Status of the Luminosity Determination for PrimEx

A. Somov

Analysis Meeting, August 26, 2020

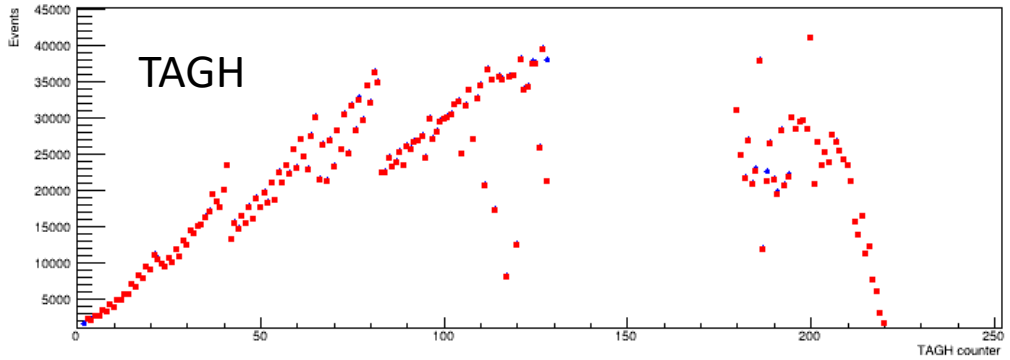
Improvements for PrimEx

- Energy calibration of the PS, TAGH / TAGM
- Implement correct beam energy in the reconstruction and MC simulation
- Initial lumi number for PrimEx runs in the CCDB (since last year)
- Not smooth energy dependence of the Compton cross section in the TAGM region

  - Inconsistency between lumi determination and reconstruction (in DBeamPhoton)

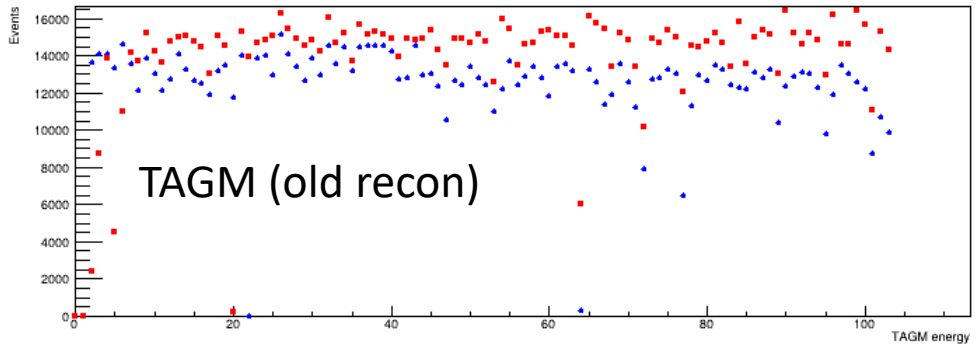
  - require TDC hit in the TAGM reconstruction

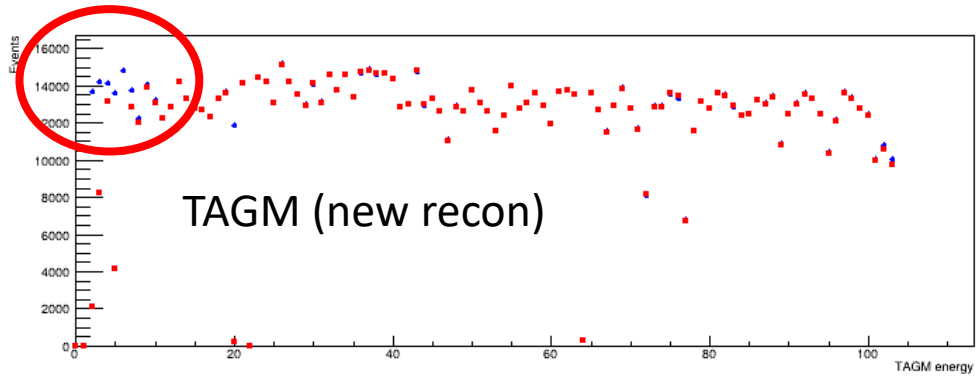
Tagged Flux for TAGH / TAGM



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

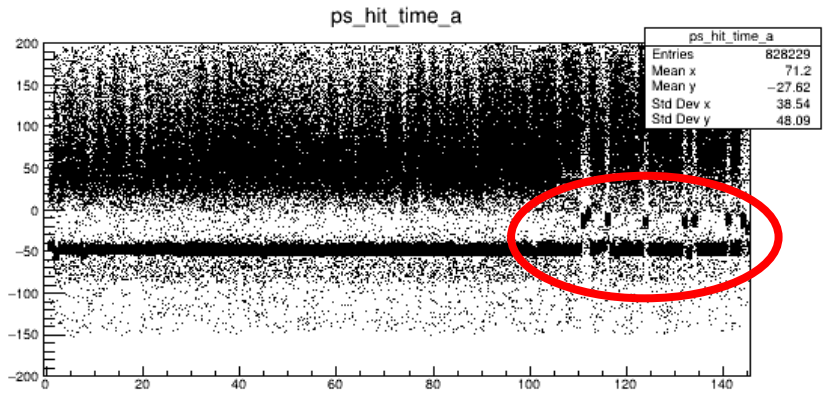
PS Timing Calibration Issues

Run 61914 (He)

