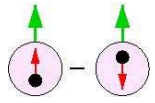


# **Luminosity Monitor Performance During PREX Beamtest and Issues for the Transversity Experiment**

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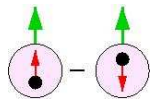
March 17, 2008



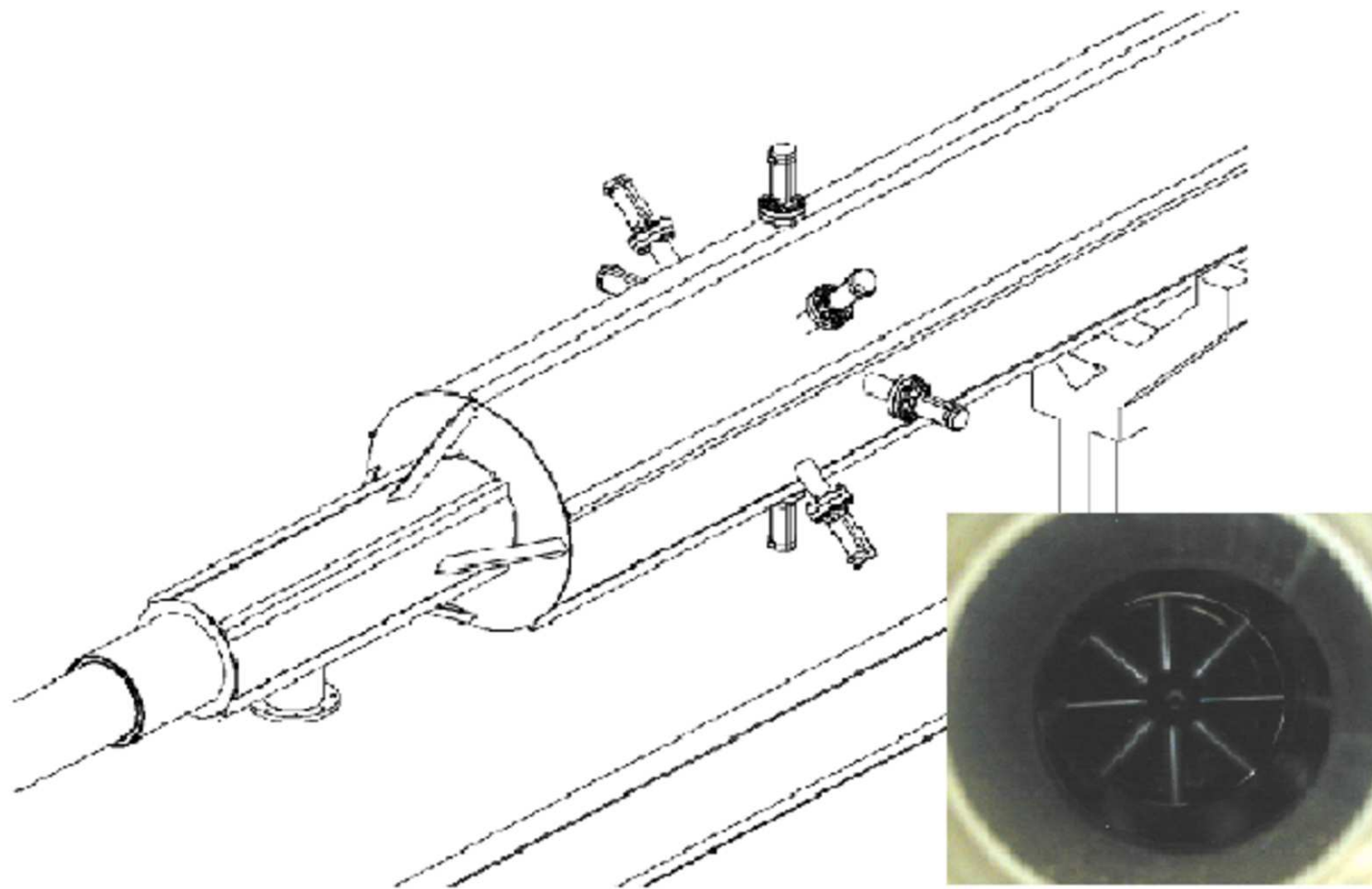
## **Luminosity Monitor Performance During PREX Beamtest and Issues for the Transversity Experiment**

