Summary of the Spring 2016 commissioning run

A. Deur
Jefferson Lab

Spring 16 run

- Operation included physics running. Beam energy: 12.05 GeV (same as Fall 15)

  Accelerator goals for Hall D:

  - Continue to commission Fast Feedback
  - Continue to commission nA BPMs
  - Hall D beam line transport studies

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  - Solenoid first at 1200A (2.5 months) then at 1345A (6 days, includes 3 day of data taking)
  - Diamond and Al. radiators.
  - 5mm collimator hole first, then 3.4mm for the first time, then back to 5mm.
  - LH2 target.

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- Continue trigger commissioning
- Confirm high DAQ rate performances
- Establish polarized beam, including on thin diamonds. Before this, gather π^0 calibration data
- Commission Total Absorption Counter for absolute photon flux meas.
- Commission Level 3 trigger
- Gather enough polarized physics data and enough systematic data for publication

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- Operation included physics running. Beam energy: 12.05 GeV (same as Fall 16)

  Accelerator goals for Hall D:
  - Continue to commission Fast Feedback ✓ but more work remains
  - Continue to commission nA BPMs ✓ work well
  - Hall D beam line transport studies ✓

- Hall D configuration:
  - Solenoid first at 1200A (2.5 months) then at 1345A (6 days, includes 3 day of data taking) ✓ No quenches, 3 PS trips
  - Diamond and Al. radiators. 4 thin diamonds arrived. 2 tested. Not a success (nor failure). More work remains
  - 5mm collimator hole first, then 3.4mm for the first time, then back to 5mm.
  - LH2 target. ✓ glitches when empty ↔ full transitions

Hall D main goals:
- Continue trigger commissioning ✓ but more work remains: tuning trigger parameters, assess efficiency.
- Confirm high DAQ rate performances ✓ achieved low luminosity run requirement. Reliable operations.
- Establish polarized beam, including on thin diamonds. Before this, gather π^0 calibration data ✓
- Commission Total Absorption Counter for absolute photon flux meas. ✓ more work remains
- Commission Level 3 trigger ✓ more work remains
- Gather enough polarized physics data and enough systematic data for publication ✓ great success!

Most of the goals of the Spring 2016 run were achieved.

Very successful run.

Overall accelerator availability (physics quality beam): 35%

(or 43% if we include extension as compensation for CHL maintenance)

Run plan and organization

Original timeline:

- Jan. 28th-Feb. 3rd: Electron beam restoration. Actual beam available: Feb. 13th
- Feb. 4th-Apr. 14th: Hall D Spring run. CHL preventive maintenance: March. 9th - March 27th

Added:

- Apr. 14th - Apr. 25th: Extension due CHL down time

Run plan: https://halldweb.jlab.org/wiki/index.php/Run_Coordination_Meetings:_Spring_2016_Run

Shorter term: Google calendar: https://calendar.google.com/calendar/embed?src=halldops%40gmail.com

Leadership:

- Hall D: Eugene Chudakov (Elton Smith)
- GlueX: Curtis Meyer (Matt Shepherd)

Run Coordinators:

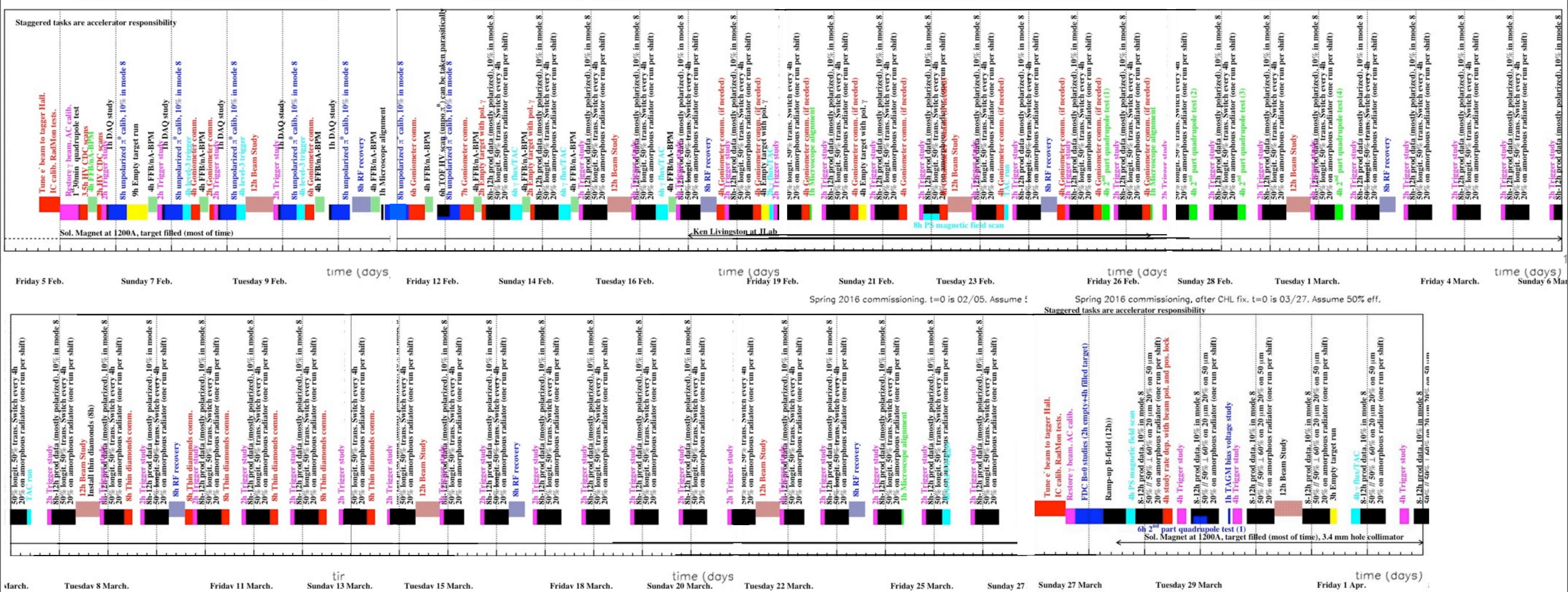
- Alexandre Deur: Feb. 4th - March 15th
- Mark Ito: March 15th - March 30th,
- David Lawrence: March 30th - April 13th
- Mark Dalton: April 13th - April 25th

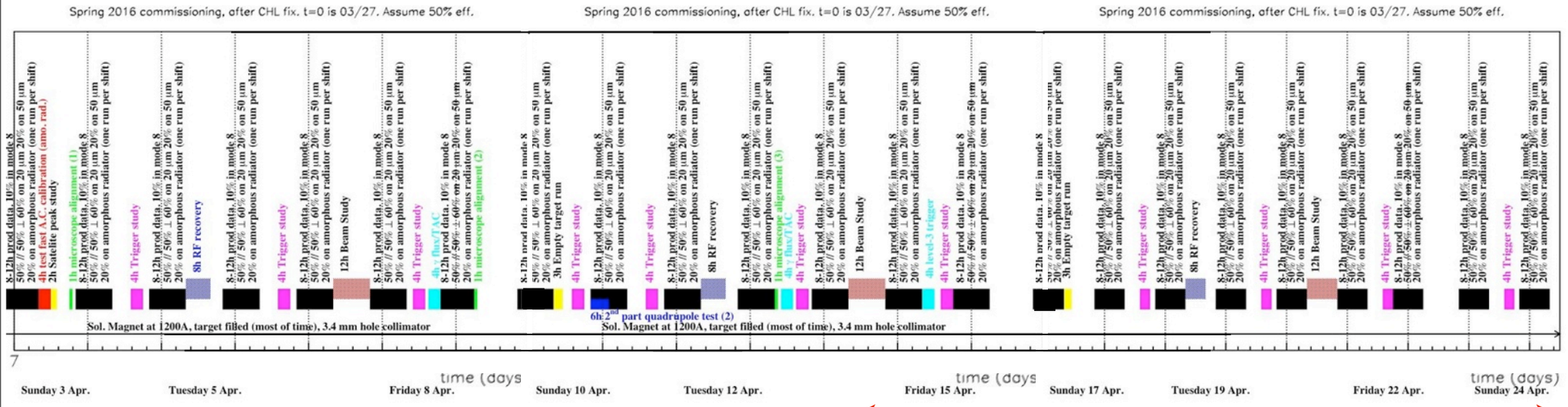
PDL:

- Benedikt Zihlmann: Feb. 4th - April 25th

Run plan

11 weeks period





Extansion

Global events

Beam restoration

Run start

arc 5 magnet burnt

growing ice ball

Initial Hall D optics (not FFB friendly)

Initial Acc. tune

Acc. RF 250 MHz

solenoid at 1200A

5mm collimator

Slow beam pos. lock implemented

CHL preventive maintenance

growing ice ball

Initial Acc. tune

RF 250 MHz

sol. at 1200A

5mm col.

growing ice ball

new Hall D optics (FFB friendly)

Initial Acc. tune

Acc. RF 250 MHz

solenoid at 1200A

3.4mm col.

CDC hole

run 11071
March 29, 2pm

growing ice ball

growing ice ball (assumed)

new Hall D optics (FFB friendly)

Initial Acc. tune

better tune

Acc. RF 250 MHz

Acc. RF 499 MHz

solenoid at 1200A

I=0A

solenoid at 1200A

sol. at 1345A

3.4mm col.

5mm col.

CDC hole (magnetic bracket pulled in by solenoid field)

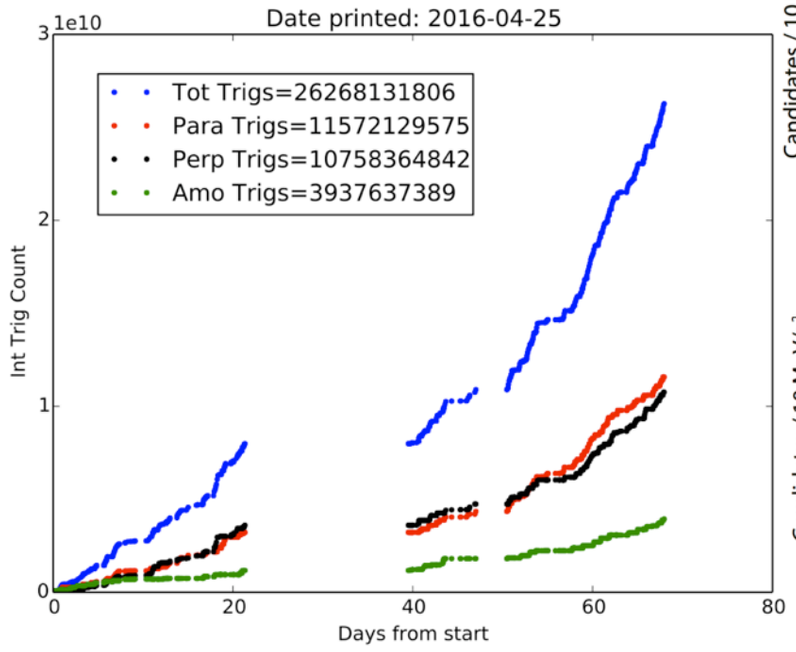
run 11555

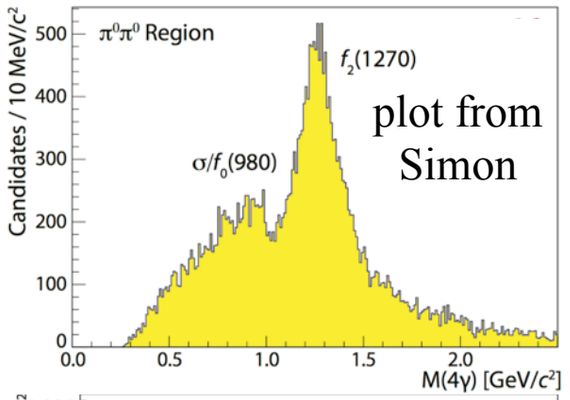
run 11565

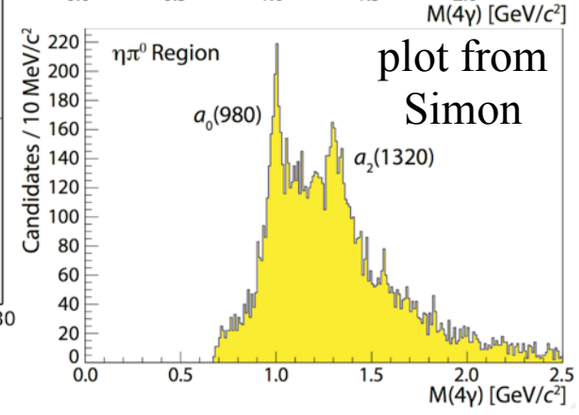
Achievements

- Large amount of triggers gathered (26 billions), mostly with polarized photons (22 billions).

  Plot from Elton, production events only.
  A few more nights of unpol. “production” events available.