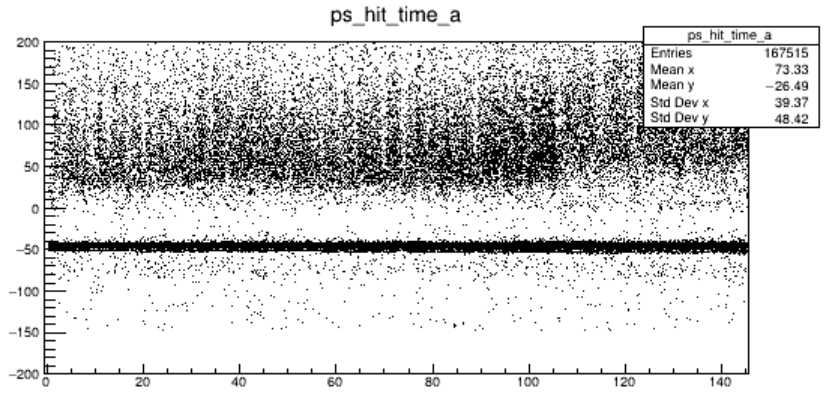
Before Calibration (Calibration updated in May)

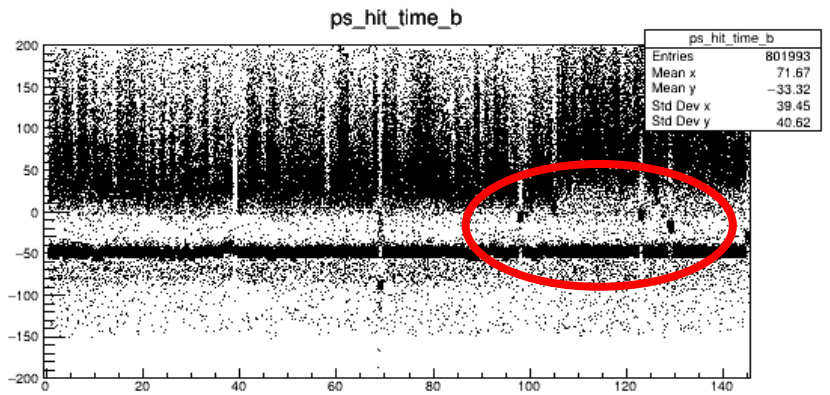
After Calibration (New)

PS time (ns)

