Status of the Analysis

Sasha, August 21 2020

Finish with the calibration of PS timing
https://halldweb.jlab.org/primexd/data_quality_2019.quality_check_2019.pdf

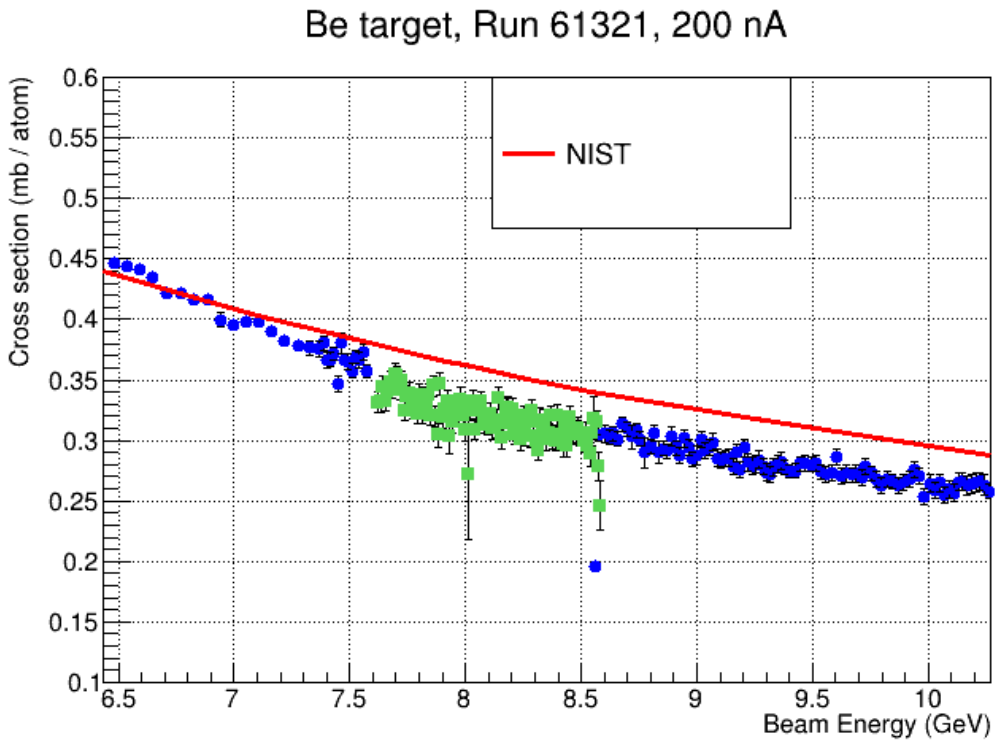
Adding monitoring plots, process data (monitoring) during next week

FCAL masks are not implemented for all runs (need to contact with Chandra)

Reprocess lumi for several runs (numbers are in the sqlite file, new TAGM reconstruction), still checking

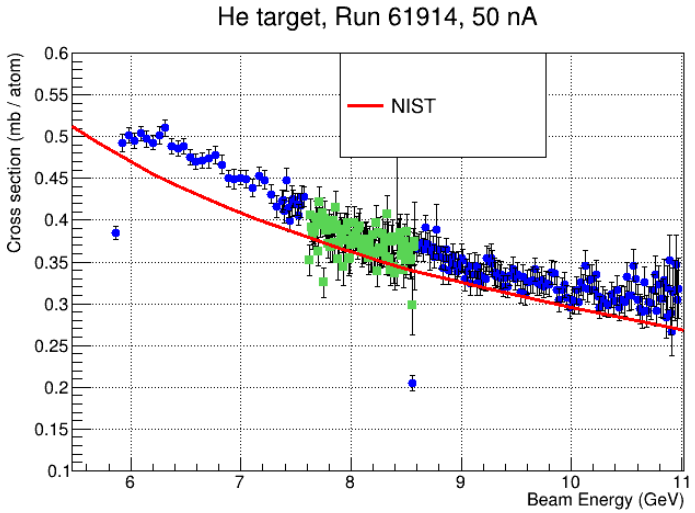
- study systematics related to accidental subtraction

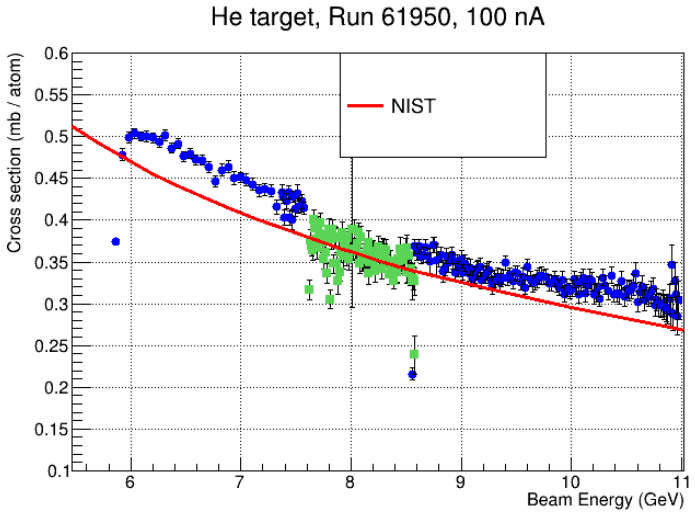
Status of the Analysis

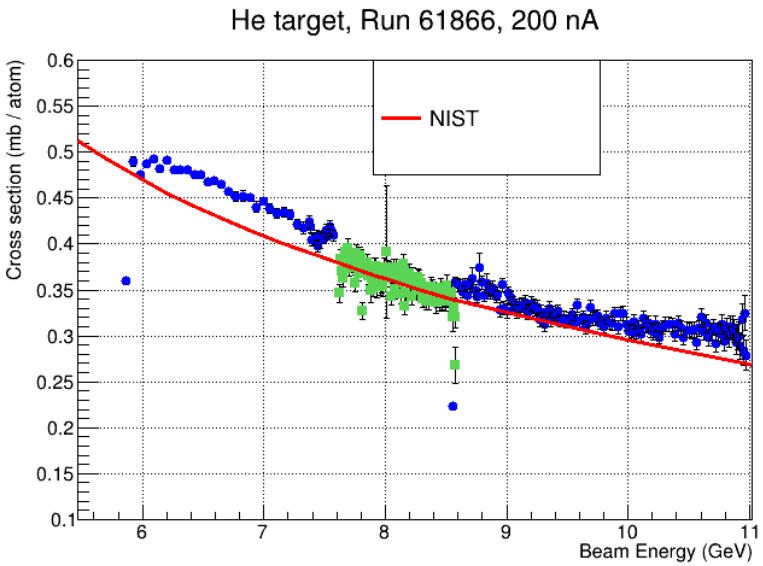


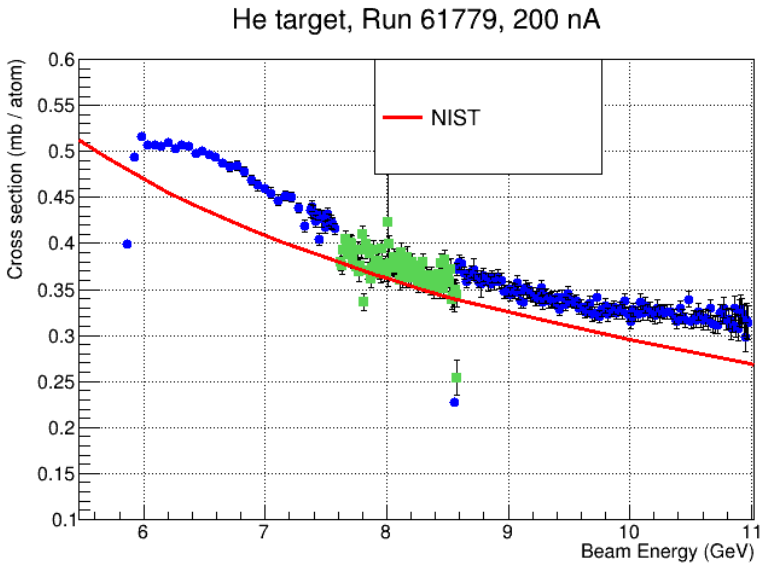
Relatively smooth transition between TAGH and TAGM