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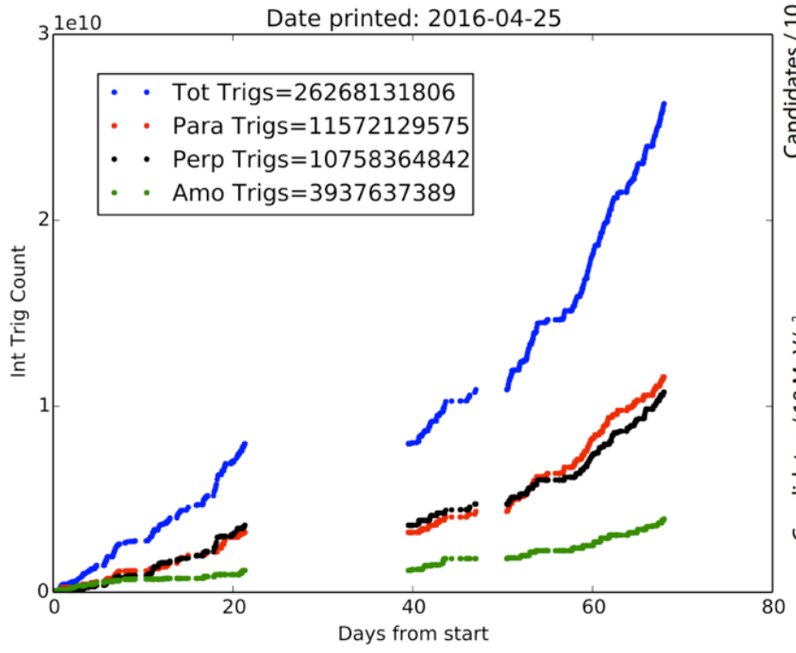

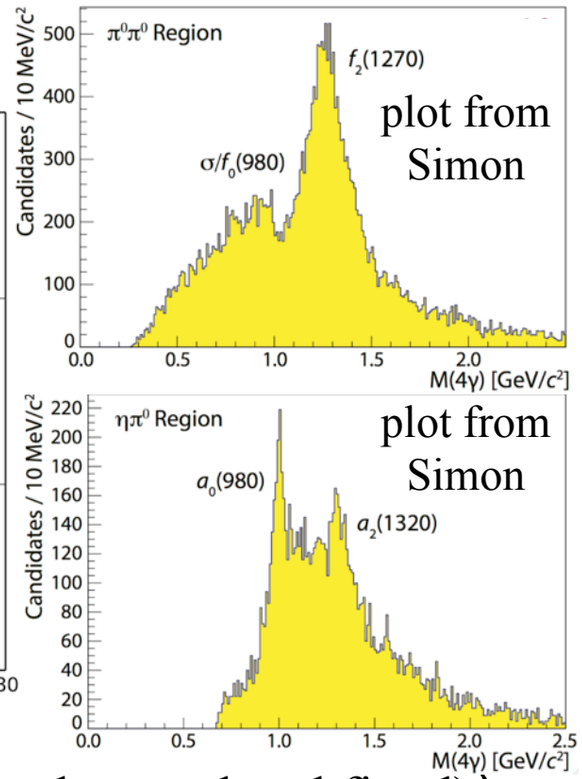

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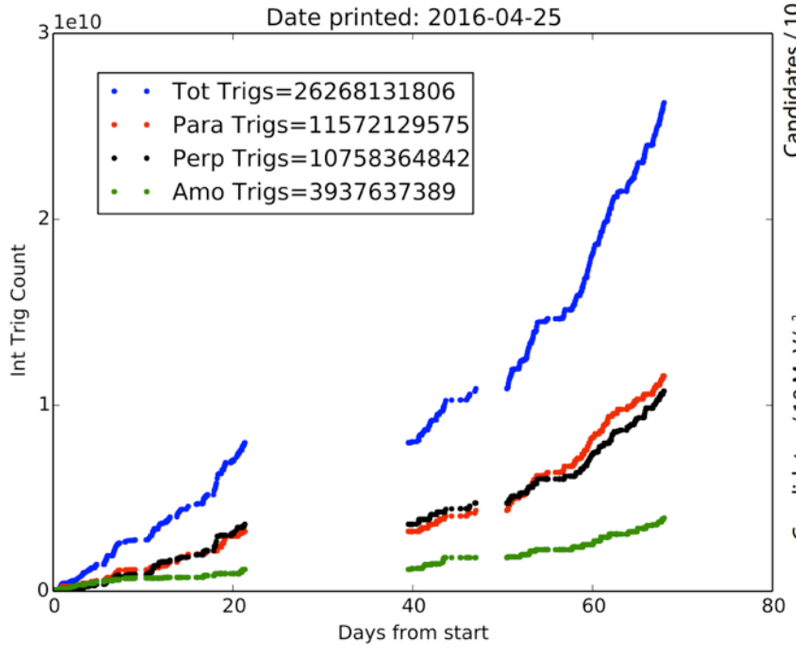

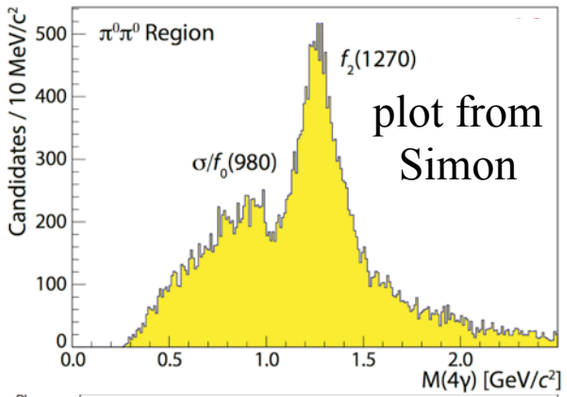

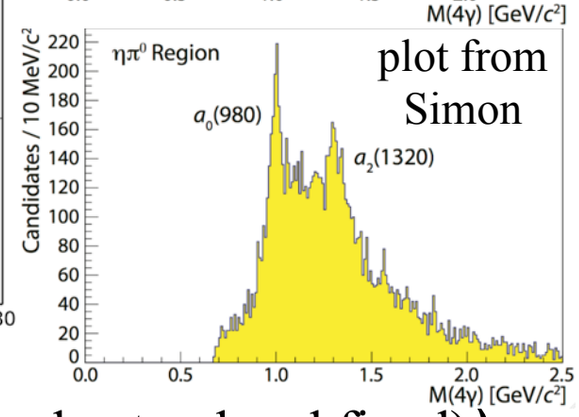

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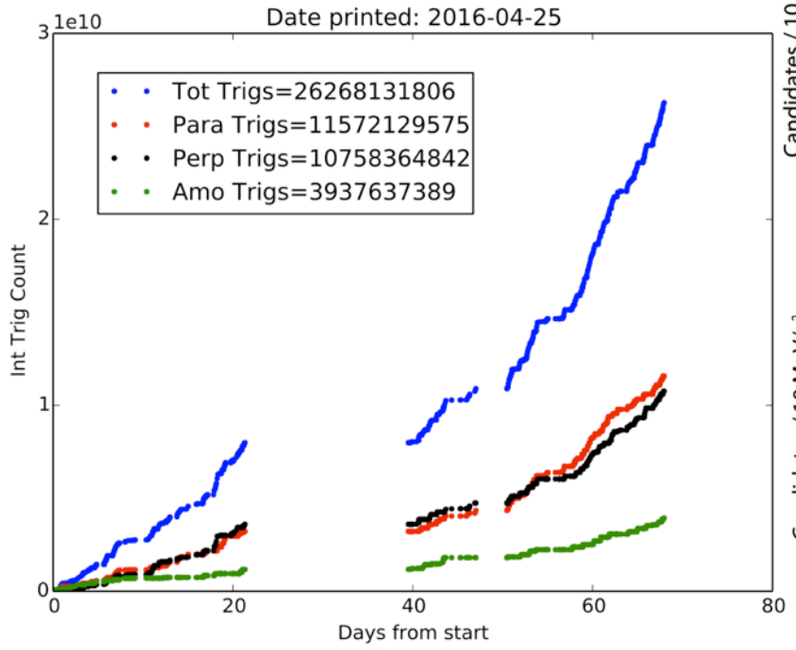

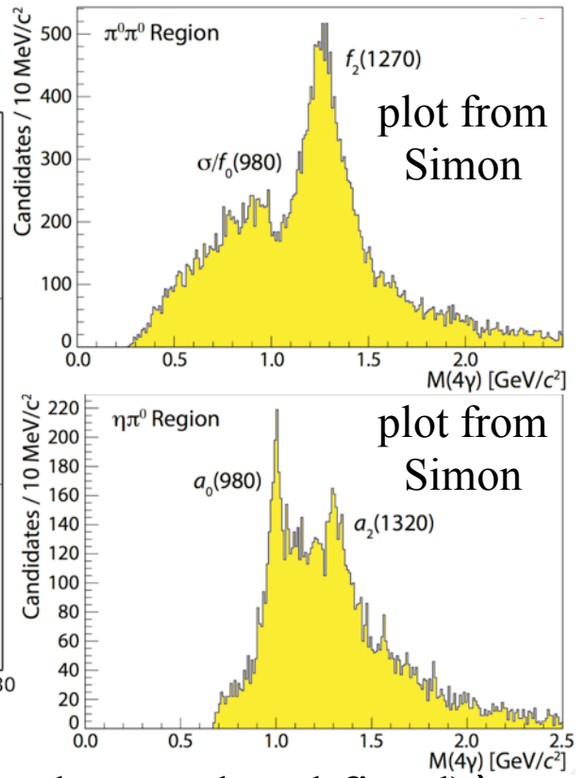

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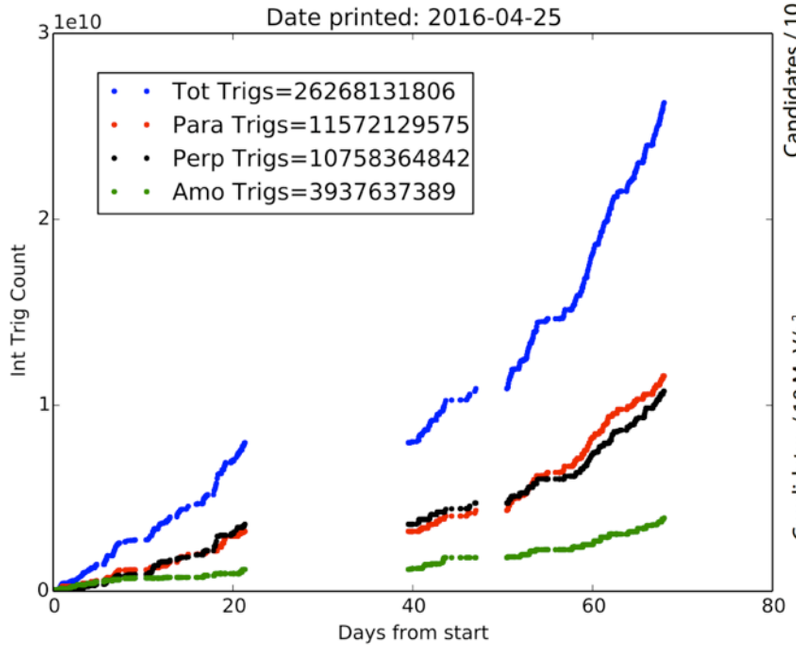

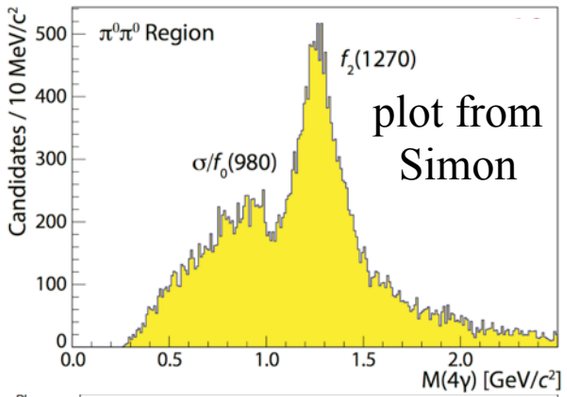

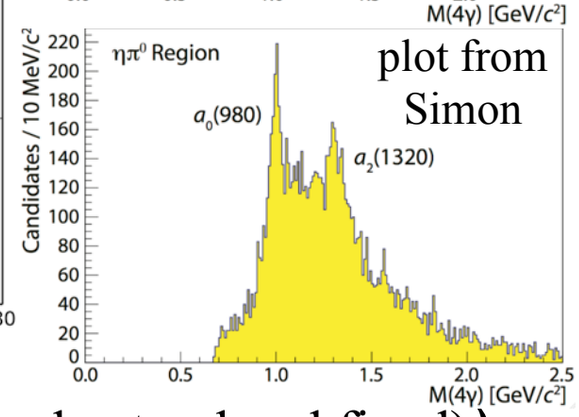

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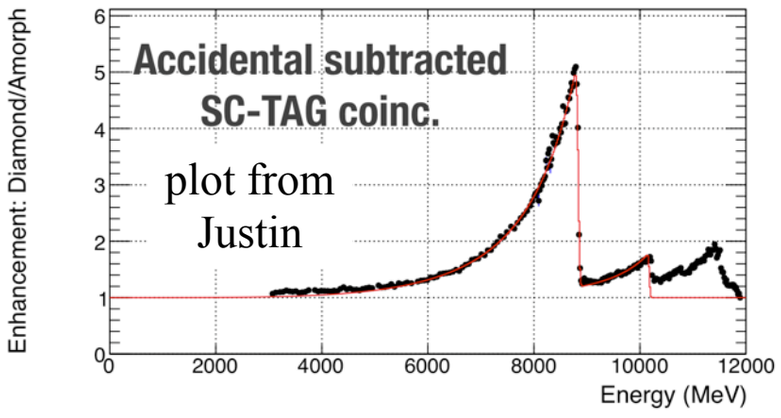
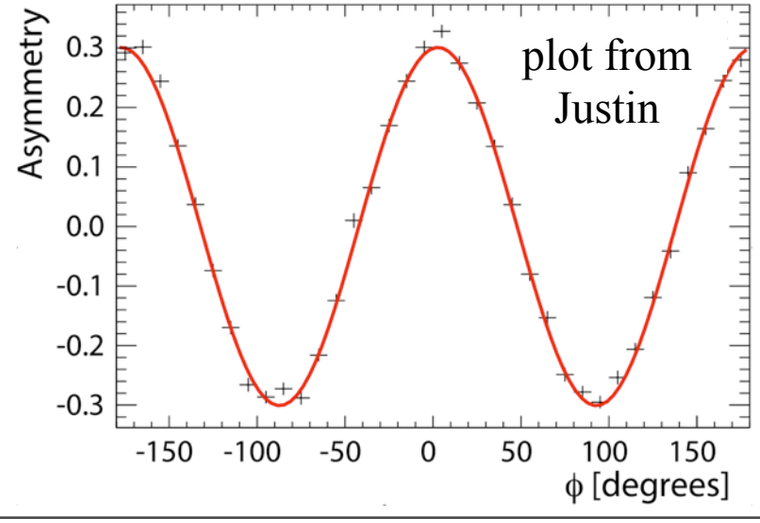
- Peak pol: ~40% (rho asy., T.Pol, coherent peak fit).
- Coherent edge nominally at 9 GeV. Test data also taken at 8.5, 7 and 6 GeV.