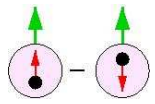
### Outline

- Lumi Design and Sensitivity (review)
- PREX Beamtest Performance
- Summary of Issues for Transversity
- Discussion

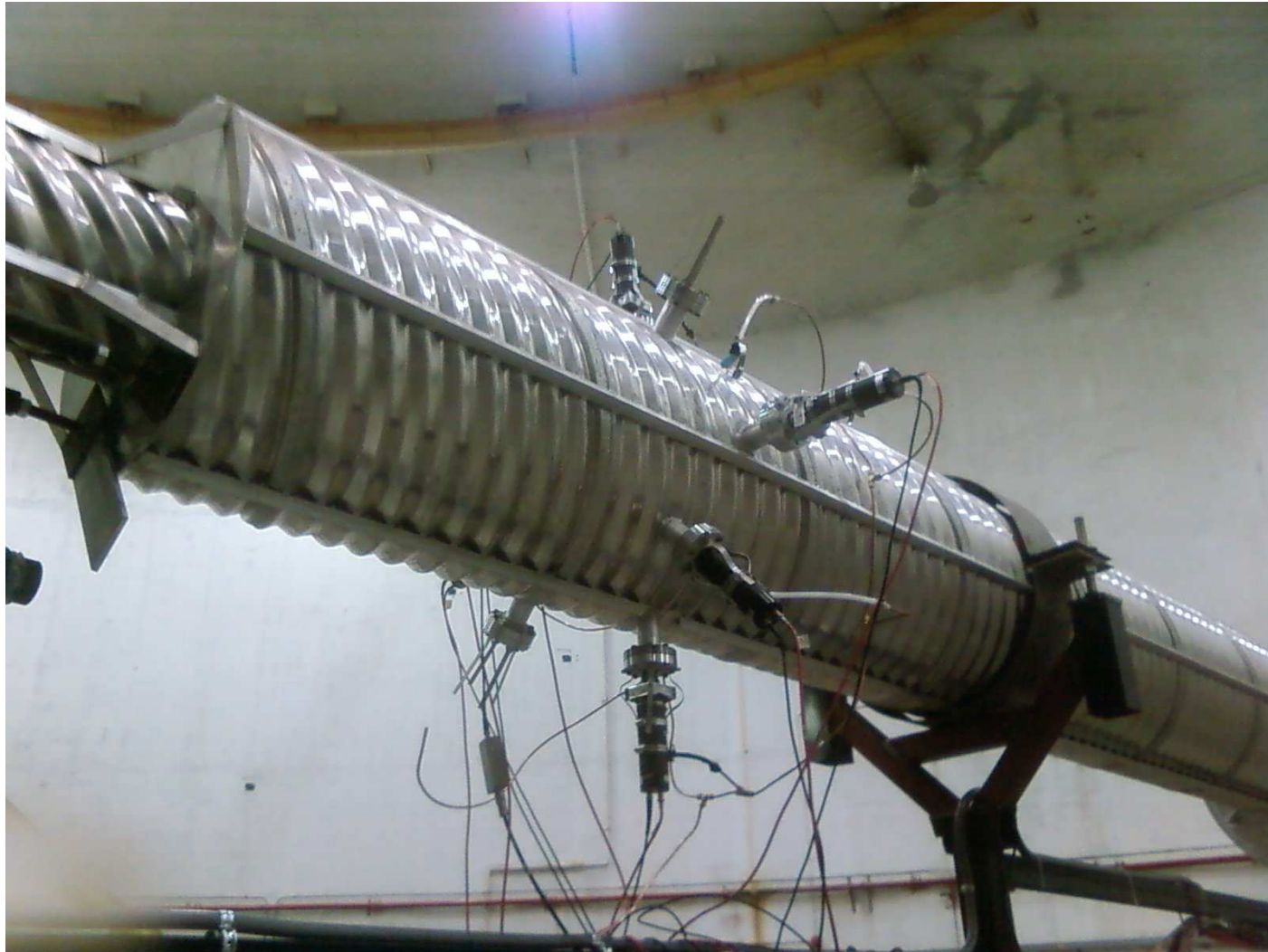


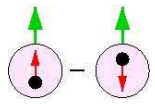
## Hall A Luminosity Monitor





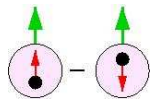
## **Hall A Luminosity Monitor**





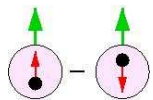
## Hall A Luminosity Monitor

- Measures electron scattering rate at  $\sim 0.5^\circ$  using integrating DAQ.
- Monitors relative luminosity at  $10^2$  ppm level for 30Hz beam helicity windows.
- Current design allows for neutral density filter between light guide and pmt – allows greater flexibility in optimizing pmt linearity under varied run conditions.
- From E03-004 proposal, longterm (10 - 20min) sensitivities estimated at the 50ppm level.