Status of the Analysis









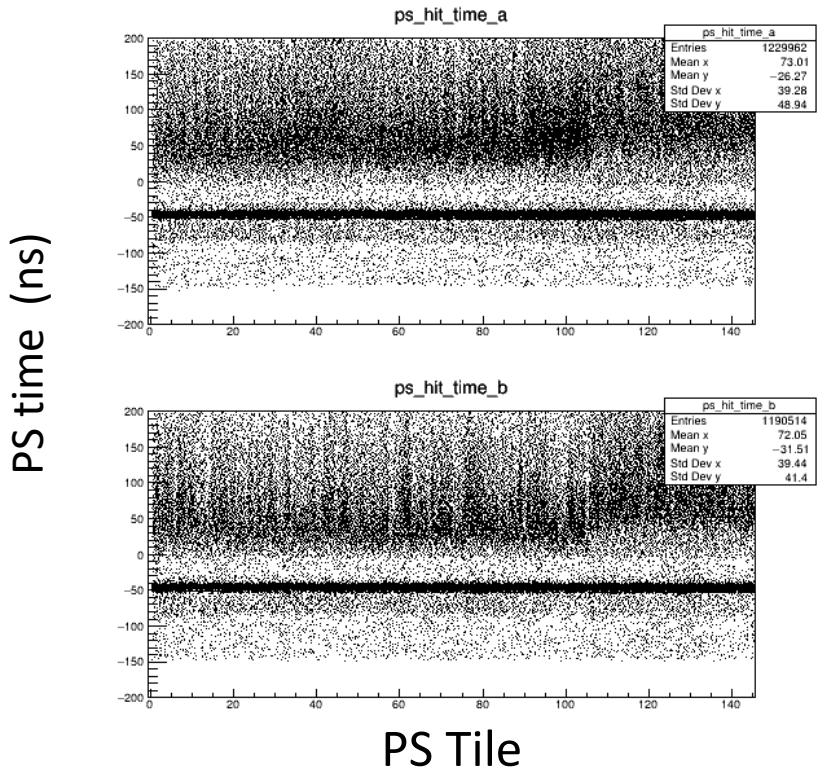
Backup Slides

Status of the Analysis

Sasha, August 7 2020

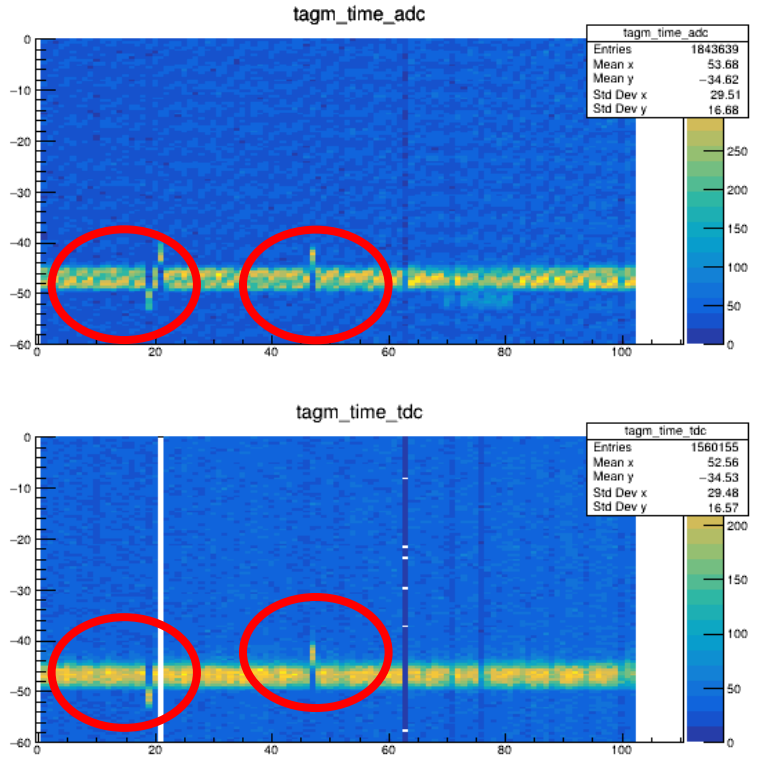
- Finished with the PS time calibration for almost all PrimEx production runs
  https://halldweb.jlab.org/primexd/data_quality_2019/quality_check_2019.pdf
- TAGM calibration can be improved for some runs
- Re-processed lumi for some runs (new TAGM reconstruction)

Run 61718



Arm A

Arm B



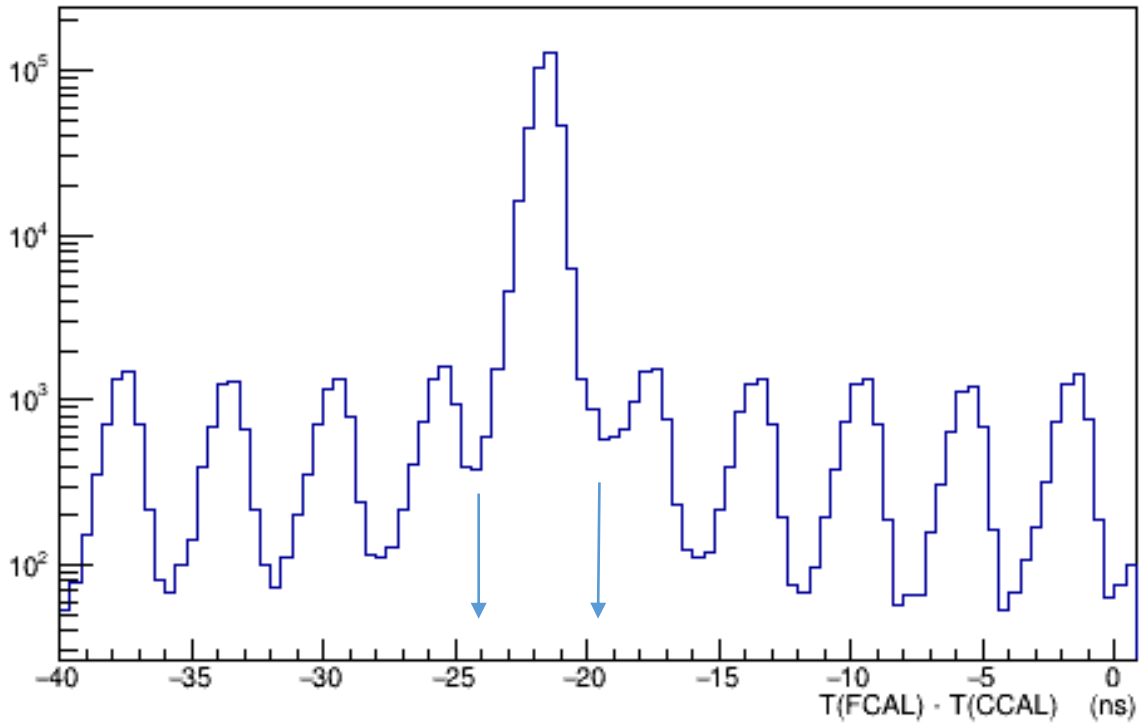
FCAL and CCAL Timing in MC

- Account for pile-up events in efficiency calculations

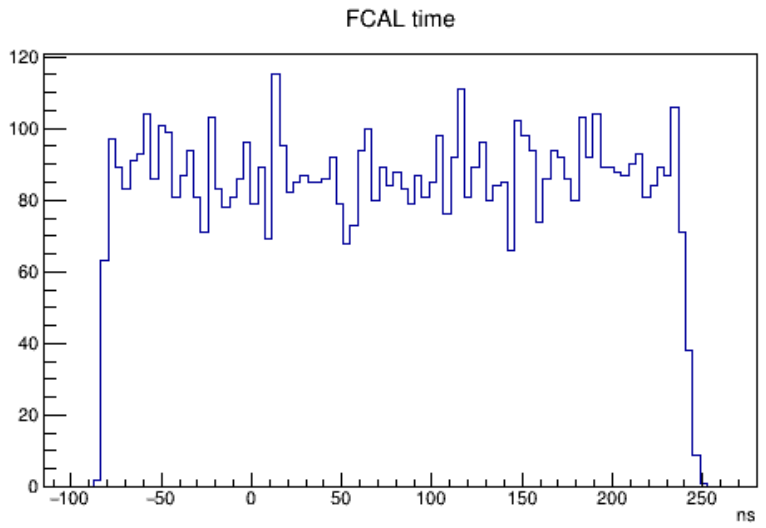
  - superimpose MC with random trigger events

T(FCAL) – T(CCAL)

