

Hall A Møller Polarimeter Upgrade

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For Parity collaboration meeting, May 2007

Outline

- 1 Overview
 - Goals
 - Implementation
- 2 Development
 - Status
 - Plans

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Goals

Purpose of the planned upgrade

- Provide a $\sim 1\%$ polarimetry for PREX
- Investigate the pros and cons for retaining the upgrade in the future

Changes to the present setup

- Reduce the main error (target polarization) à la Hall C
- Be able to run at high beam currents

Systematic Errors

The goal for the systematic error

Variable	Error		
	OLD	Present	PREX goal
Target polarization	3.5%	2.5%	0.5%
Target angle	0.5%	0.5%	0.0%
Analyzing power	0.3%	0.3%	0.3%
Levchuk effect	0.2%	0.2%	0.2%
Dead time	0.3%	0.3%	0.3%
Others	-	-	0.3%
Total	3.6%	2.6%	~1.0%

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Implementation

Target polarization

- Hall C target clone (the claim $\sigma \mathcal{P}_{beam} \sim 0.5\% @ \sim 3 \mu\text{A}$)
- Round target foil perpendicular to the magnetic field

Running at $50 \mu\text{A} \Rightarrow \times 100$ of today

Target heating:

- Bunch suppression $n=4$ - non-invasive
- Tune beam $\Delta t = 1 \text{ ms}$ at $30 - 120 \text{ Hz}$
- Small raster of $0.7 \times 0.7 \text{ mm}^2$

Counting rate:

- Foil $\sim 1 \mu\text{m}$ thick \Rightarrow rate factor ~ 0.03
- Bunch suppression $n=4$
- Electronics/detector update to reduce the dead time

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Status

Target

- The magnet is installed in the EEL building
- Design work for the target ladder started

Detector/electronics

- New modules purchased
- Work on the new programmable PLU is in progress

Beam: successful accelerator tests

- Bunch suppression $n=4$,
- Macro-pulse duty cycle (tune beam) $1\text{ ms @}30 - 120\text{ Hz}$

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Plans

- Test the magnet in the EEL: July
- Target ladder/connections design: September
- Manufacturing: starting in October
- New aperture counters: October
- Final electronics assembling: December