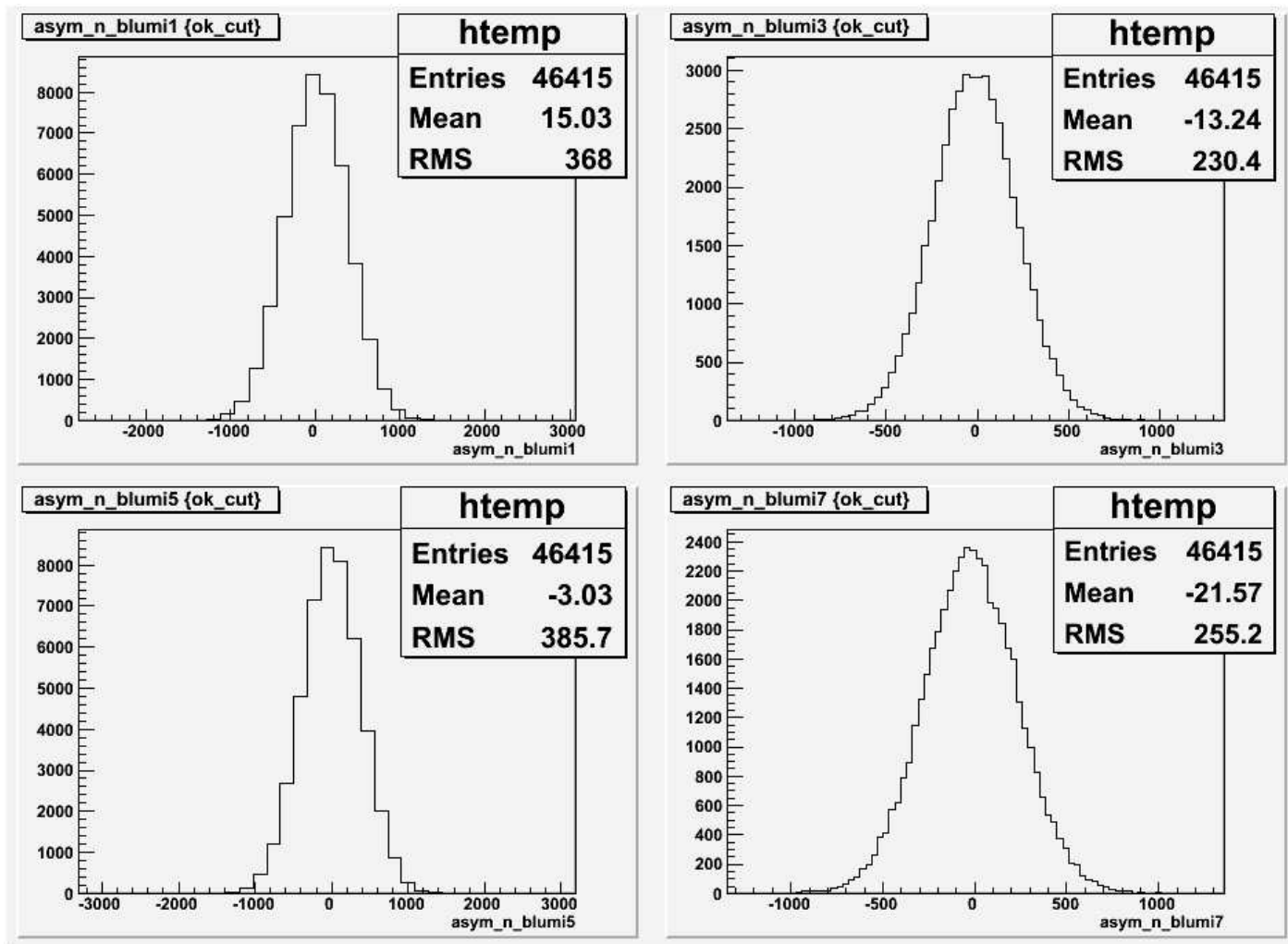


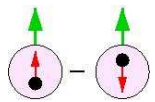
## PREX Beamtest Lumi Performance

- Main goal was to understand the optimal lumi setup (HV, ND filters, shielding) for the PREX run conditions.
- Many different run conditions and hardware configurations were studied. Detailed analysis of beamtest data is ongoing.
- Lumi system achieved 50ppm (regressed) resolution at 30Hz flipping for thin-Pb target at  $60\mu\text{A}$  and 2.77 GeV.
- We learned that the ND filters need to be used in conjunction with Lead-shielding.