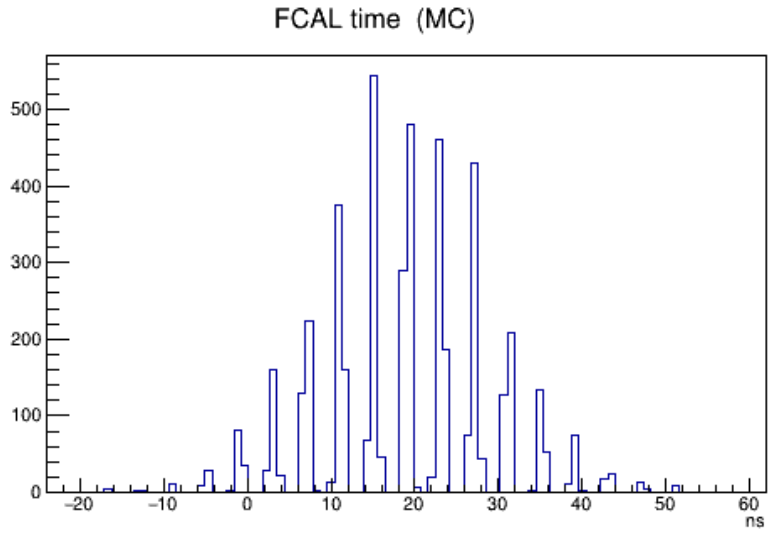
Run 61327



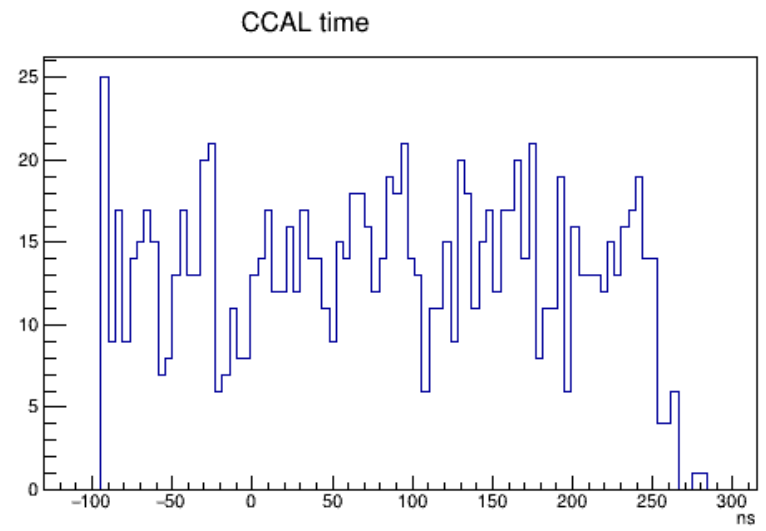
FCAL and CCAL Timing in MC

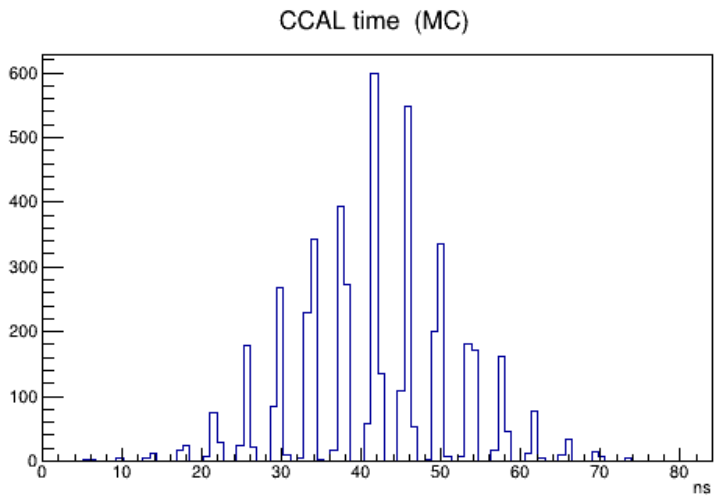


Random Trigger



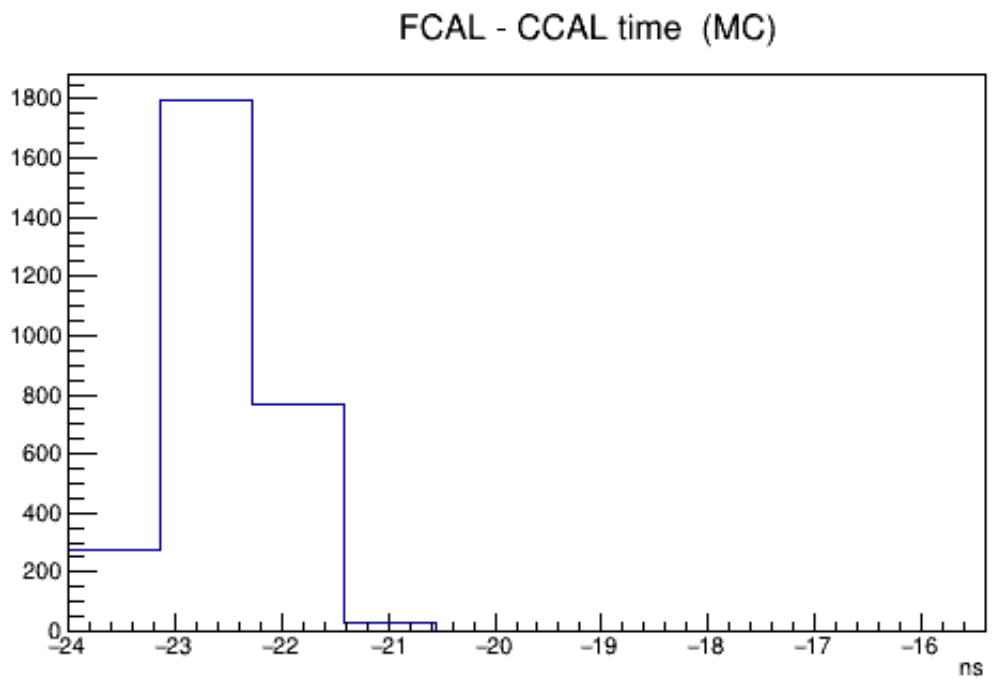
MC



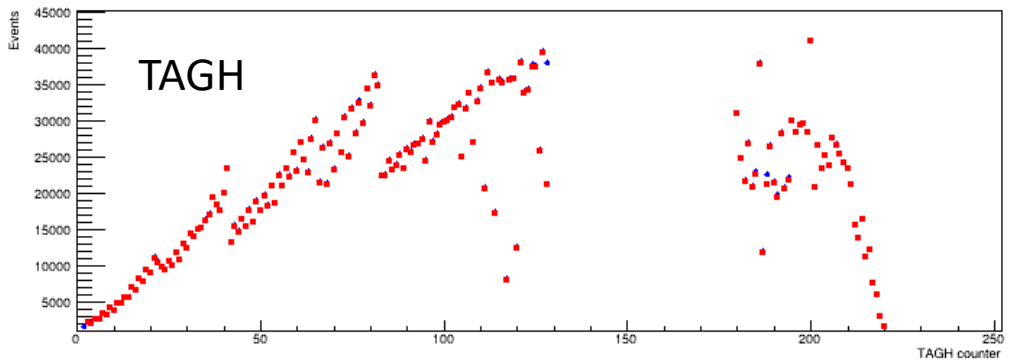


Need to understand if the pile up is simulated properly

FCAL and CCAL Timing in MC



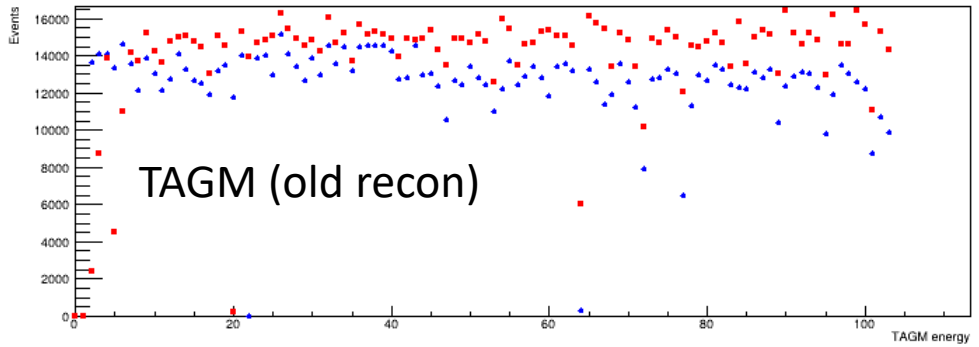
Status of the Analysis

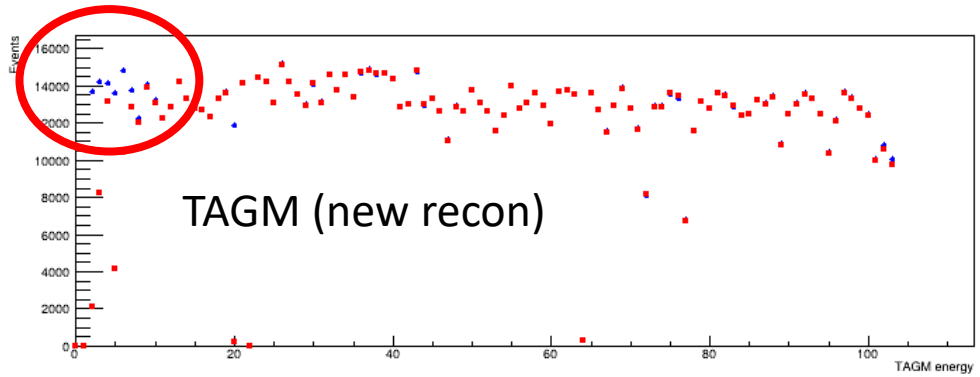


PS tagged flux extracted using two methods:

Read points: Beam photon

Blue points: FADC time (require ADC and TDC hits)





New reconstruction of the TAGM: (1) Require both ADC and TDC hits, remove amplitude thresholds