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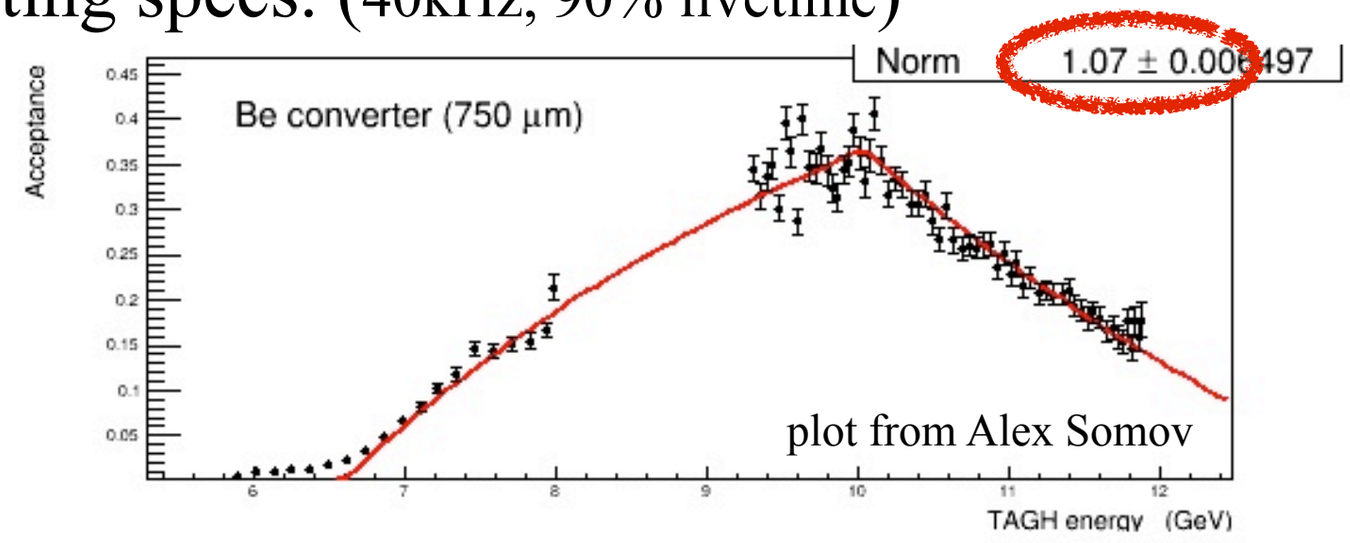

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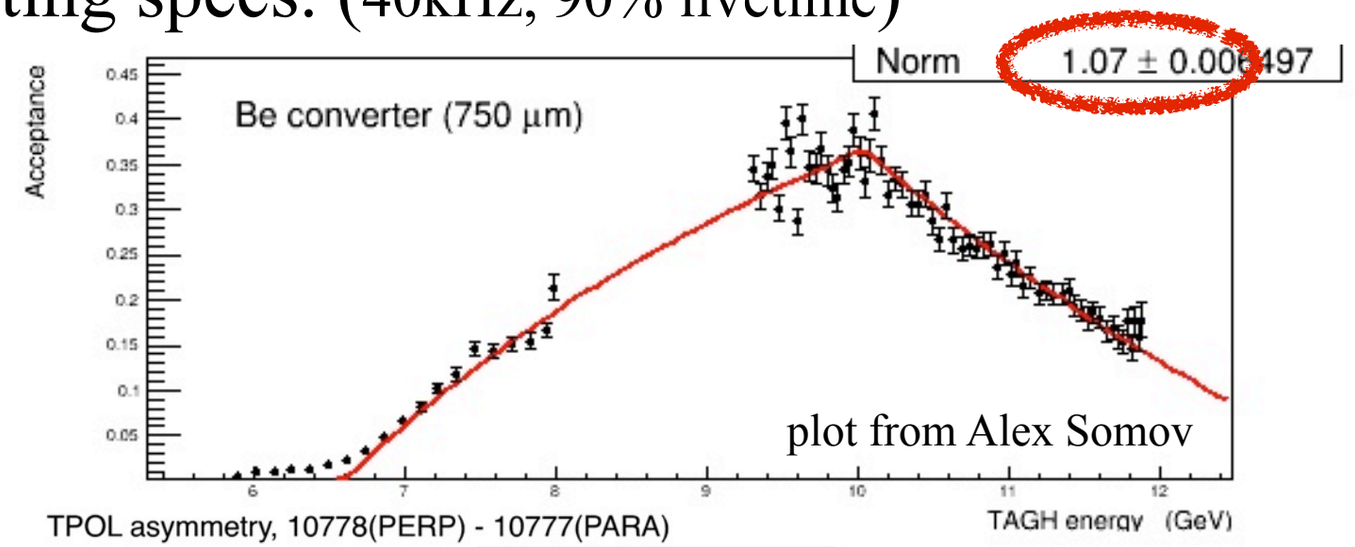
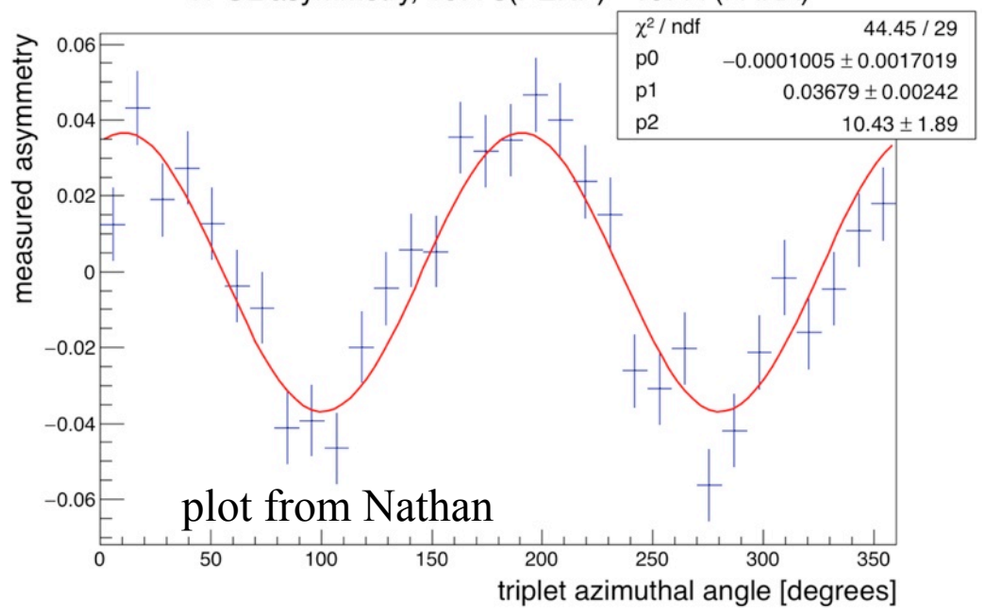


- Commissioning and operation of triplet polarimeter.



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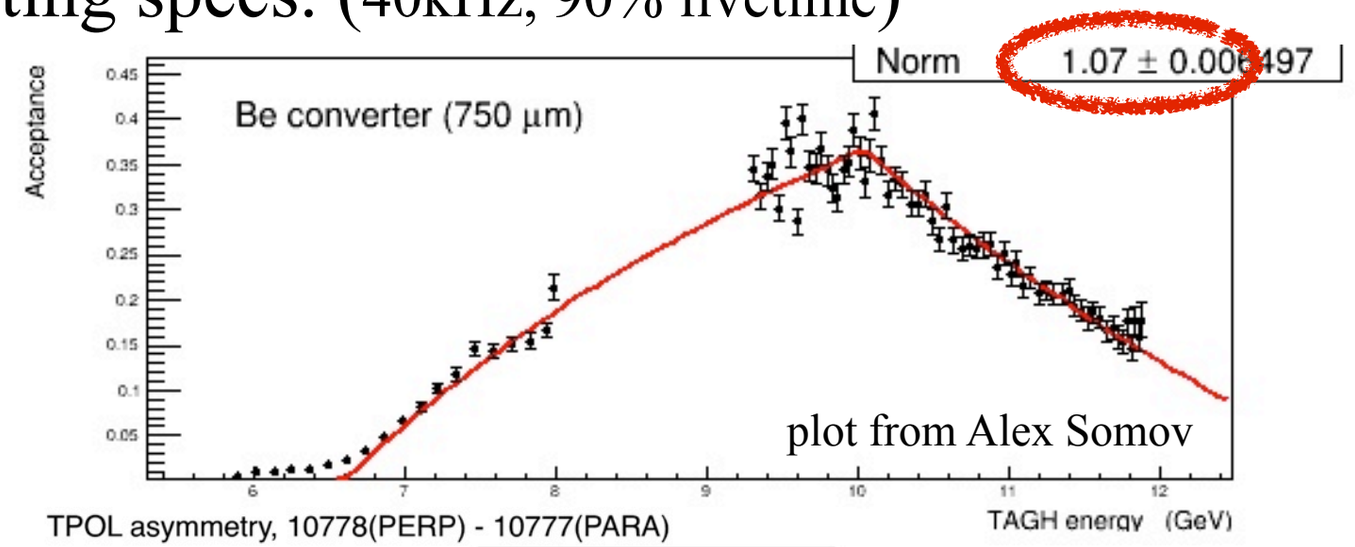

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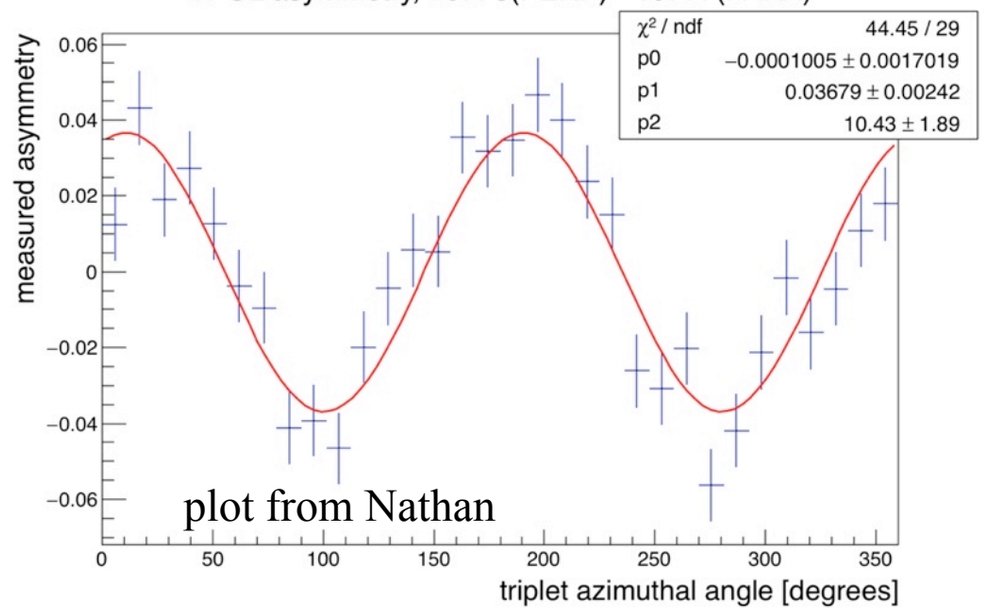

