Install QWeak Halo Monitors in Hall A beamline	Fall 2015	
<b>BCM Resolution</b>			
	BCM Digital Receiver Bench studies		
<b>Beamline Instrumentation</b>			
<b>Beam Polarimetry</b>			
<b>Beam Matching and Optics</b>			
<b>Phase Trombone</b>			

# PQB Beam Studies

Task	Sub Tasks	Date	Task Description
<b>Injector</b>			
<b>Accelerator</b>			
	Energy spread in Hall A arc		
	Spin Dance		
<b>Hall A</b>			
	Measure beam halo		