Status of the Analysis

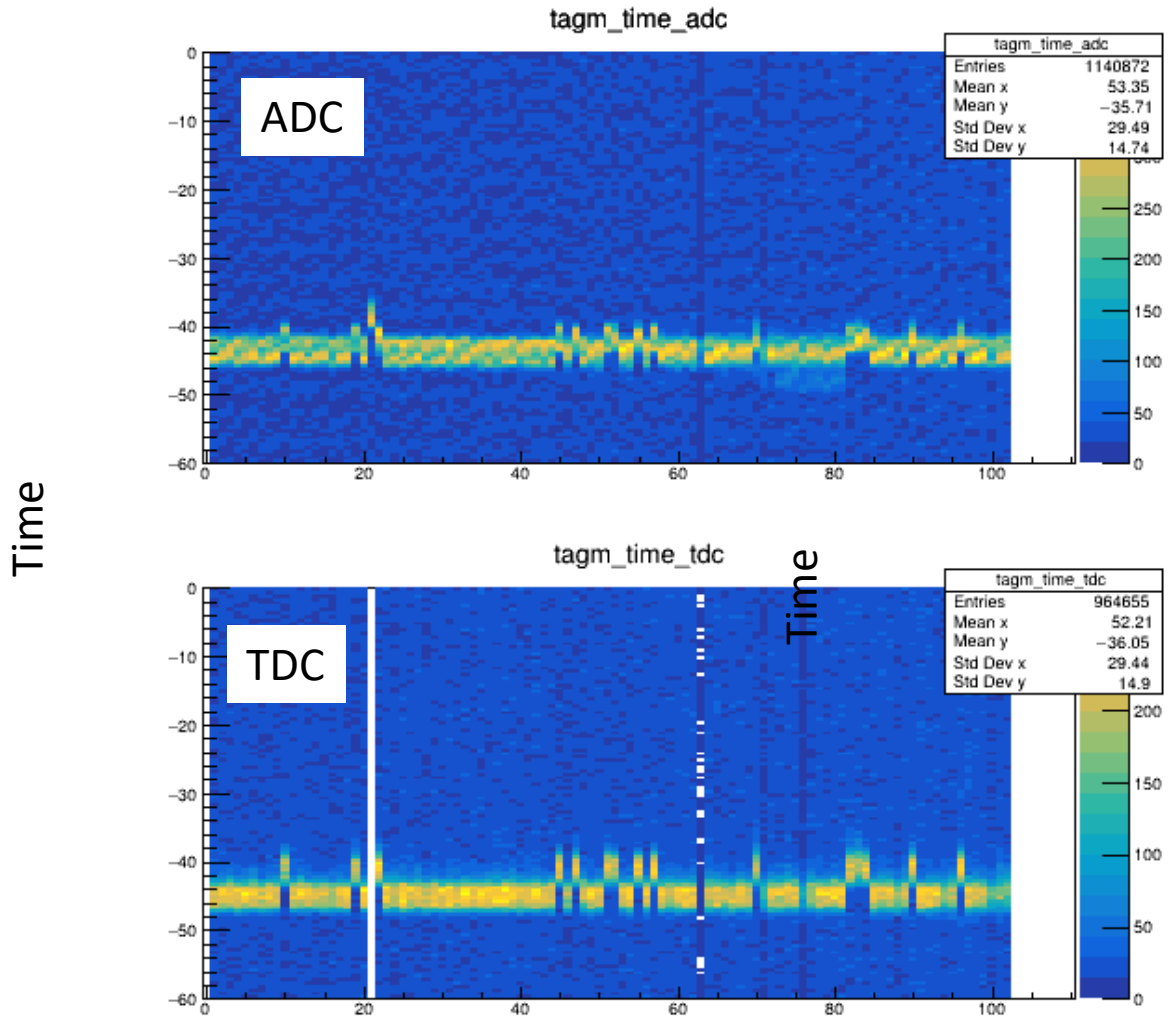
Updates in the reconstruction libs (will submit pull request shortly):

- write CCAL hits to the hddm for skims with random trigger

- FCAL masks in the MC

Backup Slides

Data Quality Check (TAGM timing)



Run 61955 (He)

Not well calibrated

TDC time is used in the DbeamPhoton

Possible mismatch with RF

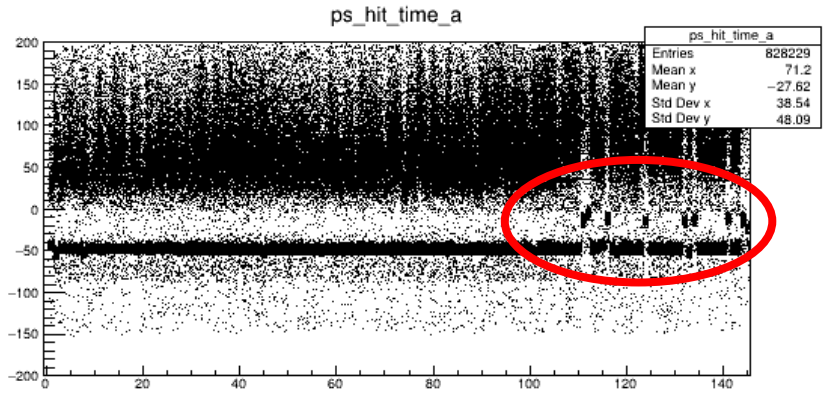
PS Timing Calibration

Run 61914 (He)

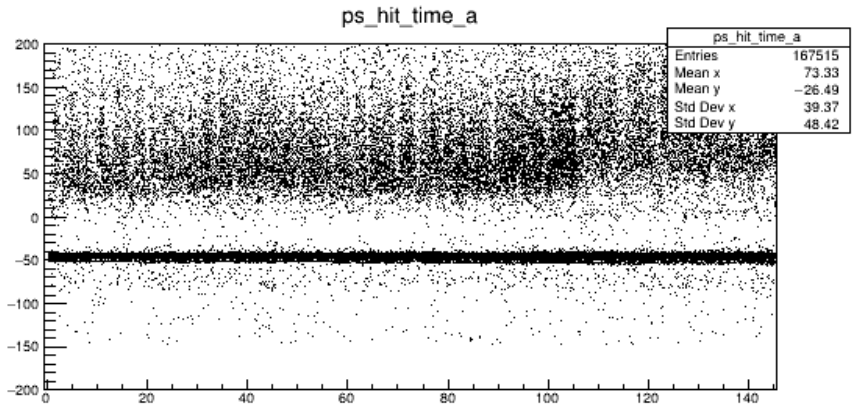
Before Calibration (Calibration updated in May)

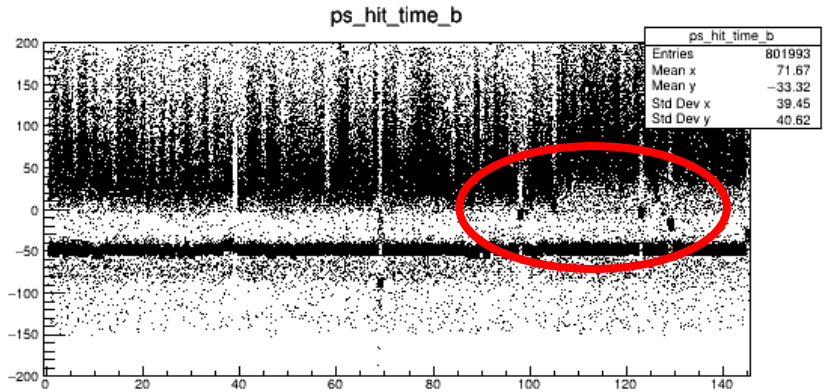
After Calibration (New)

PS time (ns)

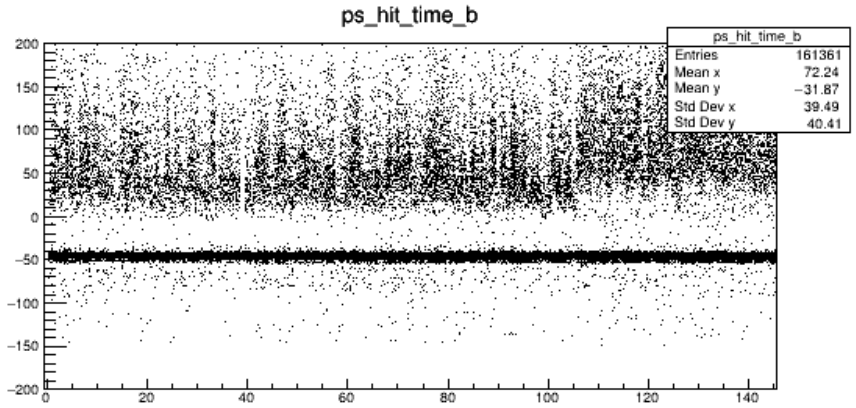


Arm A





Arm B



PS Tile

PS Tile

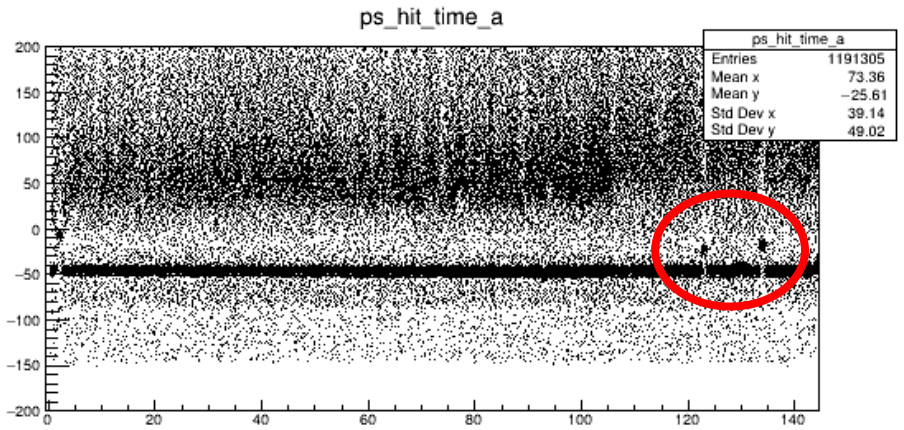
PS Timing Calibration

Run 61321 (Be)