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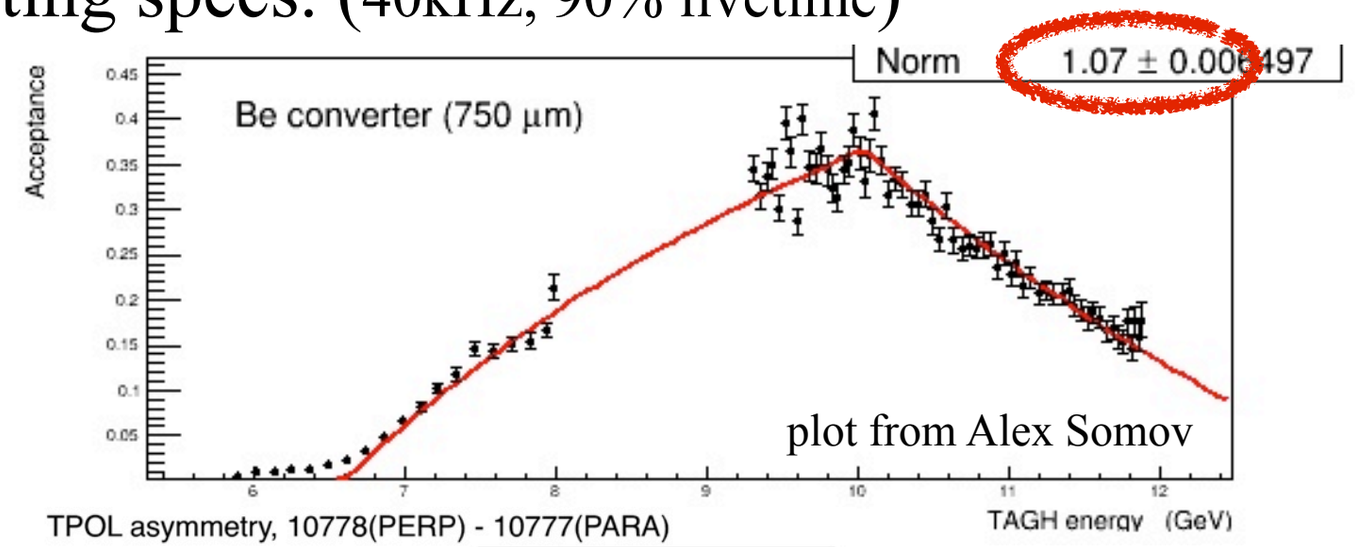

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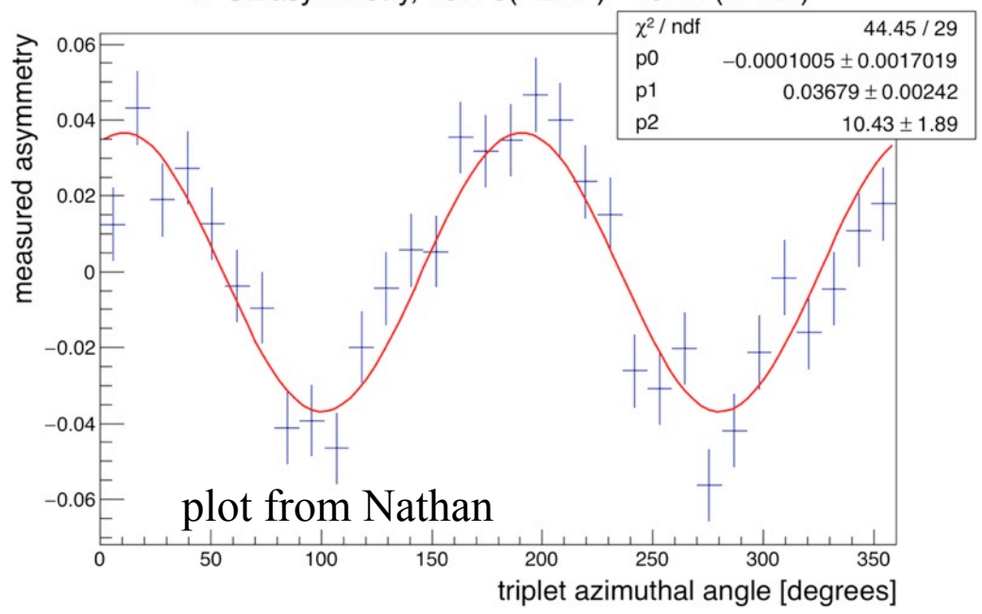

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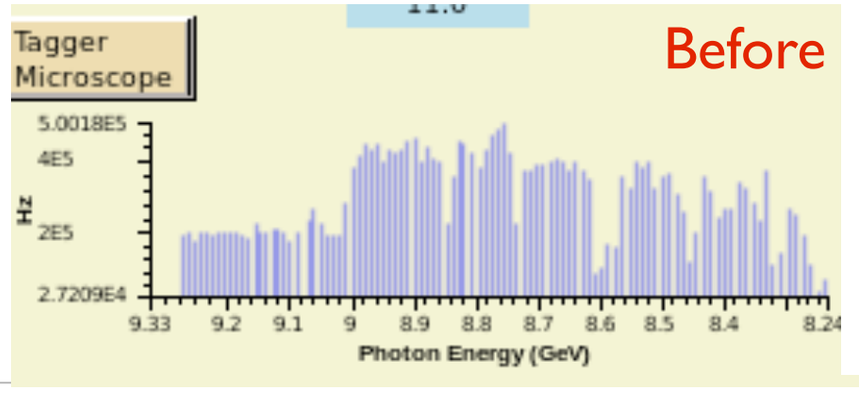
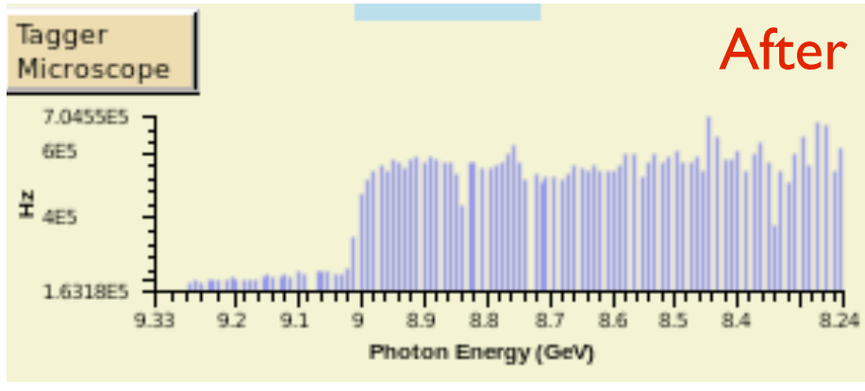
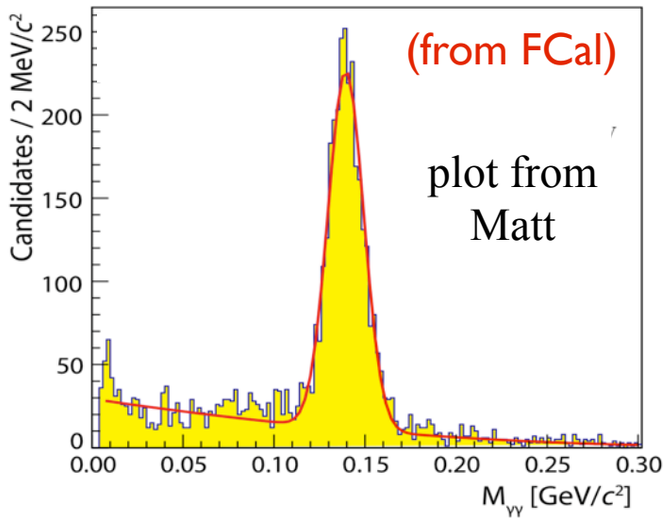


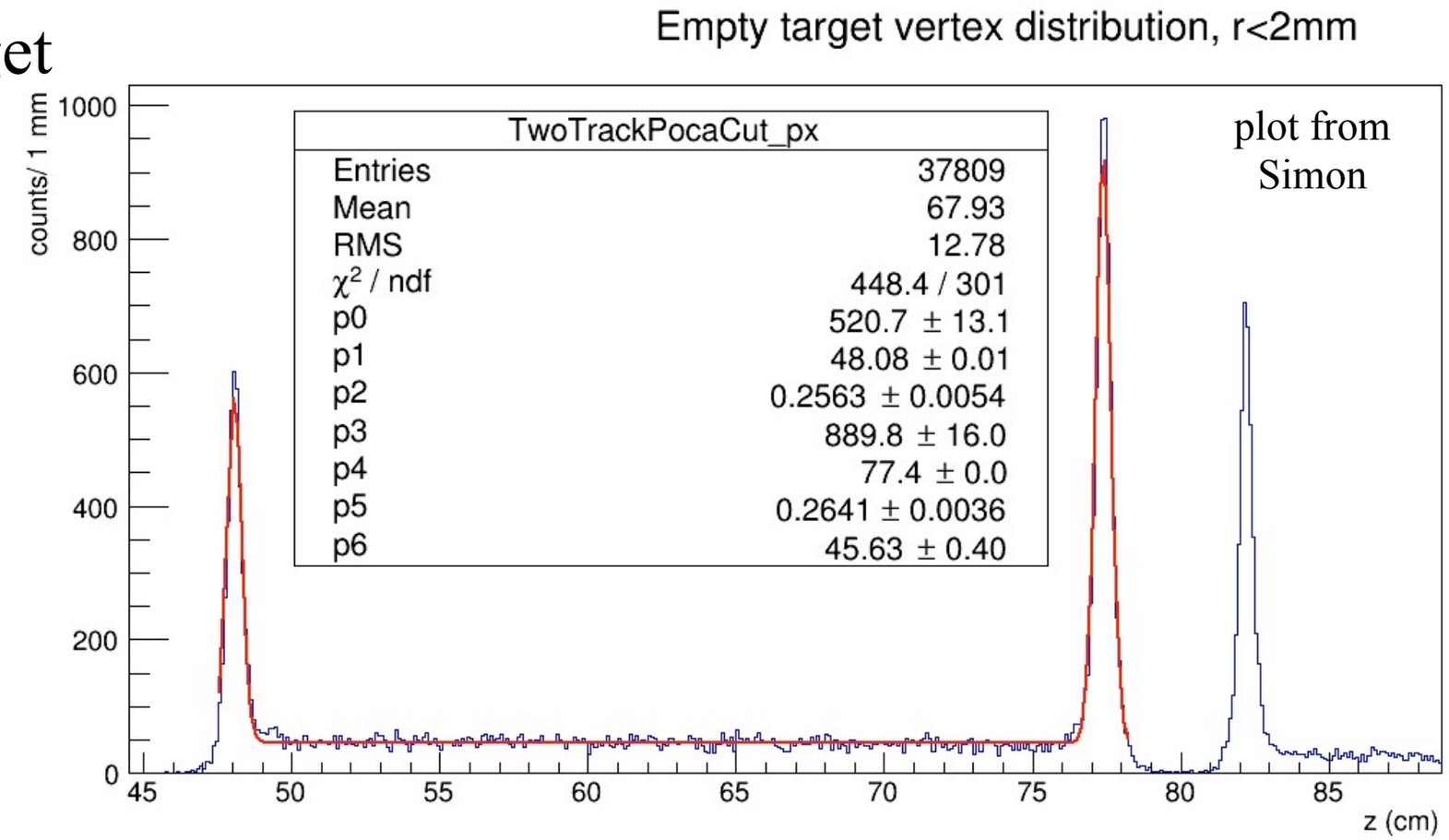


A. Deur. GlueX collaboration meeting. 05/09/2016

Achievements (cont.)

- Systematic studies: Empty target and unpolarized data runs. Good vertex reconstruction. Clear π^0 peak seen.





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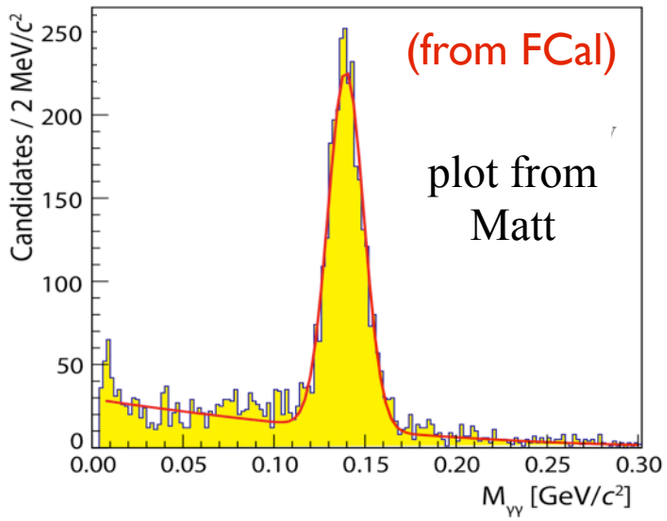