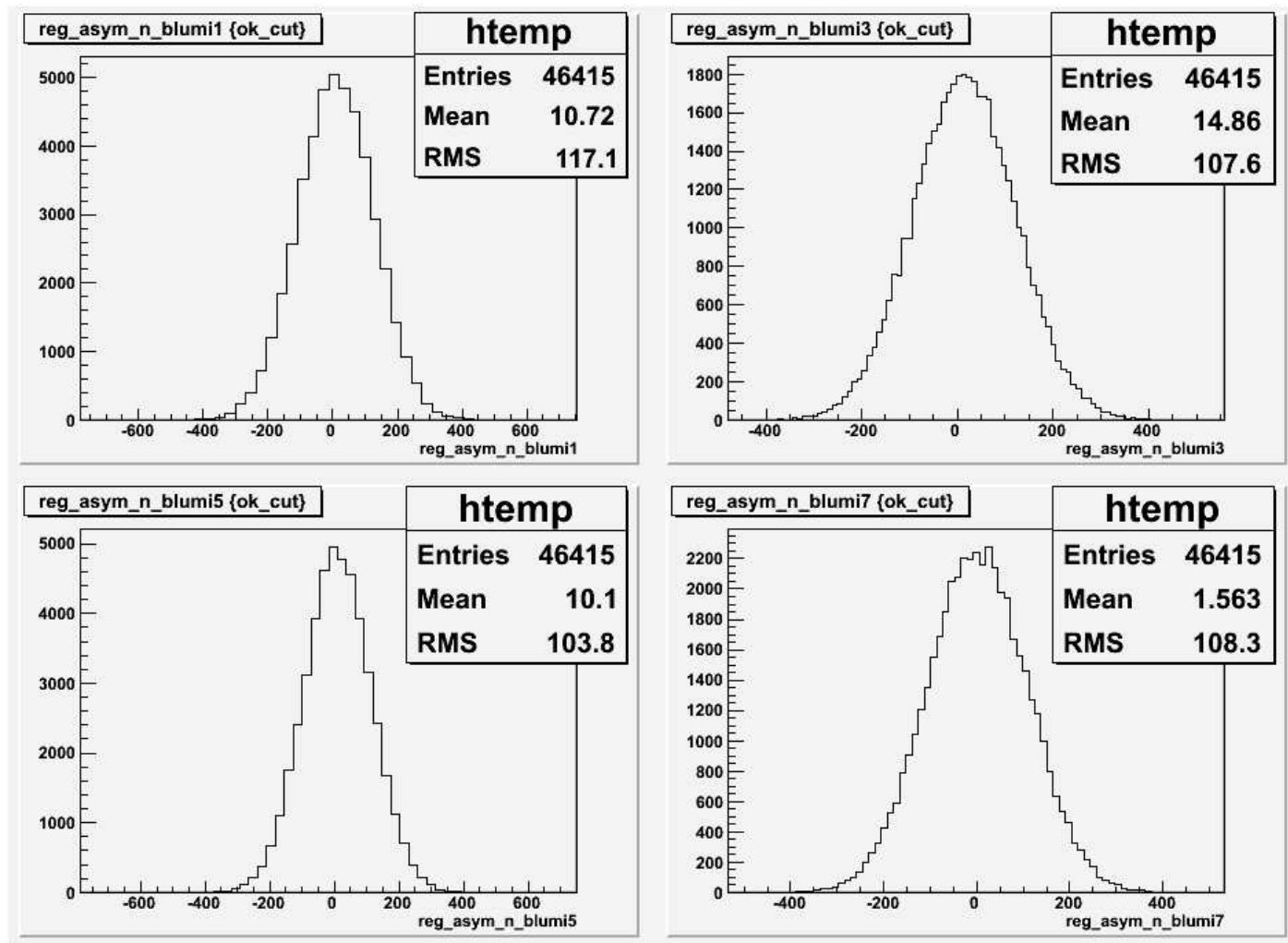


## Lumi Performance: Normalized Asymmetries (1, 5, 3, 7)