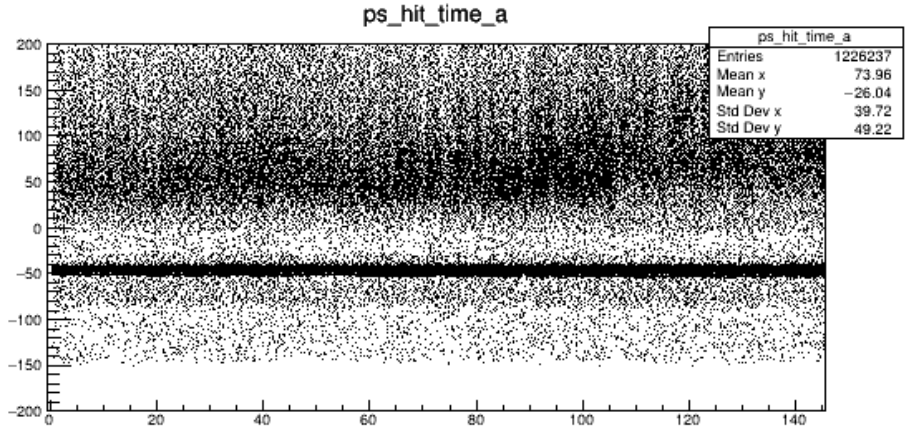
Before Calibration (Calibration updated in May)

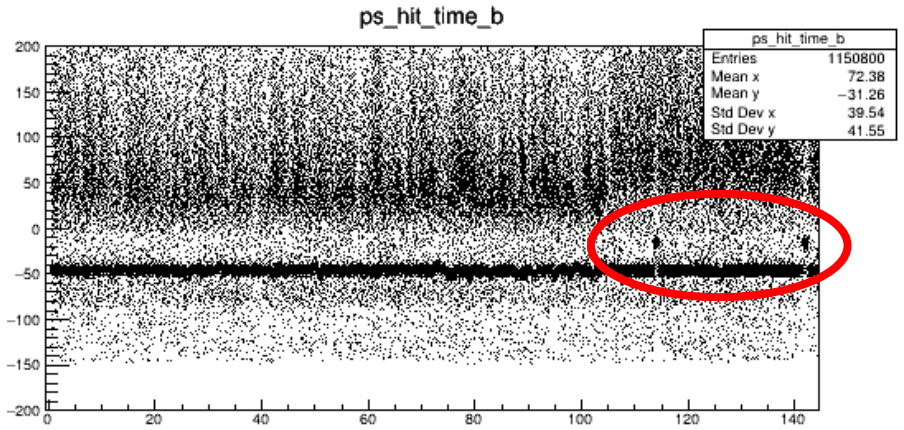
After Calibration (New)

PS time (ns)

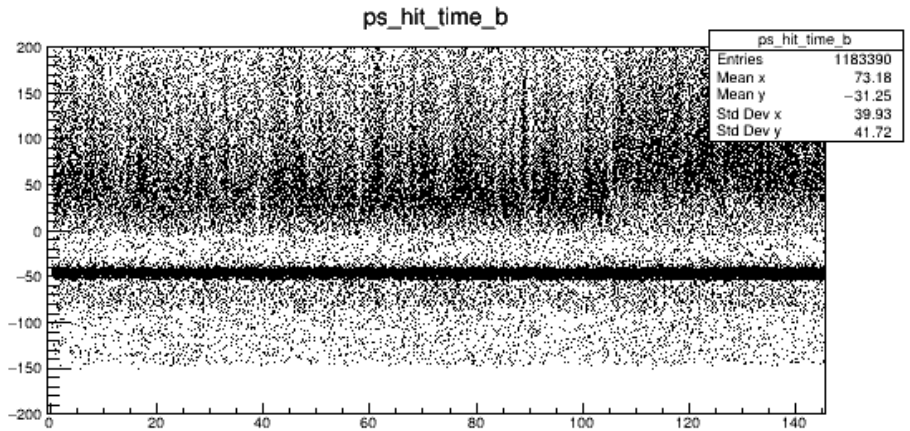


Arm A





Arm B



PS Tile

PS Tile

Calibrated about 100 runs (updating CCDB constants)

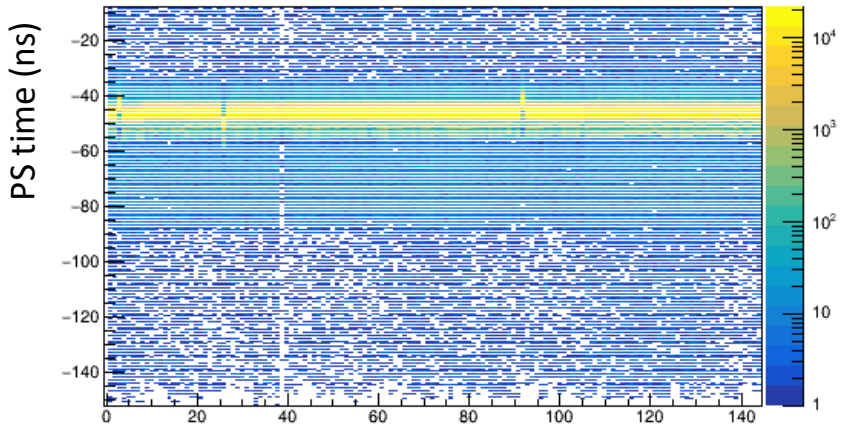
Backup Slides

Data Quality Check

Sasha, July 10, 2020

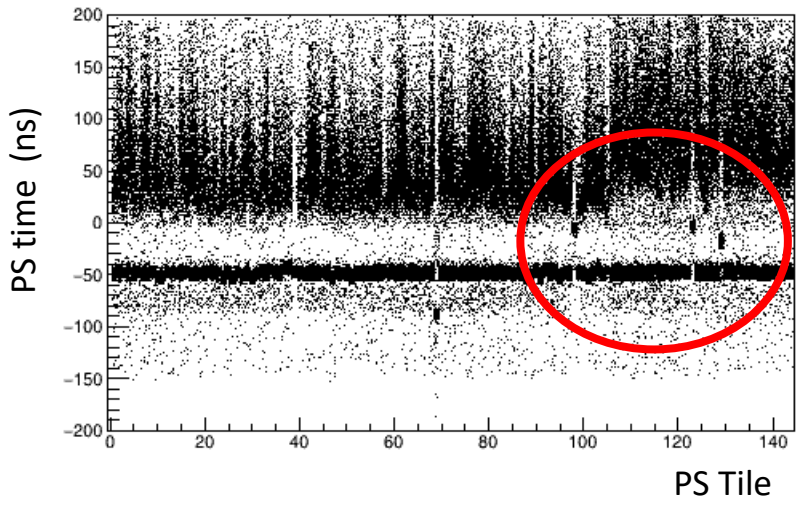
The photon flux decreased by about 10 % during lumi check/tuning in May
- issues with the detector calibration