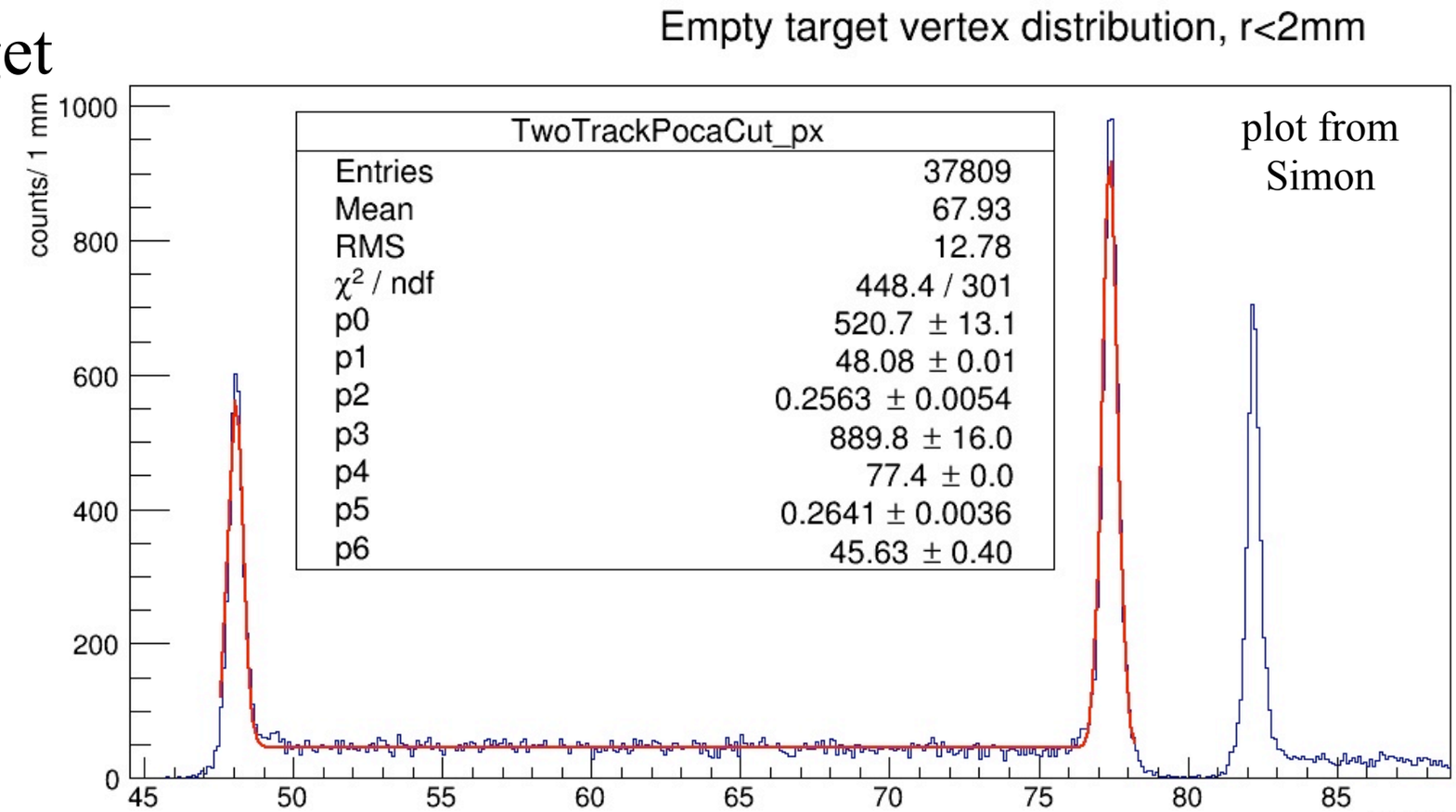

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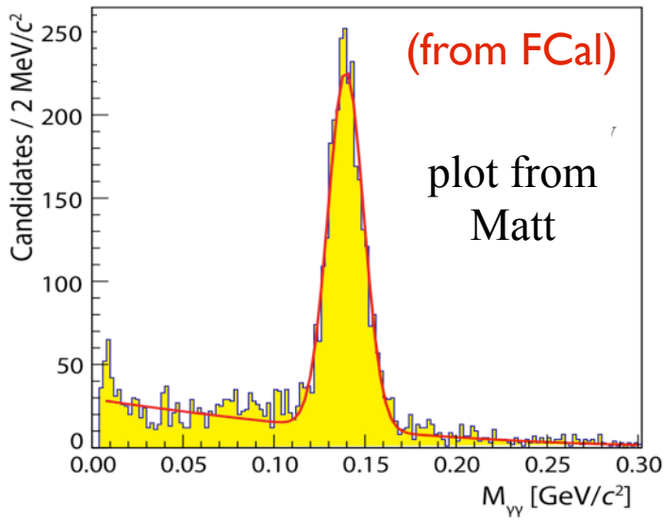

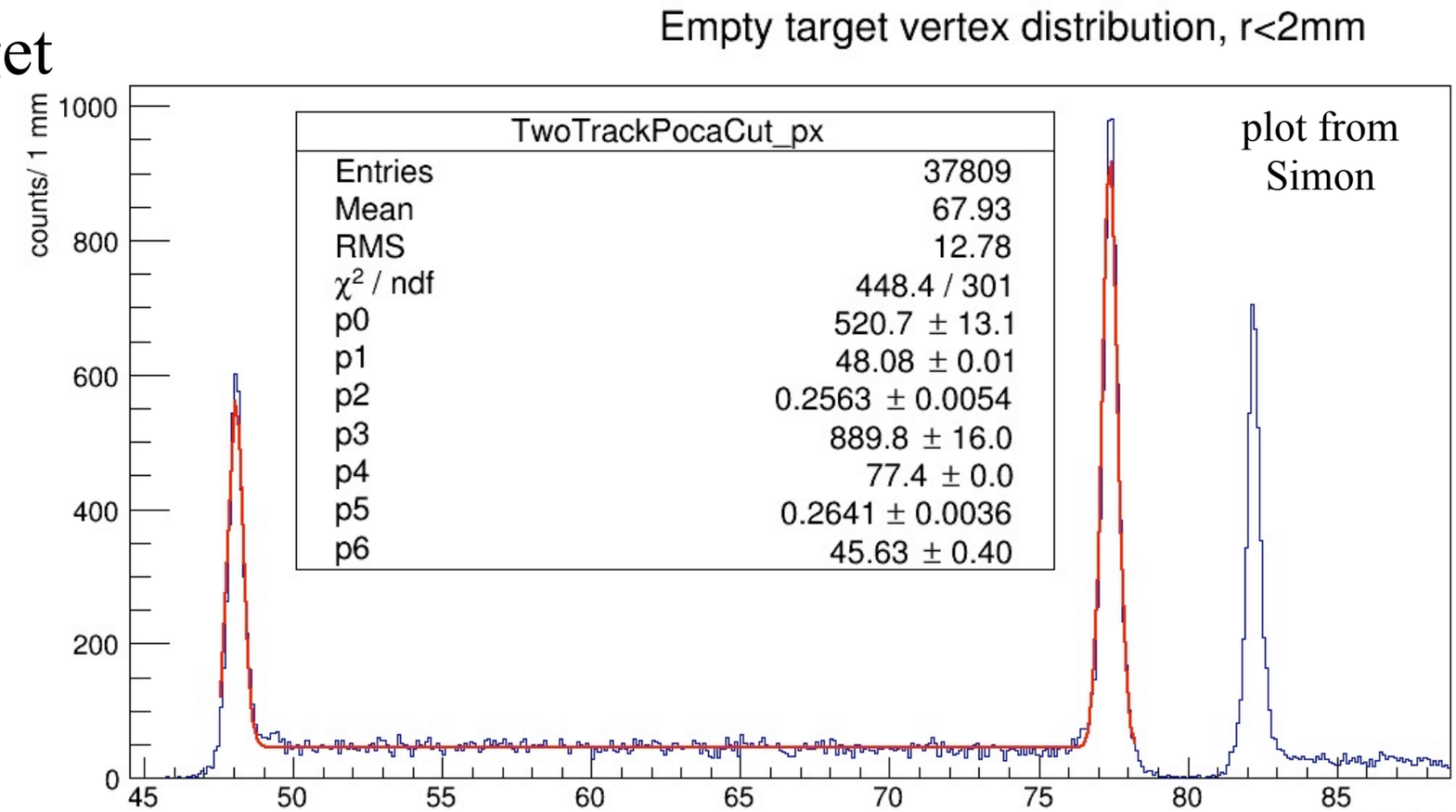

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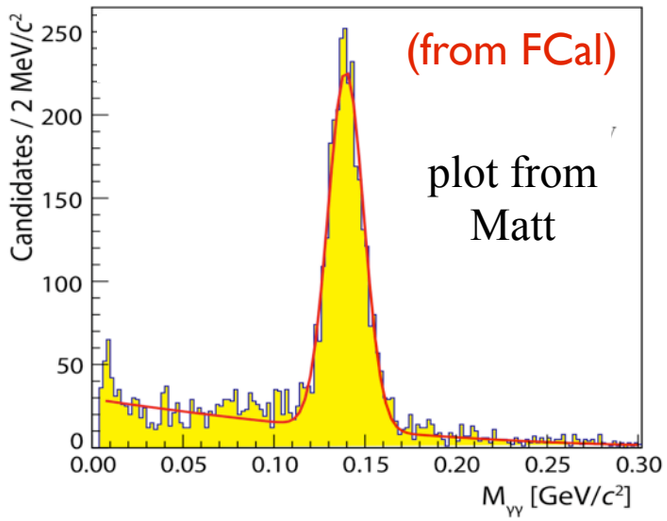

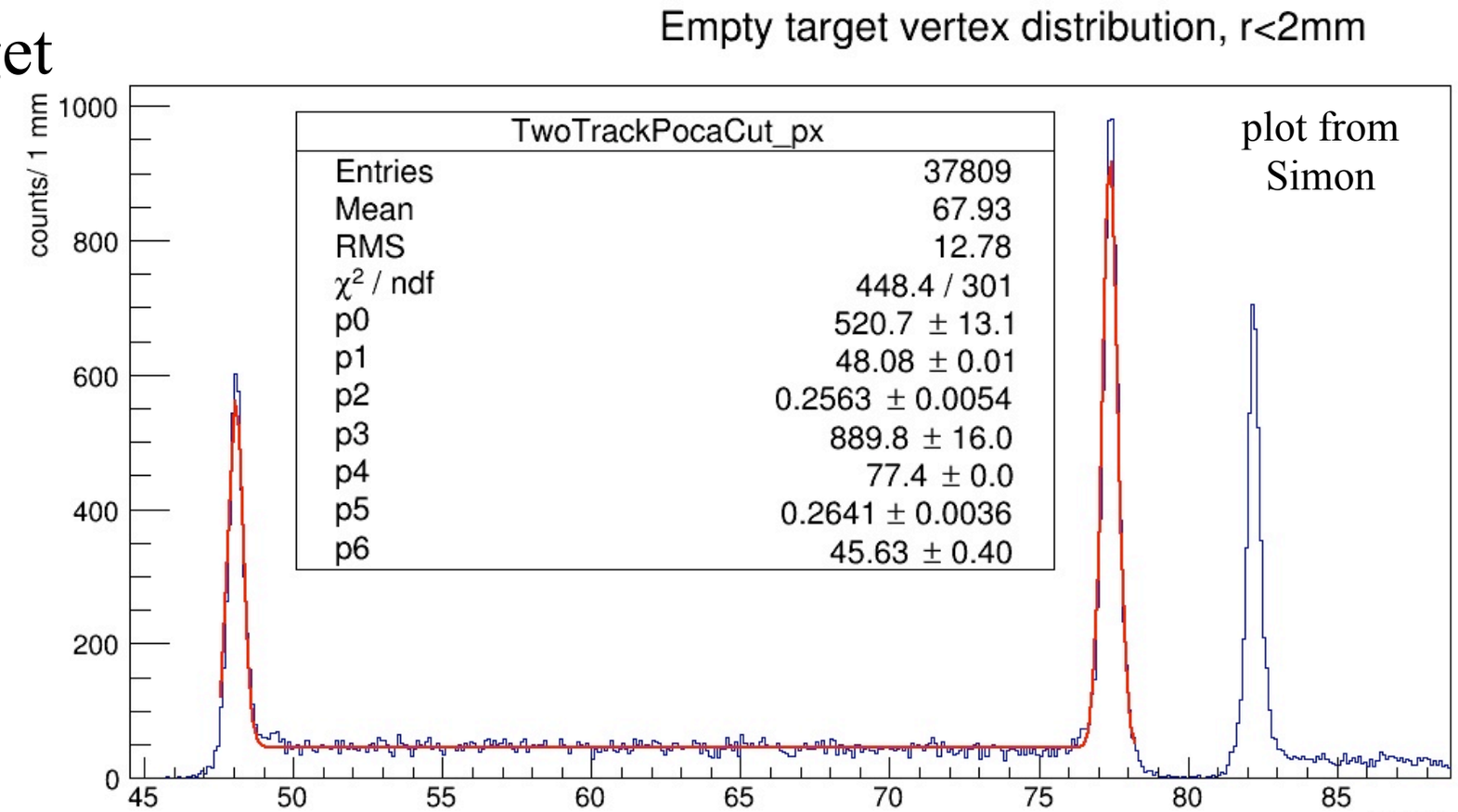

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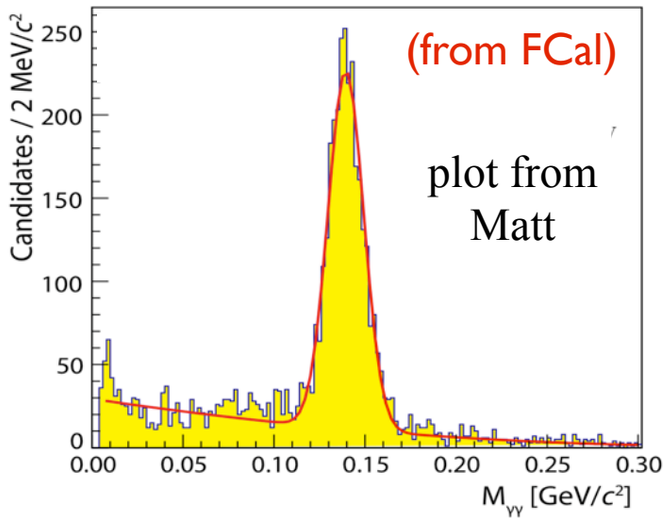

