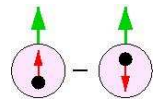# Luminosity Monitoring and Beam Charge Feedback for the Transversity Experiment

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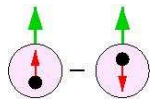
October 9, 2007
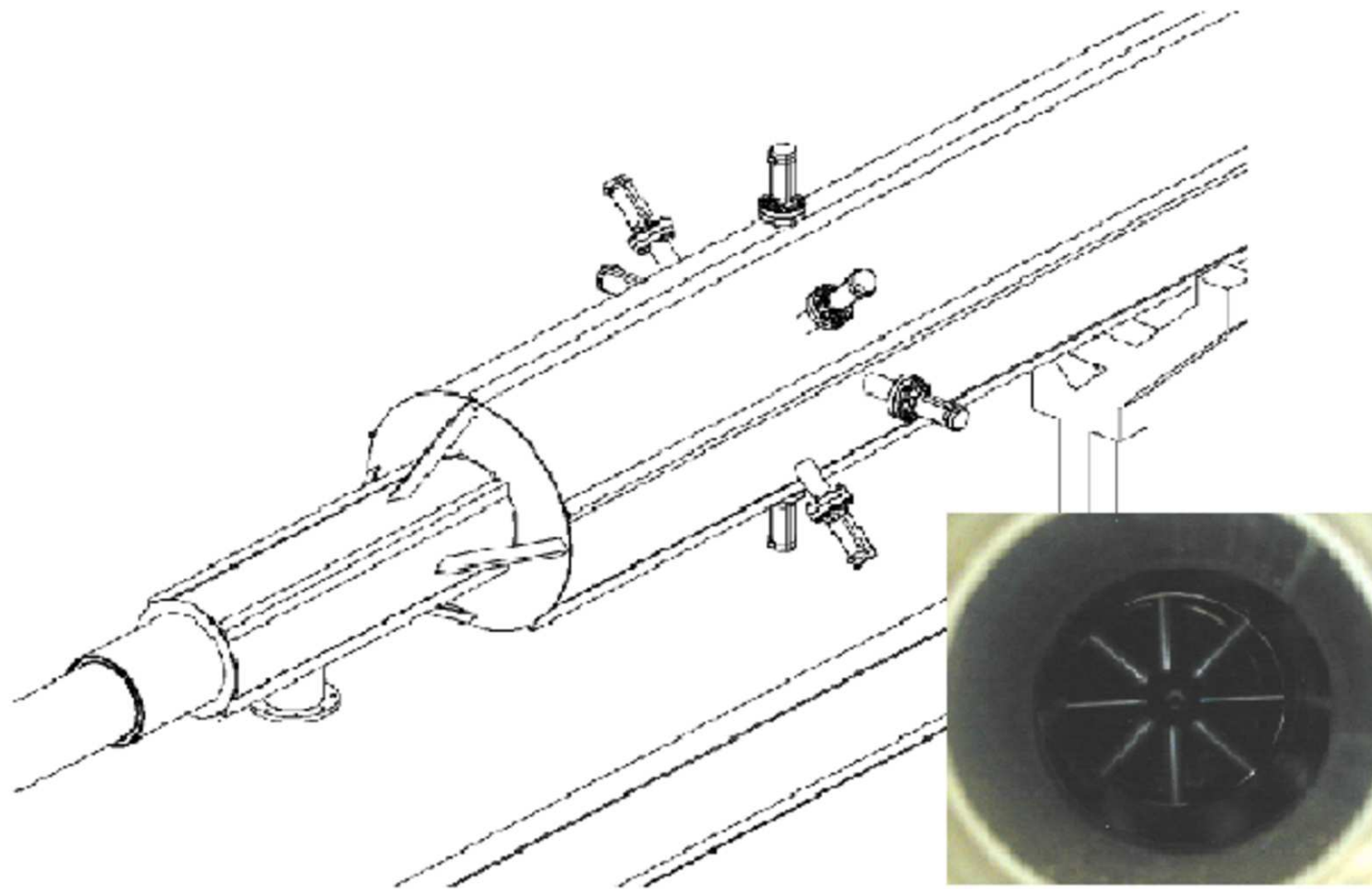
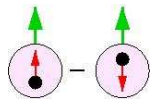# Luminosity Monitoring and Beam Charge Feedback for the Transversity Experiment

Outline

- Luminosity Monitors

  Design and Sensitivity

  Upcoming Modification

- Beam Charge Feedback

  Methods

  Limitations

- Summary of Issues and Discussion

Hall A Luminosity Monitor

Hall A Luminosity Monitor

- Monitors relative luminosity at 10^2ppm level for 30Hz beam helicity windows.

- From E03-004 proposal, longterm (10 - 20min) sensitivities estimated at the 50ppm level.

- Currently modifying Lumis: Installing neutral density filters between light guide and pmt.

- Modification allows greater flexibility in optimizing pmt linearity under varied run conditions.

- May need to think about dynamic range of Transversity run, which filters (if any) to use?

- DAQ issue: How will Lumi signals get into Transversity datastream?
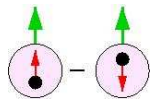
Beam Charge Feedback

- Controls the helicity-correlated average charge asymmetry.

- Using one of two methods:

  Intensity Attenuator (IA)

  Polarization Induced Transport Asymmetry (PITA)

- Feedback cycle of $\sim$1/minute with feedback slopes calibrated weekly or as needed.

- System designed to suppress helicity-correlated charge asymmetries on a 30Hz time scale.

- No longterm (10 - 20 min) feedback/controlling of average beam charge asymmetry (non helicity-correlated).

- DAQ issue: Transversity shouldn't rely on Parity DAQ for charge asymmetry measurement, since DAQs can be difficult to synchronize.
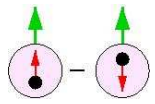
Summary of Issues

- Prelim. study indicated Lumi longterm (10 - 20min target helicity window) noise level: $\sim$50ppm – not explored by Parity collab.

- Installing filters in the Lumis – Does it matter for Transversity?

- Lumi signals inserted into Transversity datastream. How? Who?

- How will the Lumi data be used in the analysis?

- Beam charge feedback accomplished by IA or preferably (for HAPPEX) by PITA.

- No "longterm" beam current feedback. Need/have plan for this?

- Charge asym. measure may need incorporation into Transv. DAQ.

- Beam dynamics: If helicity-correlated position diffs important, then need beam study time to optimize the source configuration.