

Accelerator Parity Quality Beam

PQB To-do List

Monday, February 23, 2015

Schedule

- PREx is tentatively scheduled for Hall A in May 2016.
- C-REx is tentatively scheduled for Hall A in Fall 2016.
- Møller is planned for Hall A in 2019.
- 4-Hall operation and/or multiple A/B/C 5th 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 (μA)	Target	A_{pv} (ppb)	Maximum Charge Asym (ppb)	Maximum Position Diff (nm)	Maximum Angle Diff (nrad)	Maximum Size Diff ($\delta\sigma/\sigma$)
PREx-II	1.0	90	70	^{208}Pb (0.5mm)	500 ± 15	100 ± 10	1 ± 1	0.3 ± 0.1	10^{-4}
C-REx	2.2	90	150	^{48}Ca (5mm)	2000 ± 42	100 ± 10	1 ± 1	0.3 ± 0.1	10^{-4}
Møller	11.0	90	60	^1H (150 cm)	35.6 ± 0.74	10 ± 10	0.5 ± 0.5	0.05 ± 0.05	10^{-4}

Laser Table

Task	Sub-Task	Date	Notes
2 kHz Helicity Reversal		PREx	Requires 10 μ s settle time – No ringing
	RTP Pockels Cell		
	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
Pockels Cell Stewart Platform		Fall 2015	For remote optimization using e-beam

Injector

Task	Sub-Task	Date	Notes
Improve 2-Wien Flip Optics		PREx	
Injector Matching		PREx	Maximize damping
Helicity-correlated Beam Size Monitor		PREx	
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	
Feedback to minimize transverse polarization			

Accelerator

Task	Sub-Task	Date	Notes
Study Depolarization at Higher Passes			
	Energy stability and precession to Hall		
Synchrotron Radiation			
	Depolarization		
	Energy spread and energy tails		Clipping might be spin dependent
	Polarization dependence		
	Adiabatic damping		

Hall A

Task	Sub-Task	Date	Notes
BCM Resolution			
	BCM Digital Receiver Bench studies		
Beamline Instrumentation			
Beam Polarimetry			
Beam Matching and Optics			
Phase Trombone			

PQB Beam Studies

Task	Sub-Task	Date	Notes
Injector			
Accelerator			
	Energy spread in Hall A arc		
	Spin dance		