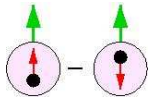




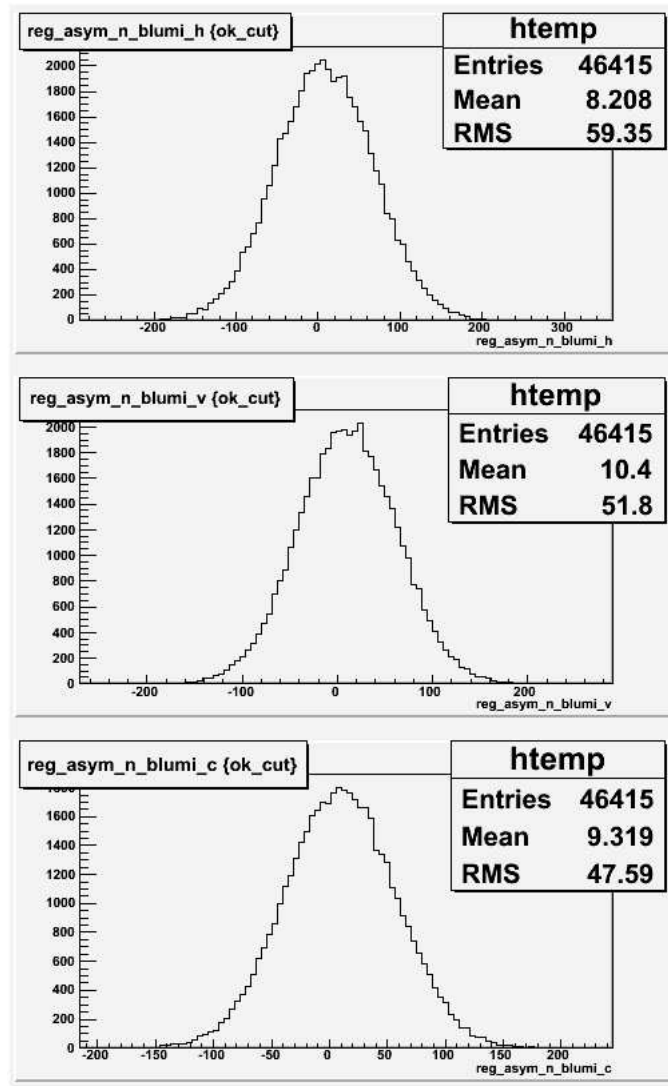
## Lumi Performance: Normalized Regressed Asymmetries