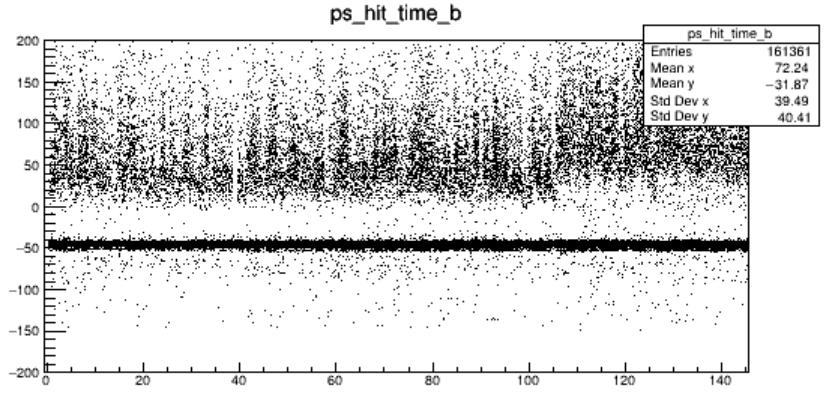


Arm A





Arm B



PS Tile

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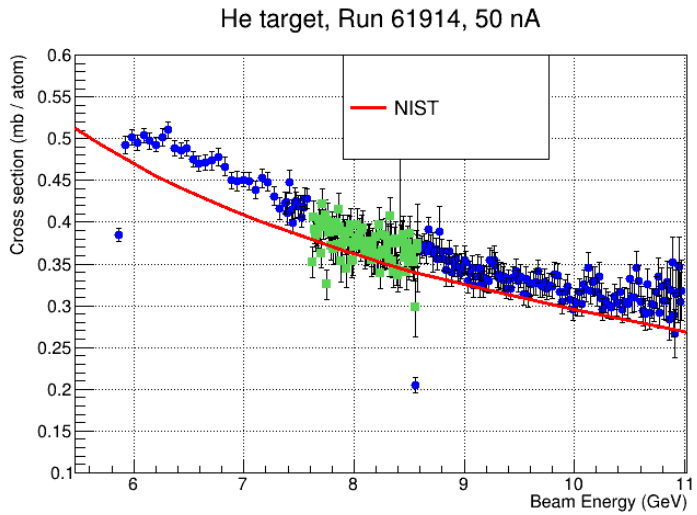
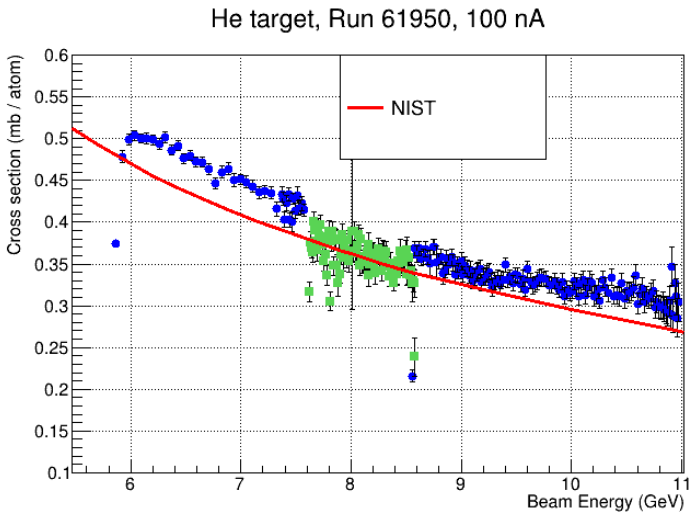
- Some PS hIts in Arm A and Arm B are out of time – missing PS coincidence
- Recalibrate PS time for all PrimEx runs (new constants in CCDB)
- Still some minor issues with TAGH/TAGM timing for some runs

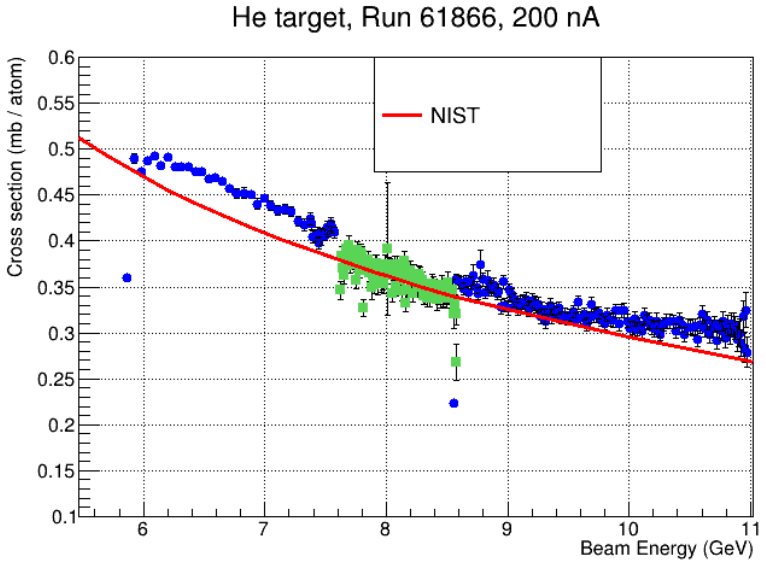
- https://halldweb.jlab.org/primexd/data_quality_2019/quality_check_2019.pdf

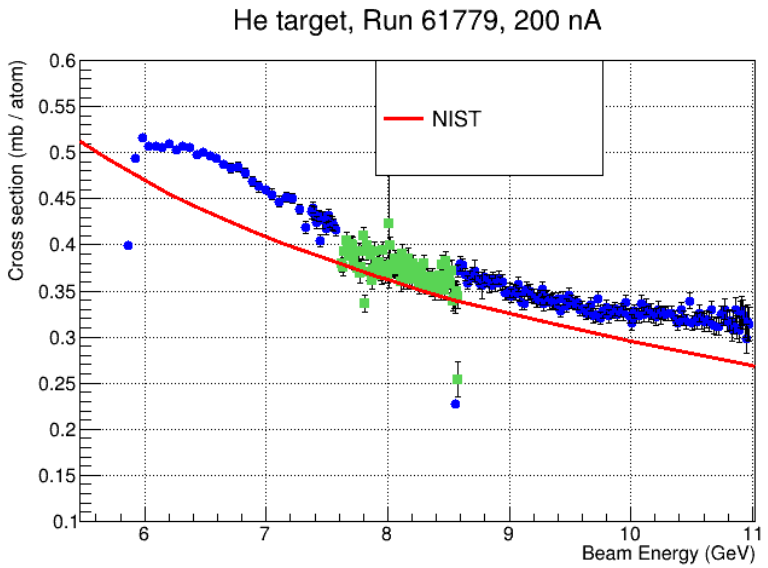
Compton Cross Section (He Runs)





Runs from the same LHe target fill (low intensity)





Runs from different target fills (high - intensity)

- Still some discrepancies in cross section shape
- Checking TAGM reconstruction

Next Steps

- Reconstruction efficiency studies

  - simulation of pileup (CCAL clusters are written to HDDM for skims with random trigger)

  - beam is not fiducialized for many runs (?)

- Started working on accidental subtraction

- Check PS acceptance for PrimEx runs

- Reprocess lumi numbers