Arm B

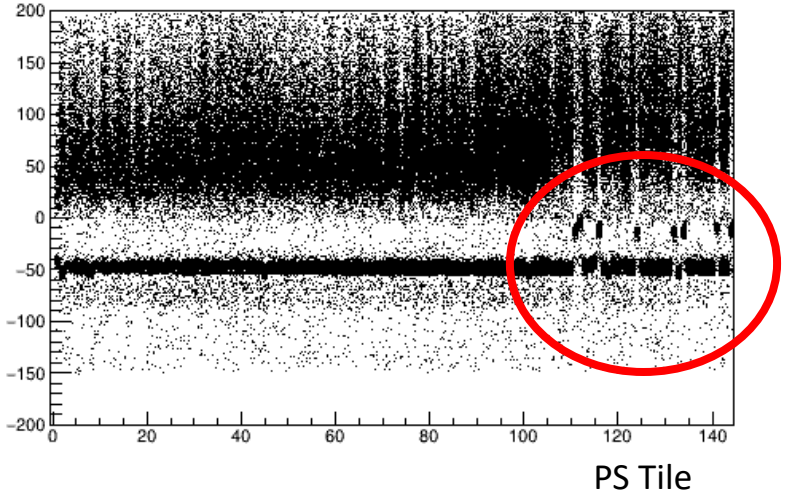


Run 61914

Arm B



Arm A



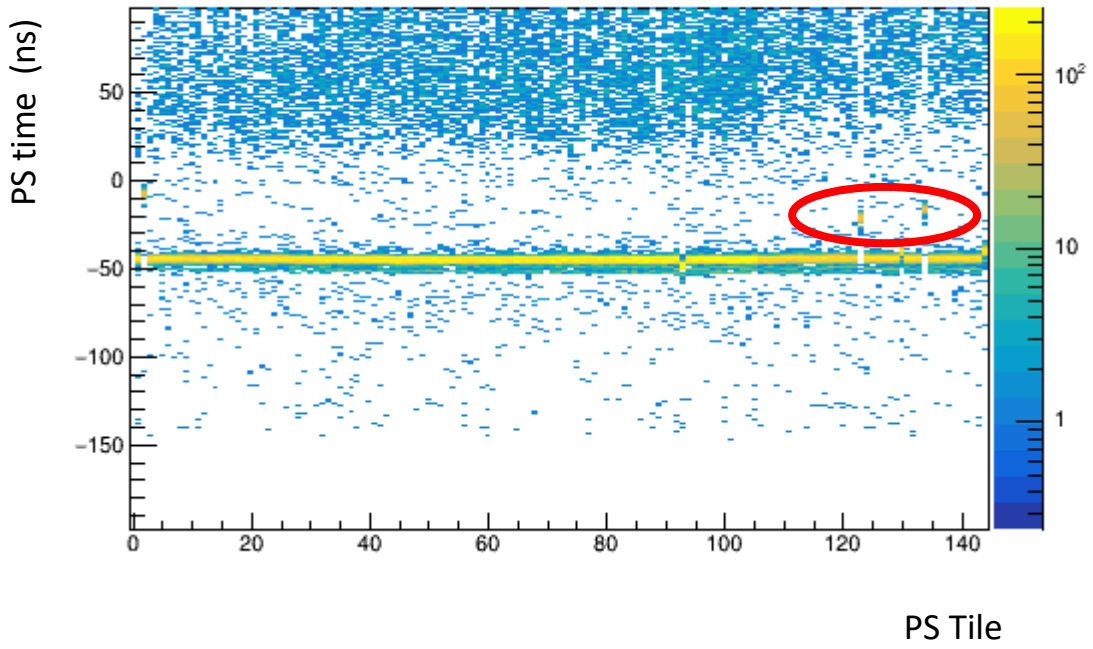
Data Quality Check

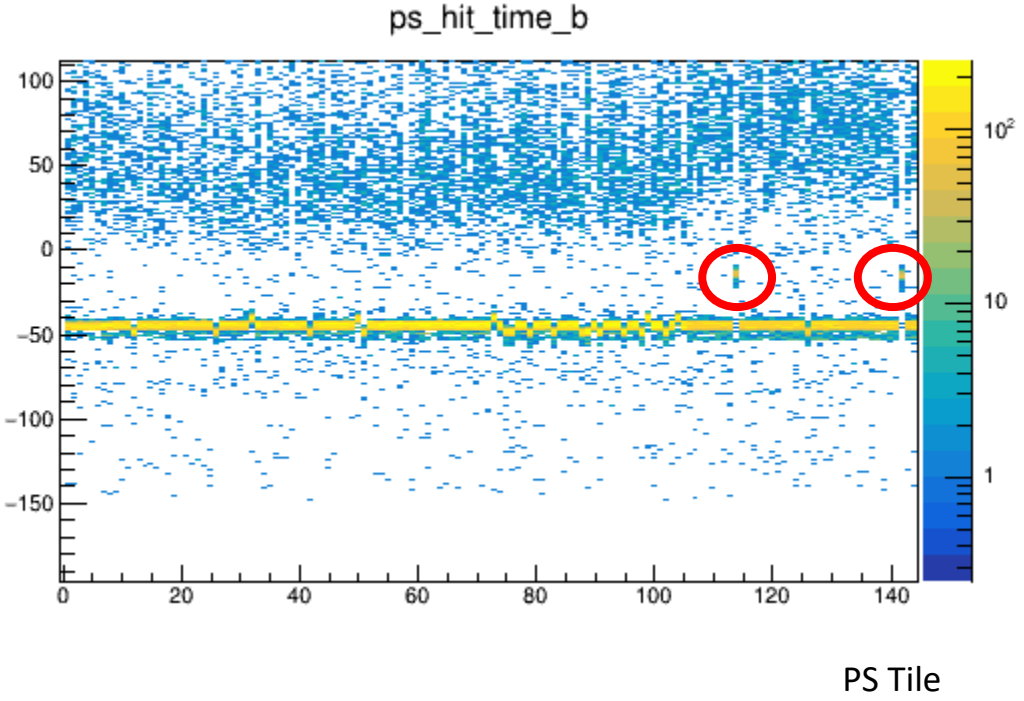
- Timing calibration have been changed several times during this year
- Changes resulting to the significant yield drop (5/13/2020)

289942	2020-05-26 14-01-32	2020-05-26 14-01-32	default	71350L-71350L
285343	2020-05-13 19-48-20	2020-05-13 19-48-20	default	61909L-69999L
285342	2020-05-13 19-48-19	2020-05-13 19-48-19	default	61908L-61908L
285341	2020-05-13 19-48-18	2020-05-13 19-48-18	default	61906L-61907L
285340	2020-05-13 19-48-17	2020-05-13 19-48-17	default	61905L-61905L
285339	2020-05-13 19-48-16	2020-05-13 19-48-16	default	61894L-61904L
285338	2020-05-13 19-48-15	2020-05-13 19-48-15	default	61893L-61893L
285337	2020-05-13 19-48-15	2020-05-13 19-48-15	default	61892L-61892L
285336	2020-05-13 19-48-14	2020-05-13 19-48-14	default	61891L-61891L
285335	2020-05-13 19-48-14	2020-05-13 19-48-14	default	61890L-61890L

PS Timing Calibration (Be Runs)

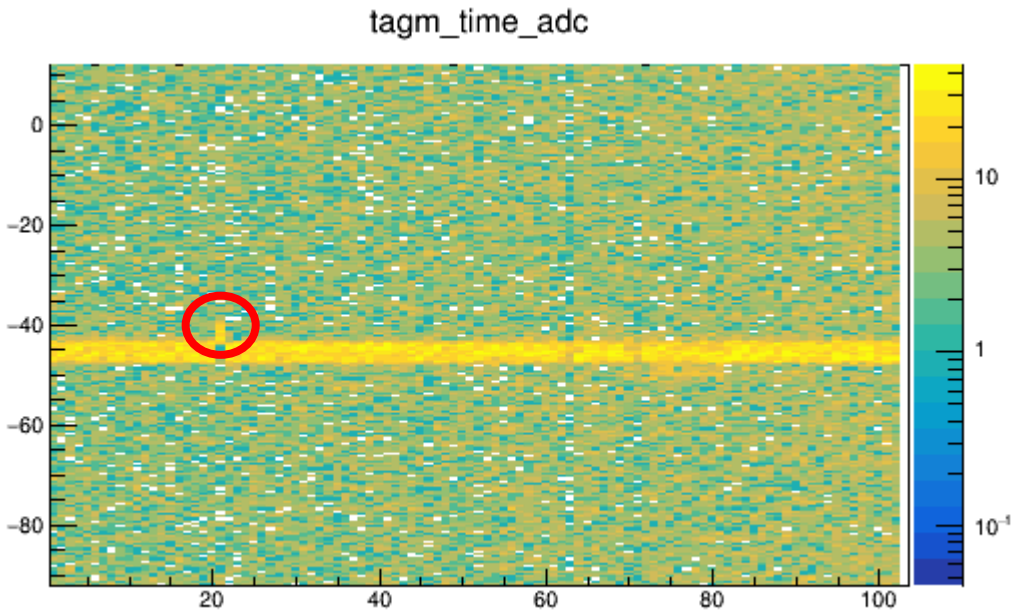
Run 61322

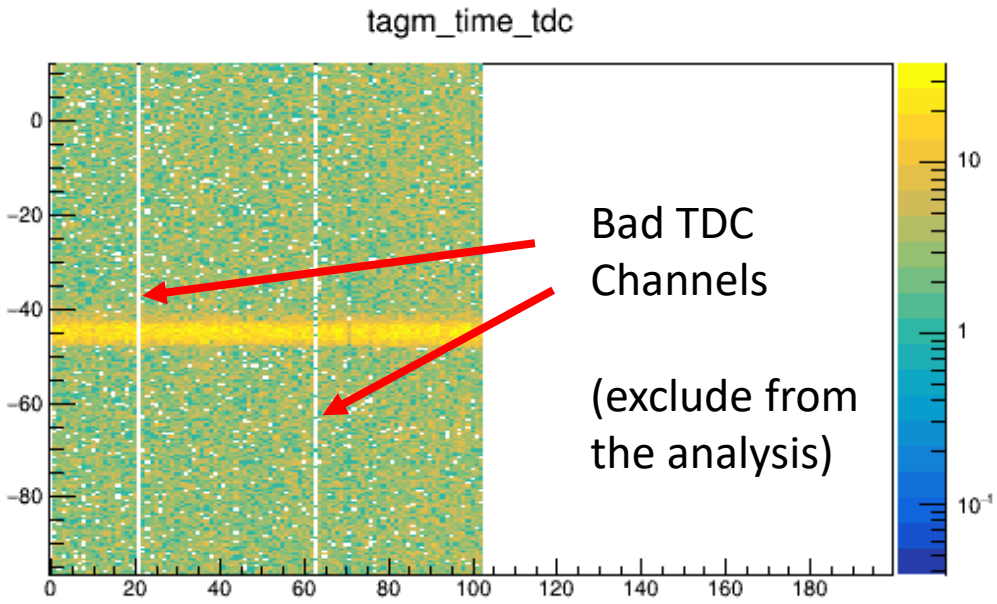




TAGM Timing Calibration (Be Runs)

