Accelerator Parity Quality Beam

PQB To-do List

Monday, March 09, 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^{th} 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	^{1}H (150 cm)	35.6±0.74	10±10	0.5±0.5	0.05±0.05	10^{-4}

Laser Table

Task	Sub Tasks	Date	Task Description
2 kHz Helicity Reversal		PREx	Requires 10 μs 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
Pockels Cell Stewart Platform		Fall 2015	For remote optimization using e-beam. Assemble, build control software, qualify summer 2015

Injector

Task	Sub Tasks	Date	Task Description
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
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		
Møller (*g-2*) Spin rotation			Change beam energy by 100 MeV (few reversals)

Hall A

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

PQB Beam Studies

Task	Sub Tasks	Date	Task Description
Injector			
Accelerator			
	Energy spread in Hall A arc		
	Spin dance		
Hall A			
	Measure beam halo		