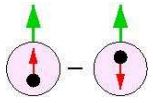




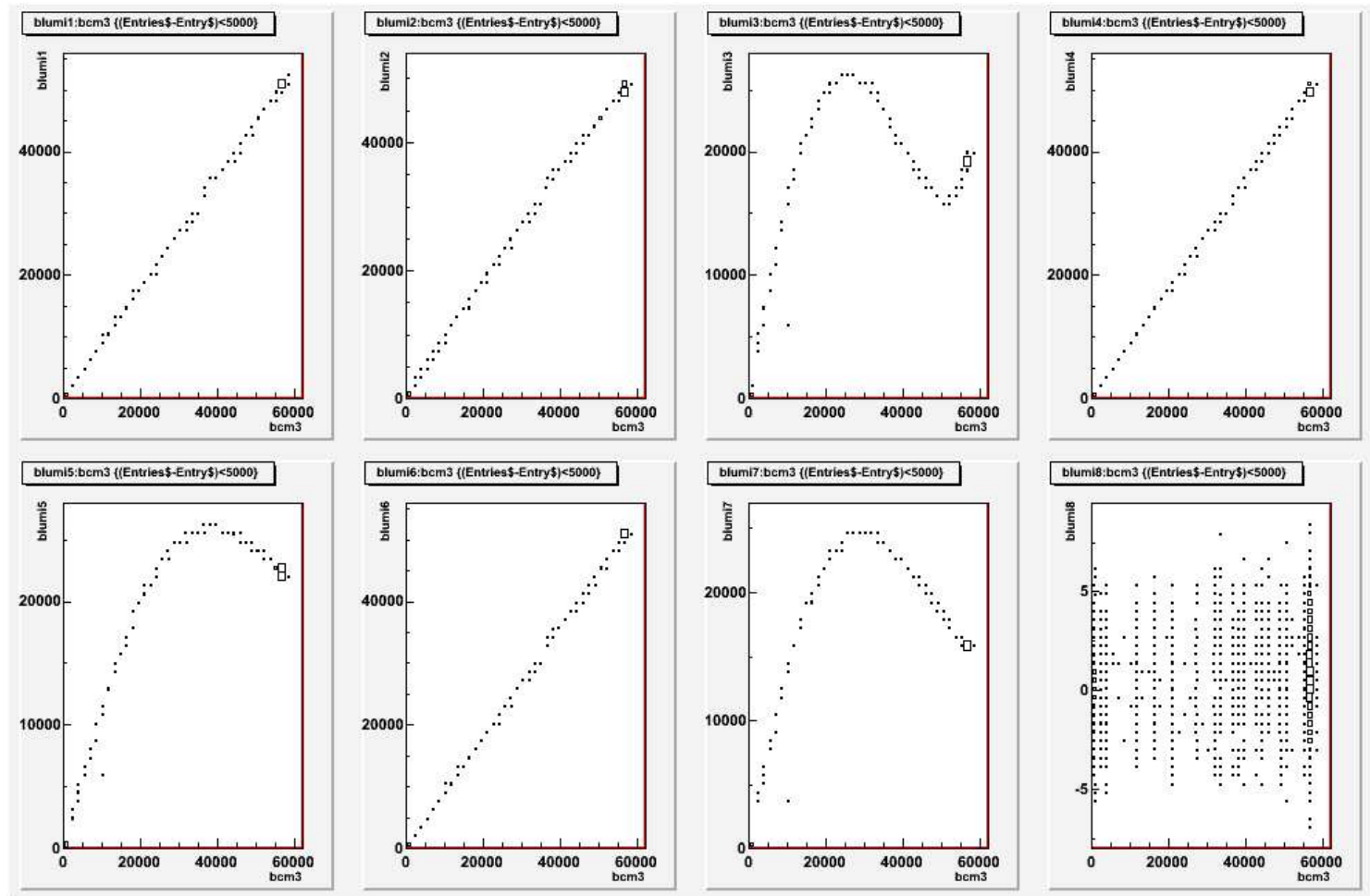


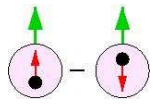
## Lumi Performance: Norm. Reg. Asym. Combinations





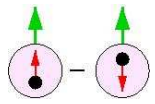
## Lumi Performance: Non-linearities at high luminosity





## Summary of Issues for Transversity

- Prelim. study indicated Lumi longterm (10 - 20min target helicity window) noise level:  $\sim 50$ ppm – not explored by Parity collab.
- We plan to examine the lumis' longterm sensitivity and stability during the 2008 beamtest to help us prepare for Transversity.
- ND filters in Lumis – Does it matter for Transversity? Probably want no filter.
- How will the Lumi data be used in the analysis? For target density fluctuations. What else?
- Lumi signals inserted into Transversity datastream. How?
- Beam charge feedback accomplished by IA or preferably (for HAPPEX) by PITA.
- Charge asym. measure may need incorporation into Transv. DAQ.



## Discussion: Incorporating Lumi signals into Transversity DAQ.

- Run parity DAQ as usual.
- Use IO register to receive target spin information.
- Use reliable server running on VME crate to collect the data (target spin and lumis).
- A Linux client (using ET system) grabs server stream and puts it into HRS DAQ.
- Lumi data then essentially looks like a scaler bank in HRS DAQ.
- Can verify reliability of server results by comparing with HAPPEX DAQ.