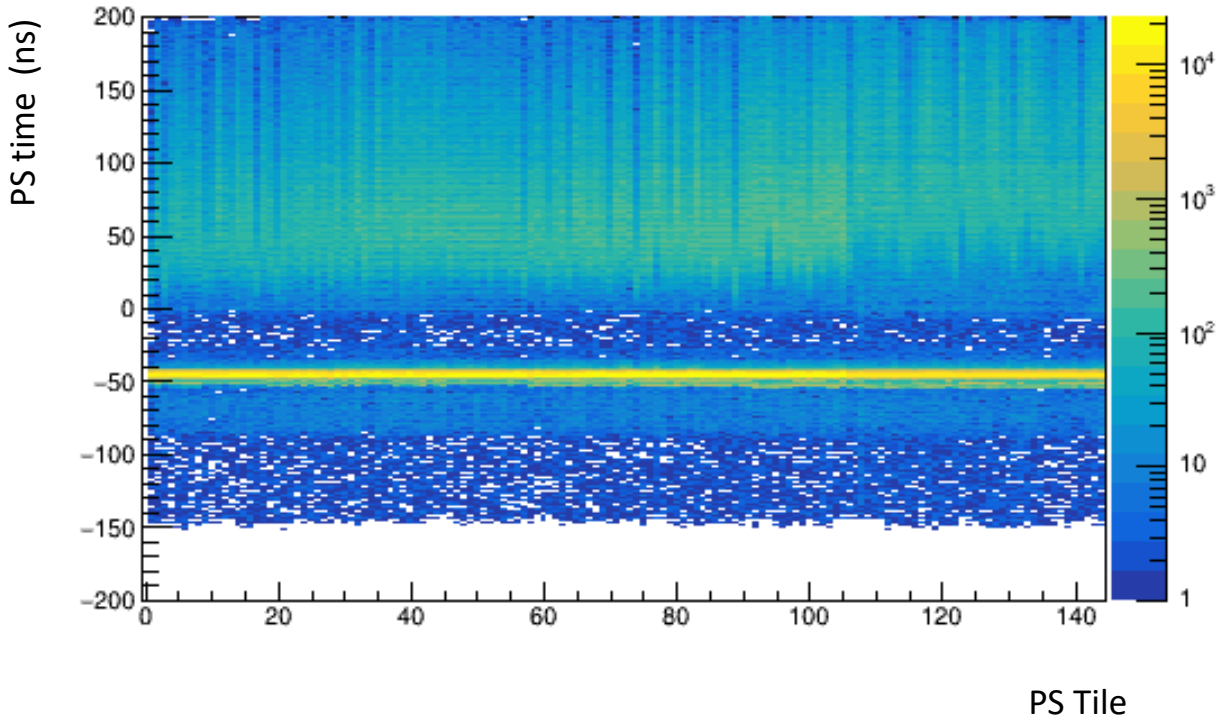
Run 61322

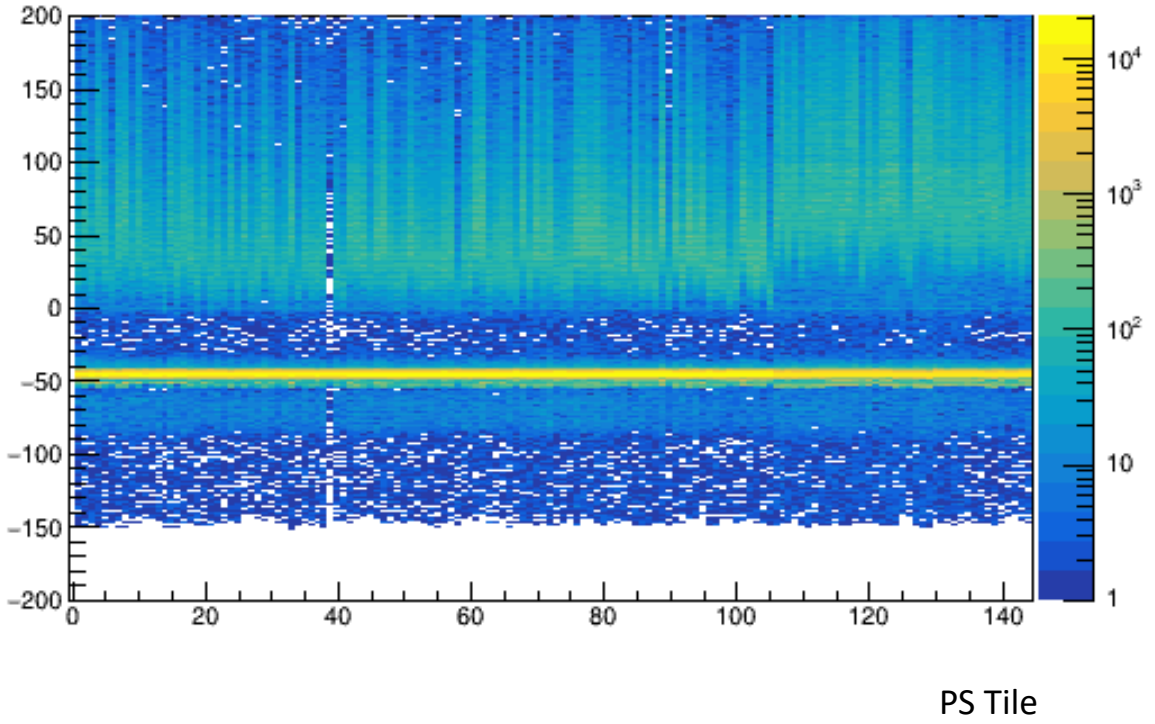




Recalibrating PS Timing Offsets

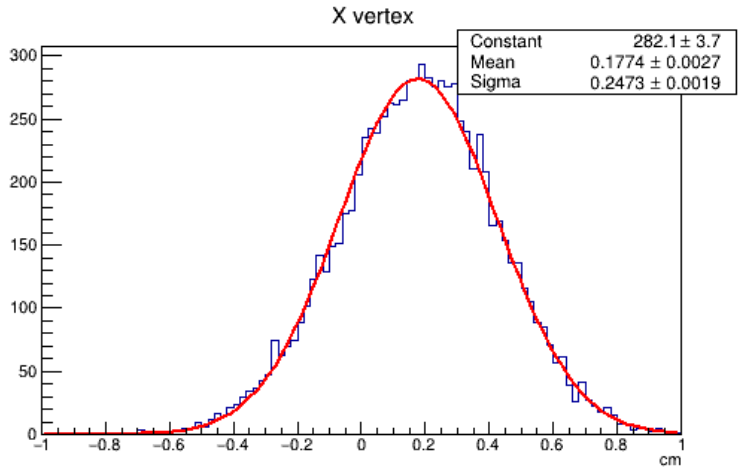
Run 61914

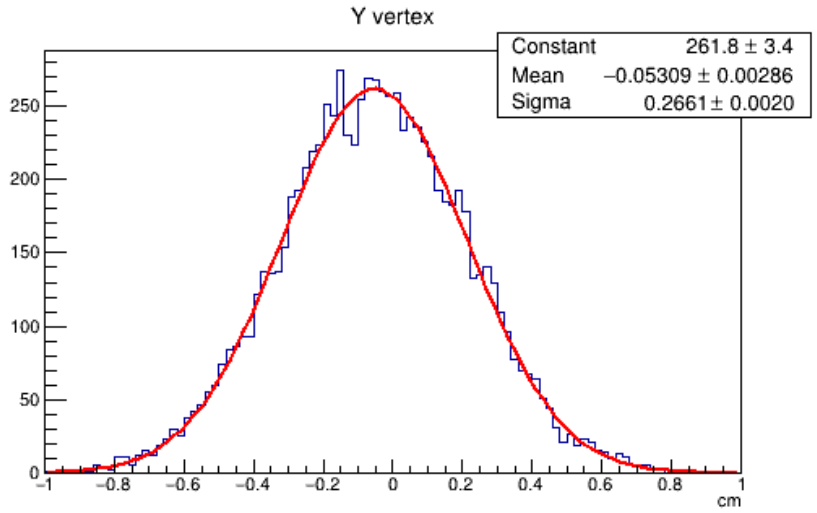




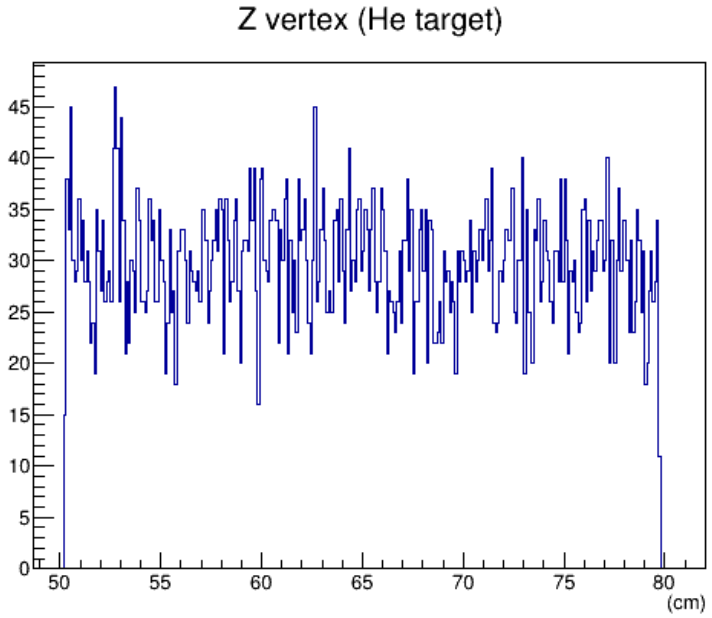
Plan: Recalibrate PS time for all PrimEx runs

MC Simulation (Vertex Position)





He Target



Beam Sport in the DB

```
File  Edit  View  Search  Terminal  Help

 136228  2018-07-19 08-20-58    2018-07-19 08-20-58     default          30000L-3
9999L
 97571  2018-01-20 16-43-34    2018-01-20 16-43-34     default          40000L-49
999L
 97570  2018-01-20 16-43-25    2018-01-20 16-43-25     default          10000L-19
999L
 96997  2018-01-20 15-22-07    2018-01-20 15-22-07     default          0L-inf

/PHOTON_BEAM> cat --id 291889
+---------------------------+
| x       (double)| 0.1755  |
| y       (double)| -0.05027|
| z       (double)| 65.0    |
| var_xx  (double)| 0.0625  |
| var_xy  (double)| 0.      |
| var_yy  (double)| 0.0729  |
| var_xz  (double)| 0.      |
| var_yz  (double)| 0.      |
| var_zz  (double)| 0.      |
| dxdz    (double)| 0.0     |
| dydz    (double)| 0.0     |
+---------------------------+
/PHOTON_BEAM>
```