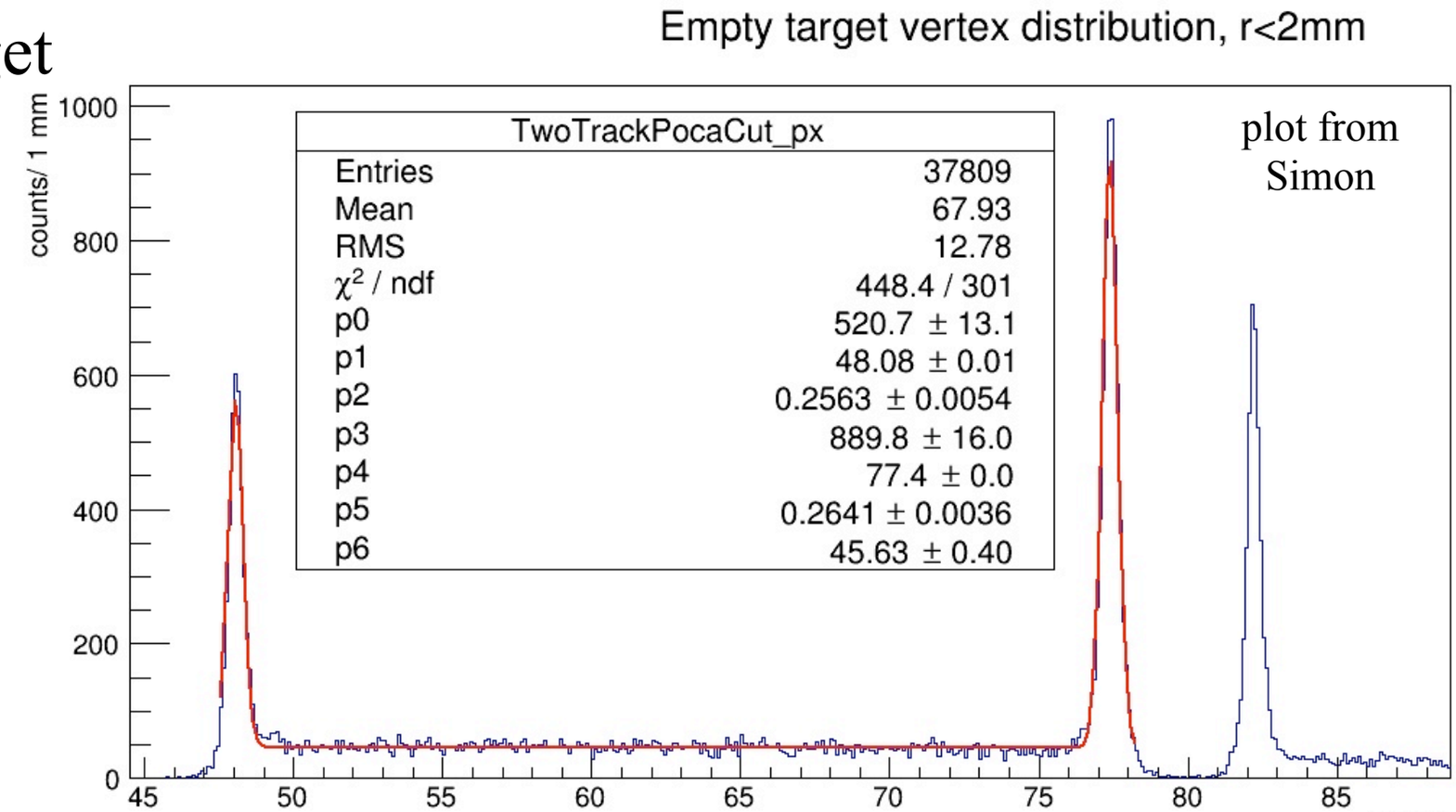

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- (Trans. Rad. Det. commissioning. Not GlueX).

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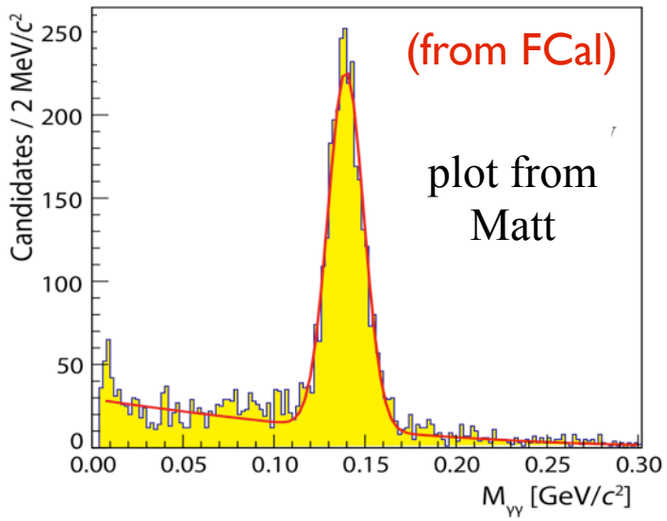

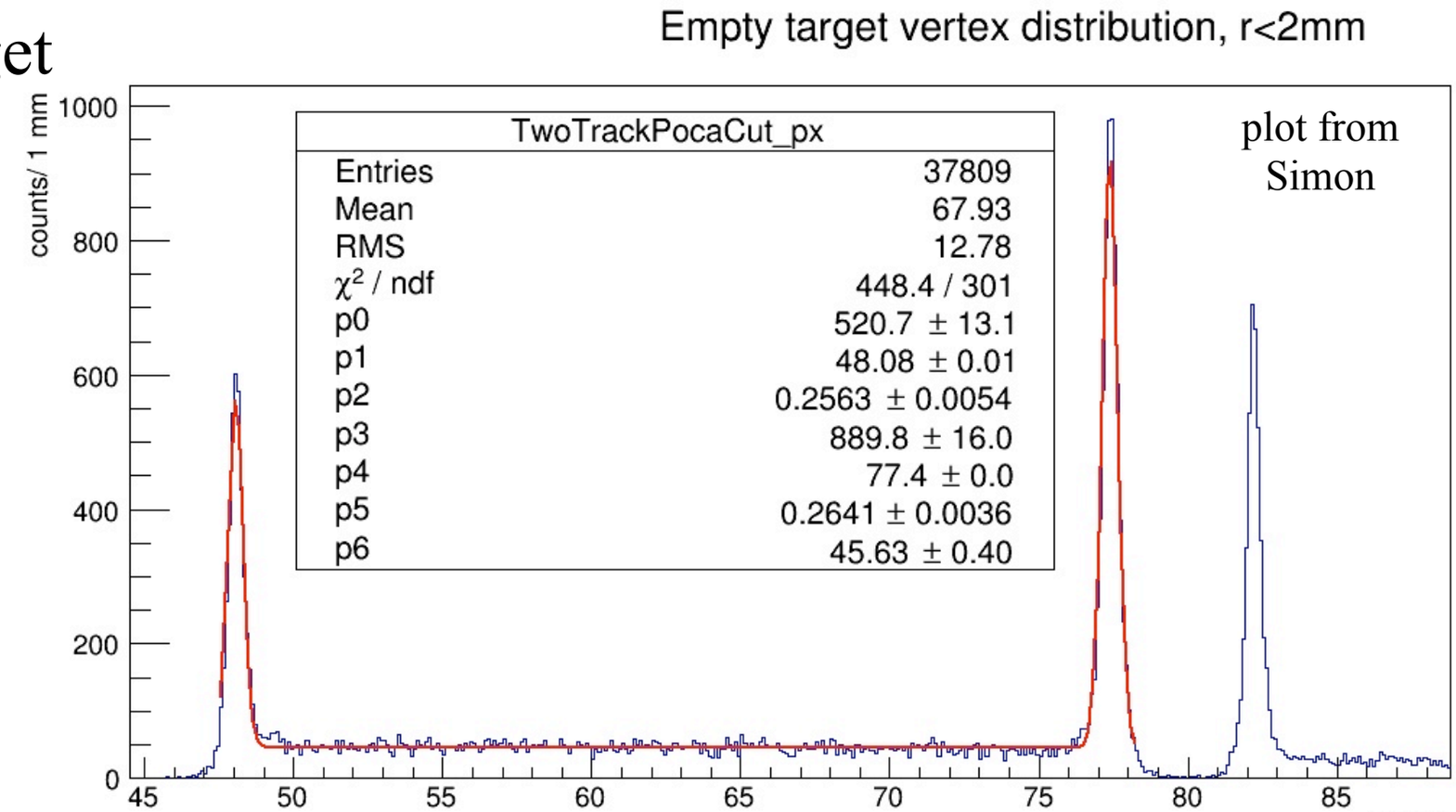

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Mostly ready for production phase

Glitches

A few items on the runplan were not done:

- Systematic TAC studies
- Fast active collimator scan procedure

Still some not understood features:

- Absolute cross-section calibration
- Yield difference between para and perp (and response of the Act. Col. to beam)
- Beam satellite structure on the profiler
- ...

Temperature rise in the Hall due to Air Cond. trip. Slow response.

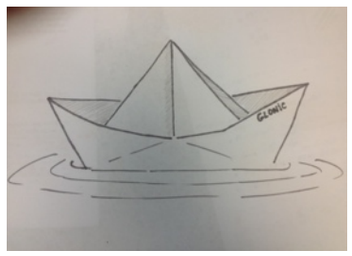
Shift takers training:

- Alarms acknowledged without warning experts.
- Replay checks not consistently done. Worst example: hole in the CDC unnoticed for almost two weeks.

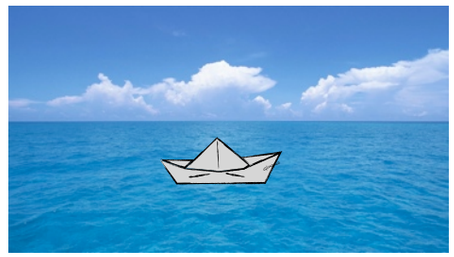
Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

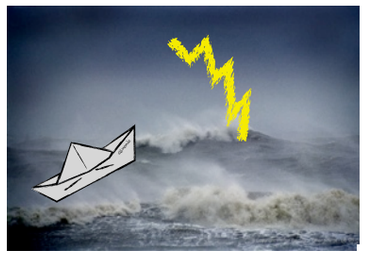
Just as beam became acceptable, CHL damage



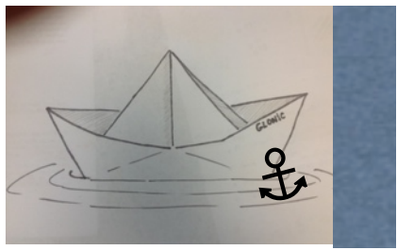
Continue at 5.5 GeV



1 week of smooth sailing



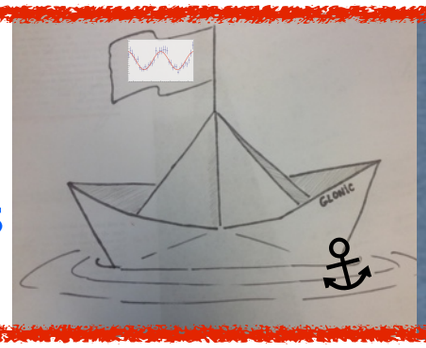
Solenoid quench after 3.5h of pol. data taking

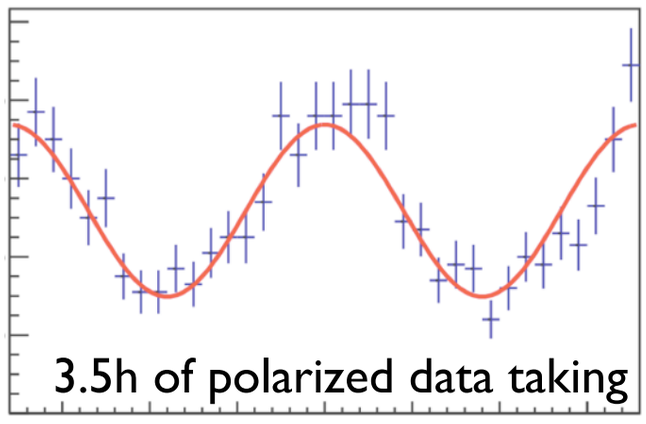


Beam shut down (no extension for Hall D).

$\Rightarrow$

Highlight: first physics asymmetries seen.