Backup Slides

Status of the Analysis

Sasha, June 26, 2020

Recent changes in the reconstruction in the middle of March - May:

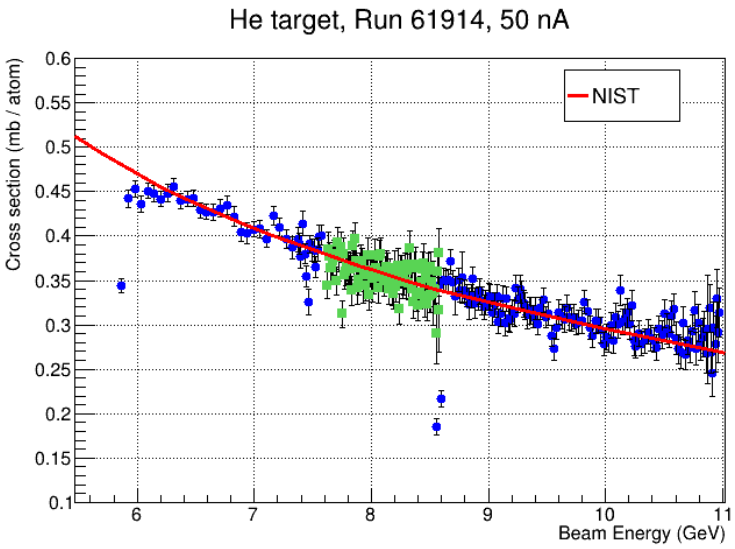
- modification in parsing of fadc250 (Richard)
- new timing calibration of the TAGH/TAGM
- modifications in the TAGM hit reconstruction

Can impact reconstruction of physics channels and lumi

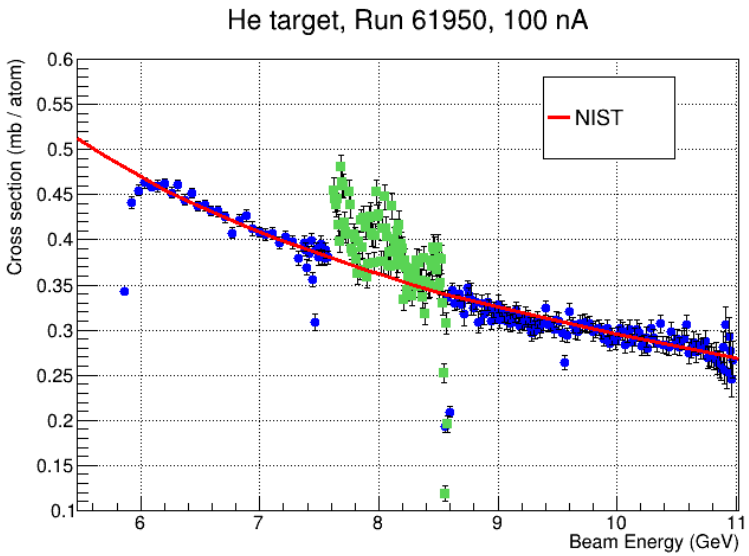
- observe some decrease of hits having coincidence between tagger and PS detectors (< 10 %). Compare number of hits before and after changes

Trying to understand what's going on

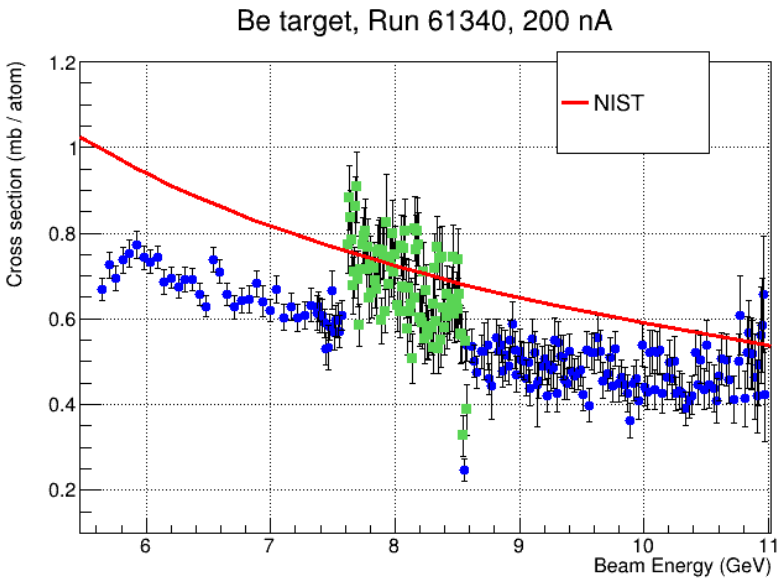
Compton Cross Section



Lumi processed in March
(correct TAGM reconstruction)



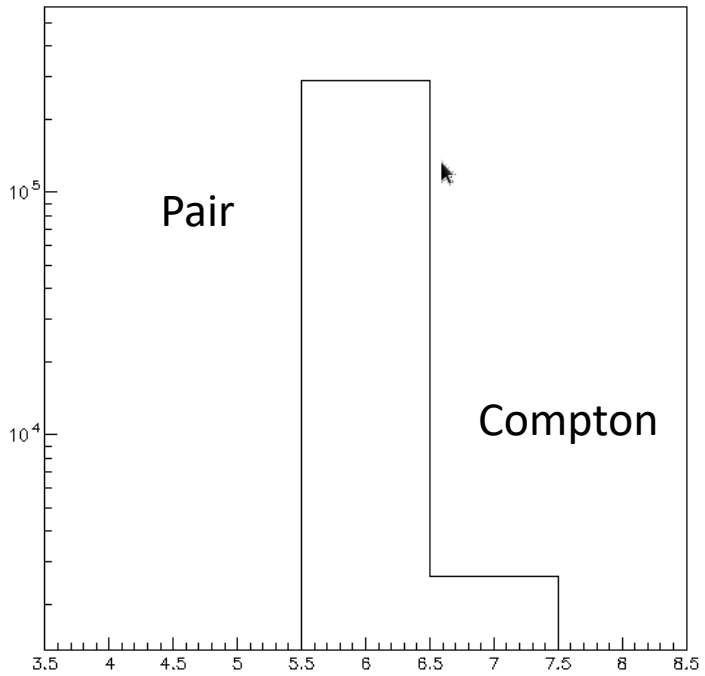
TAGM not corrected

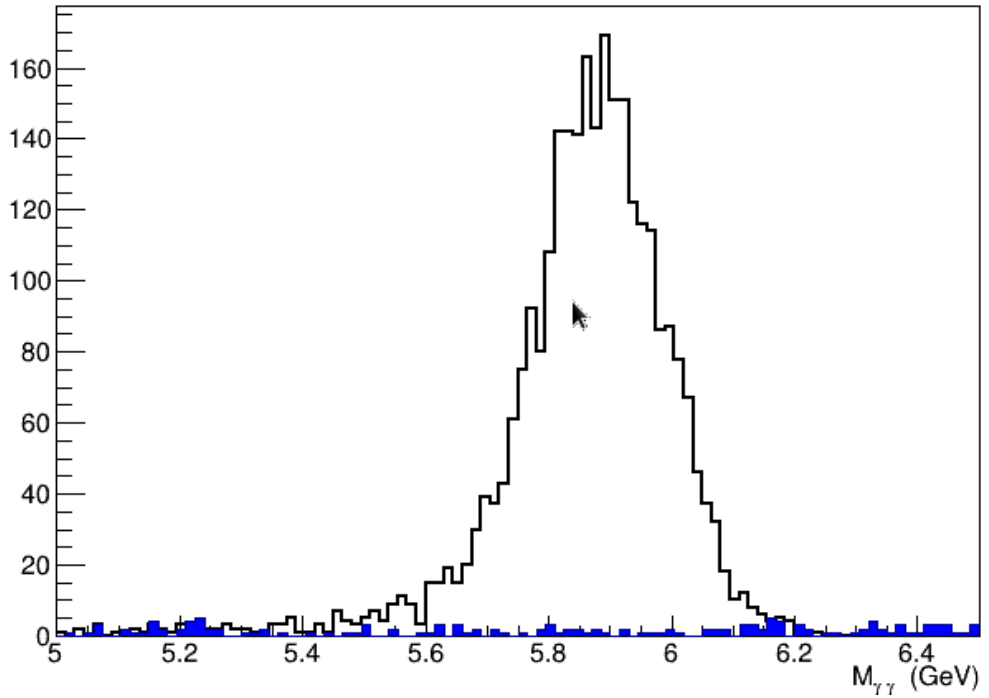


Assume the same efficiency as
for He runs

Pair Production in Geant

Geant process (LMEC)





σ (Compton) / σ (Pair) = 0.09 at 6 GeV (He target)
NIST - 0.087

Fraction of pair under Compton peak: 3 – 5 %

Background: Empty Target

Process larger empty target sample