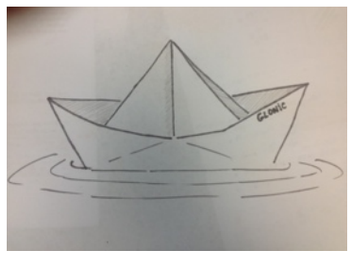


(Only para pol. data)

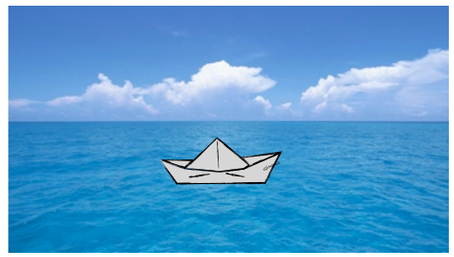
Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

Just as beam became acceptable, CHL damage



Continue at 5.5 GeV



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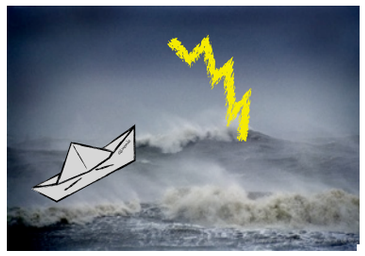
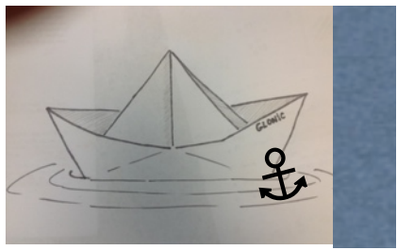


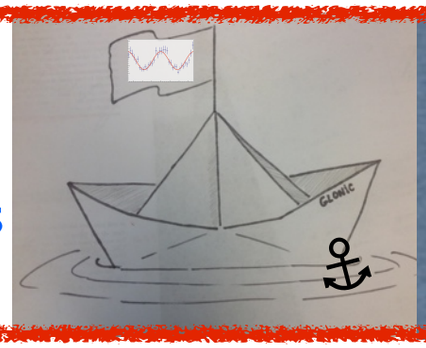
Solenoid quench after 3.5h of pol. data taking

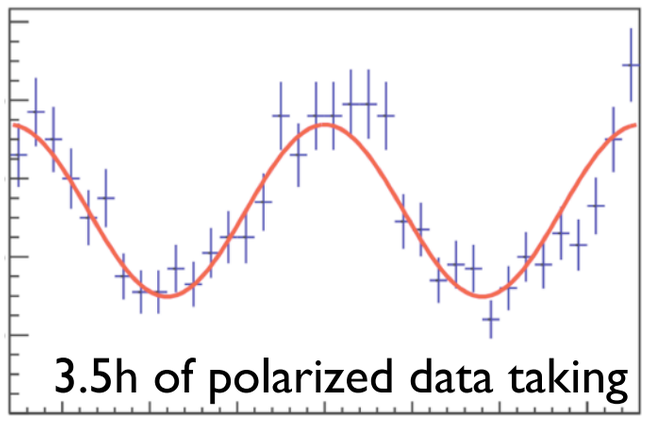


Beam shut down (no extension for Hall D).

⇒

Highlight: first physics asymmetries seen.





Spring 16 start of run

Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

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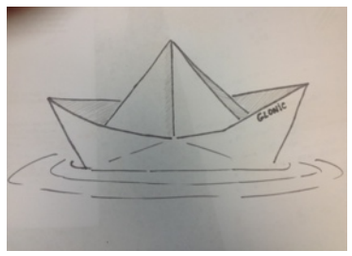
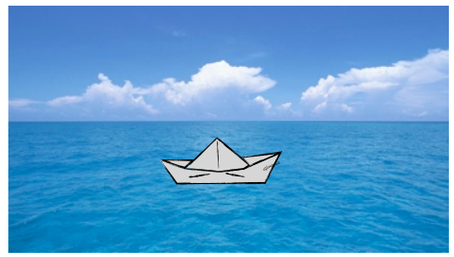


Continue at 5.5 GeV



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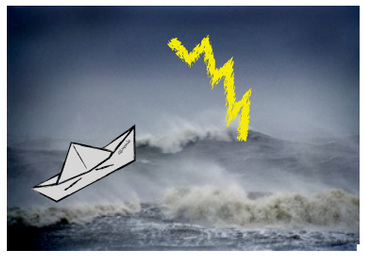
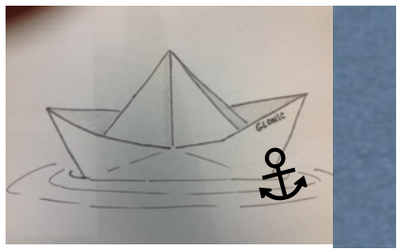


Solenoid quench after 3.5h of pol. data taking



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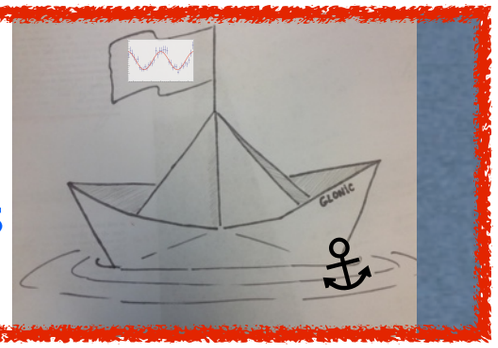

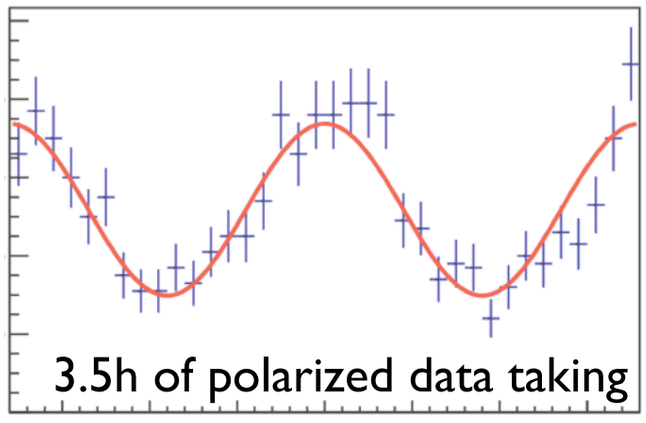

Spring 16 start of run

Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

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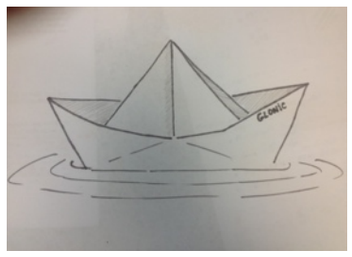
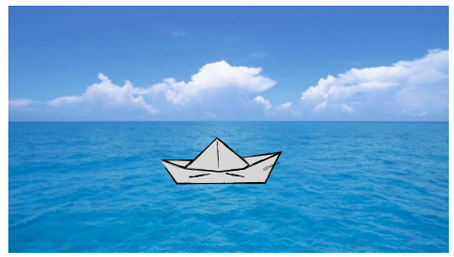


Continue at 5.5 GeV



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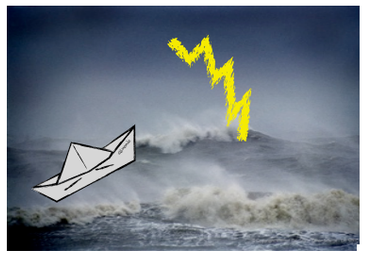
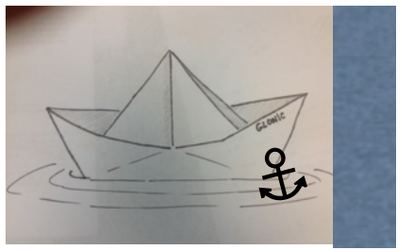


Solenoid quench after 3.5h of pol. data taking



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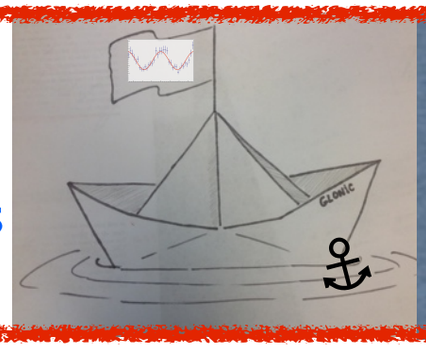
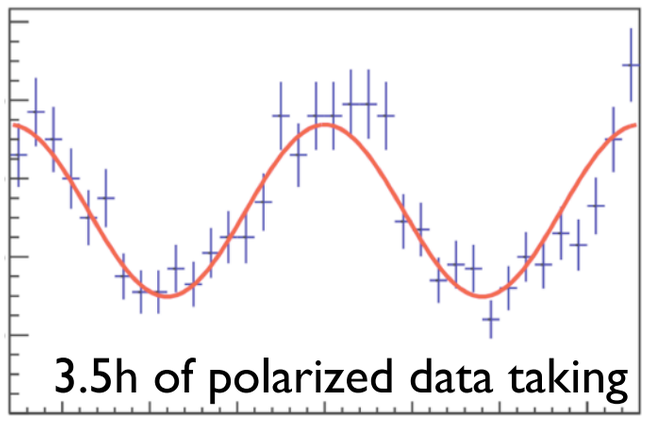
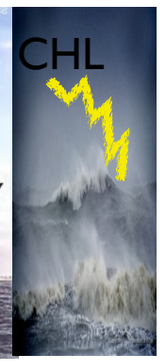




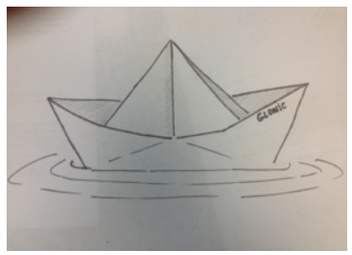


Spring 16 start of run

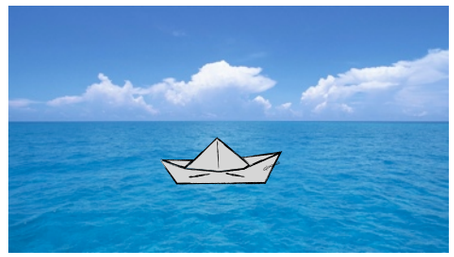
Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

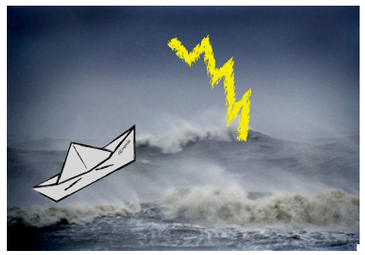
Just as beam became acceptable, CHL damage



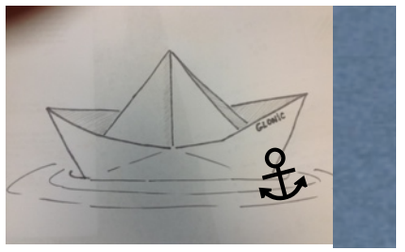
Continue at 5.5 GeV



1 week of smooth sailing



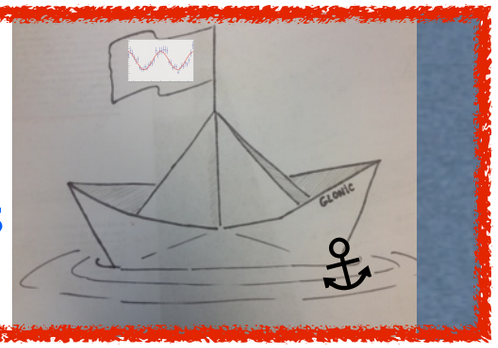
Solenoid quench after 3.5h of pol. data taking

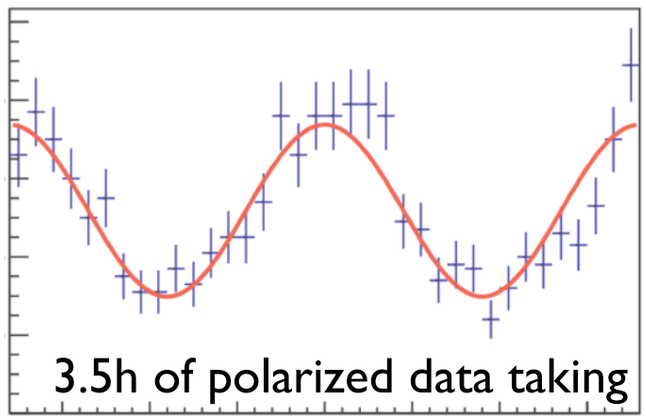


Beam shut down (no extension for Hall D).

⇒

Highlight: first physics asymmetries seen.





Spring 16 start of run

Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

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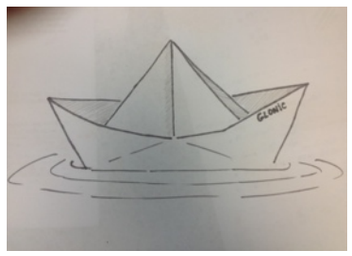
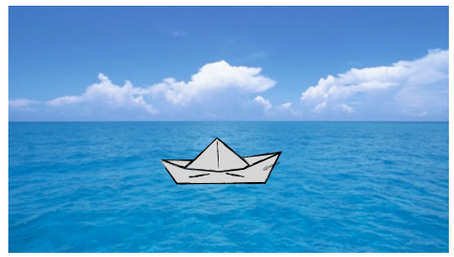


Continue at 5.5 GeV



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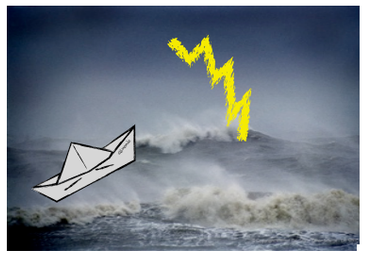
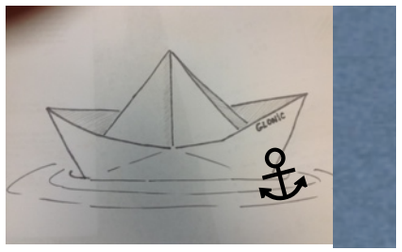


Solenoid quench after 3.5h of pol. data taking



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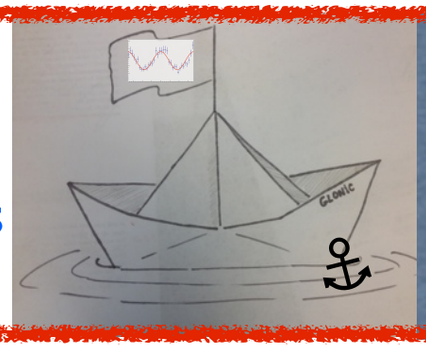
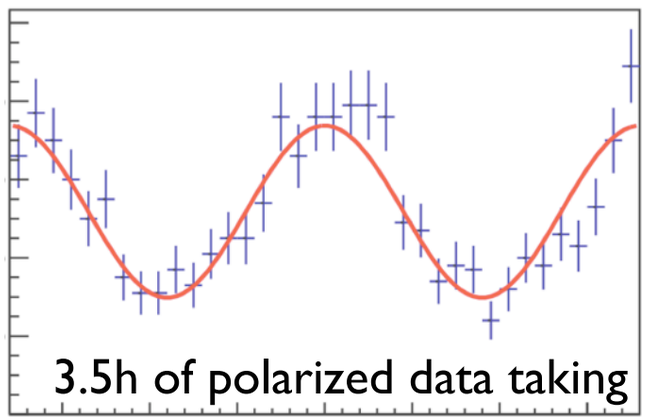




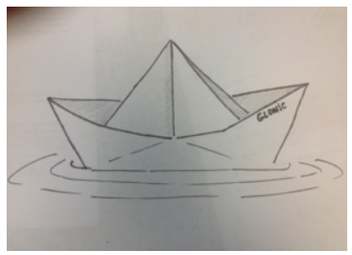
Spring 16 start of run

End of run

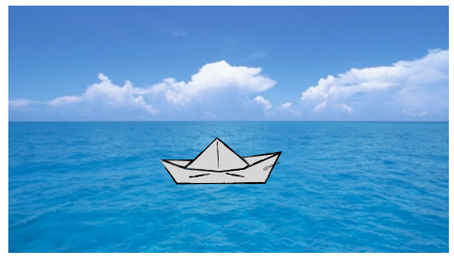
Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

Just as beam became acceptable, CHL damage



Continue at 5.5 GeV



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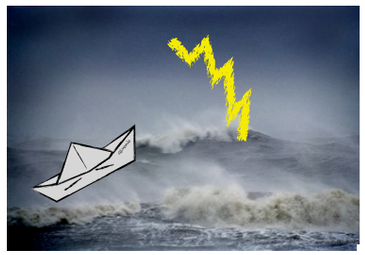

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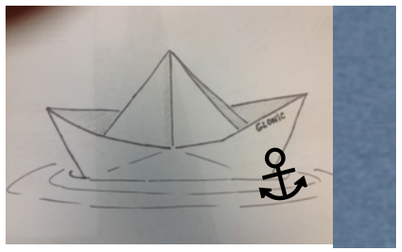

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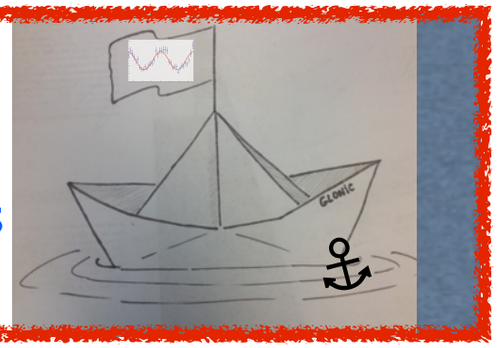
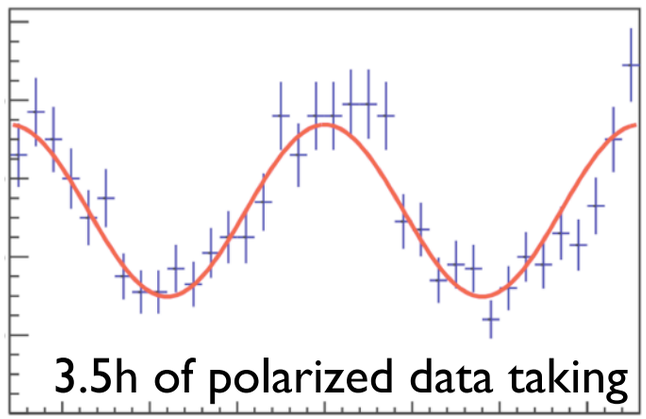
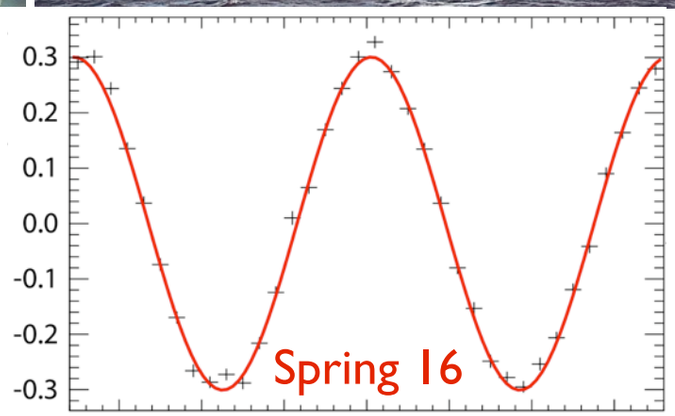




Spring 16 start of run

End of run

⇒



Jefferson Lab
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Exploring the Nature of Matter

A. Deur. GlueX collaboration meeting. 05/09/2016

Comparison with Spring 15 (our most successful run until Spring 16)

Spring 15 start of run

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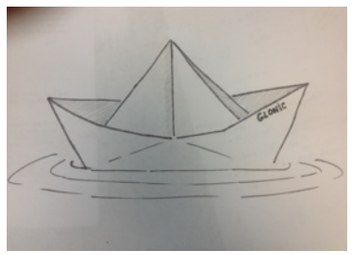
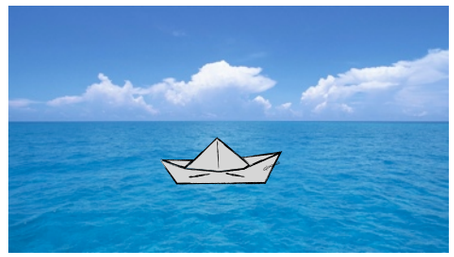
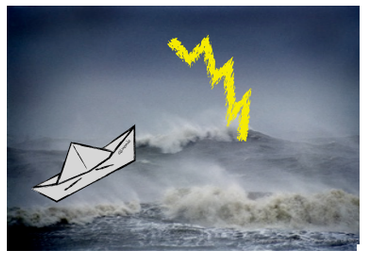


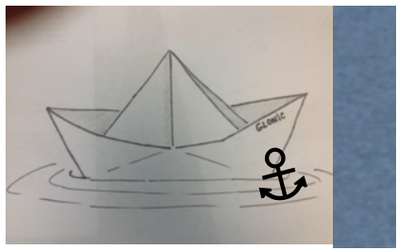
Continue at 5.5 GeV



1 week of smooth sailing



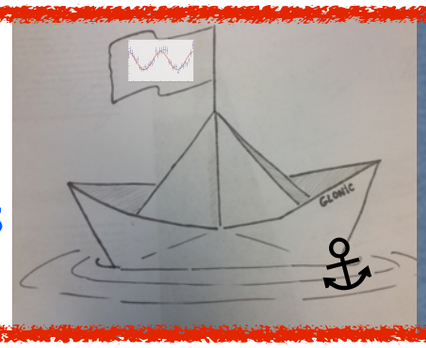
Solenoid quench after 3.5h of pol. data taking

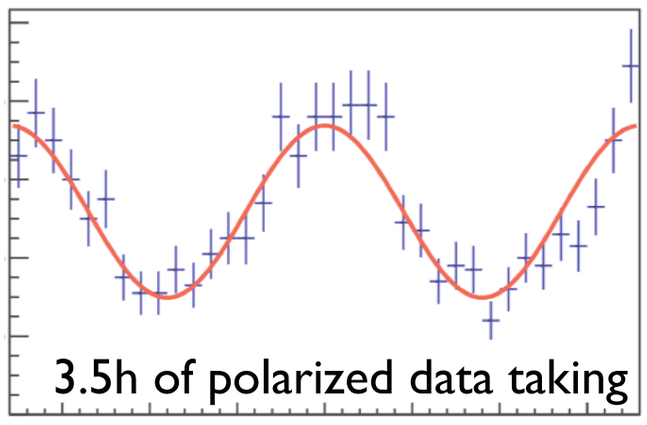


Beam shut down (no extension for Hall D).

⇒

Highlight: first physics asymmetries seen.

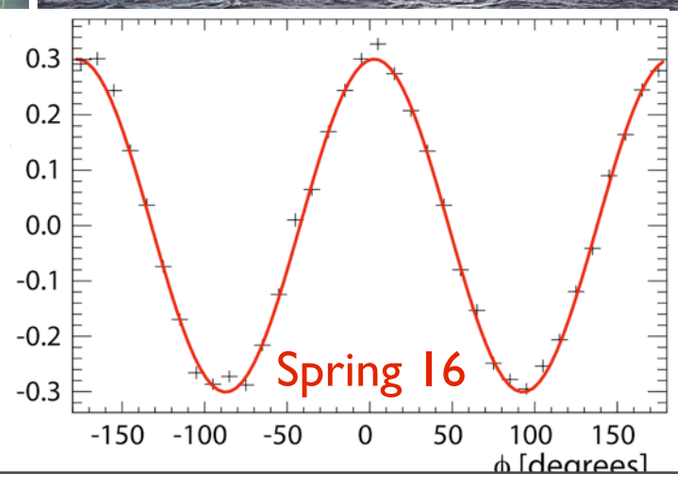


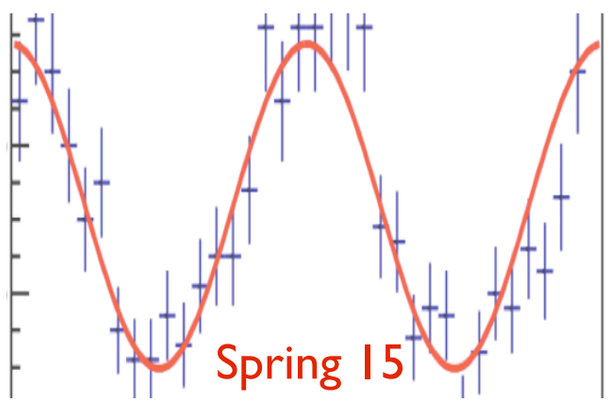


Spring 16 start of ru

End of run

⇒





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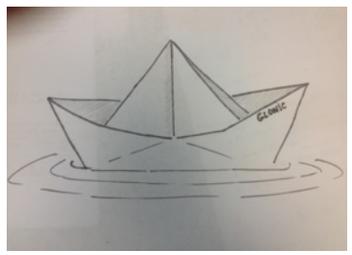
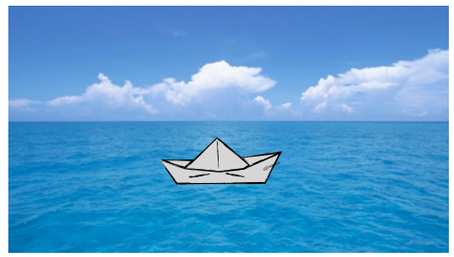


Continue at 5.5 GeV



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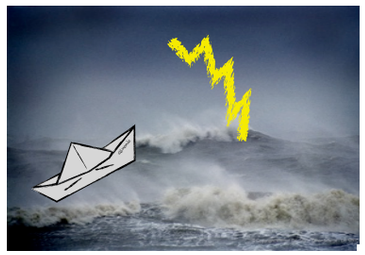
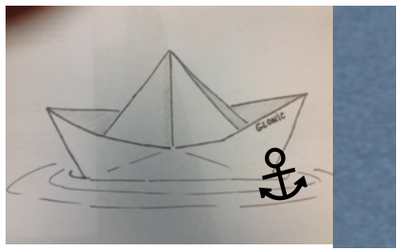


Solenoid quench after 3.5h of pol. data taking



Beam shut down (no extension for Hall D).

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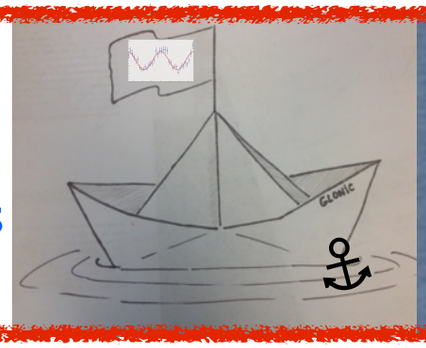
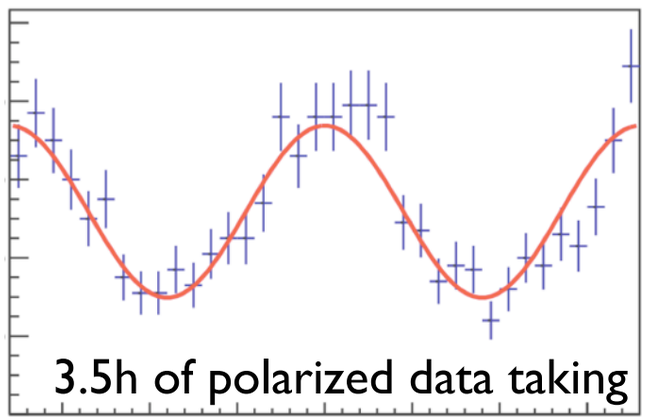
Highlight: first physics asymmetries seen.





Spring 16 start of run

End of run

Ready for exploration of hybrid territory

⇒

Jefferson Lab
Thomas Jefferson National Accelerator Facility
Exploring the Nature of Matter

A. Deur. GlueX collaboration meeting. 05/09/2016