LHRS Analysis for d_2^n

Data Quality

D. Flay

2/25/11

Outline

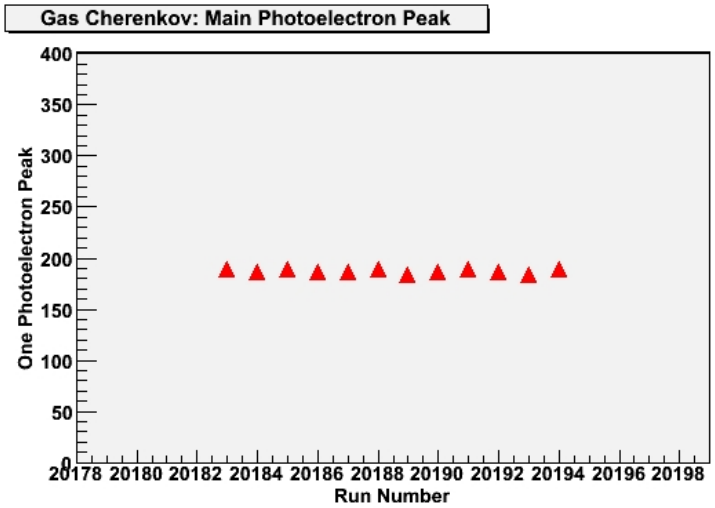
Run Lists and Kinematic Points (1)

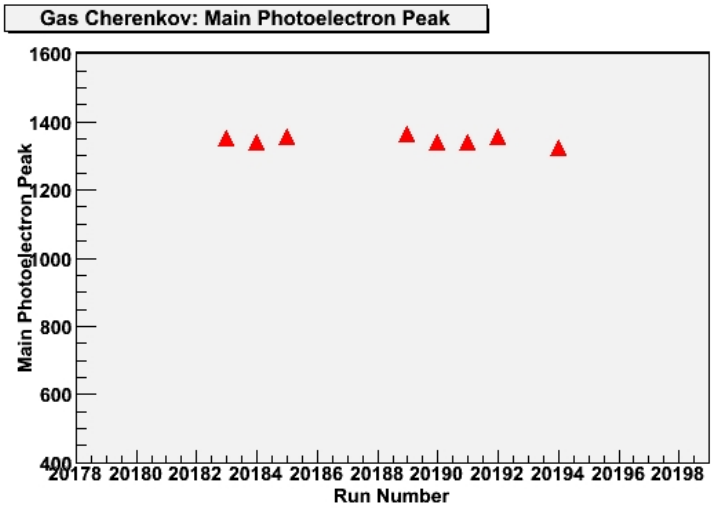
Updated Run Lists

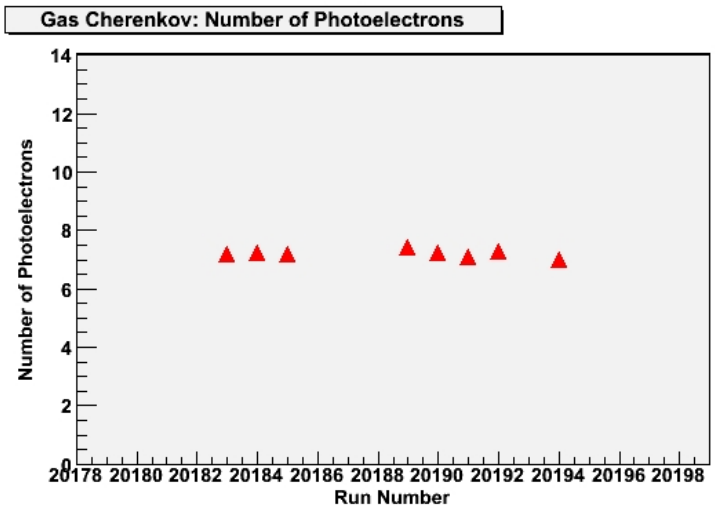
- New run list: Nitrogen runs (LHRS)
- Found 4 more kinematic points (negative polarity ^{3}He target):
  1. $p = 0.7$ GeV, $E_b = 5.89$ GeV
  2. $p = 1.12$ GeV, $E_b = 4.73$ GeV
  3. $p = 1.19$ GeV, $E_b = 4.73$ GeV
  4. $p = 1.26$ GeV, $E_b = 4.73$ GeV
     - Brings total space used on the farm for 1st round replay for LHRS runs to $\sim$ 400 GB
- The Nitrogen run list is on the Wiki (under the special runs section)
- The updated production run list will be made available as soon as data quality and efficiency studies are completed

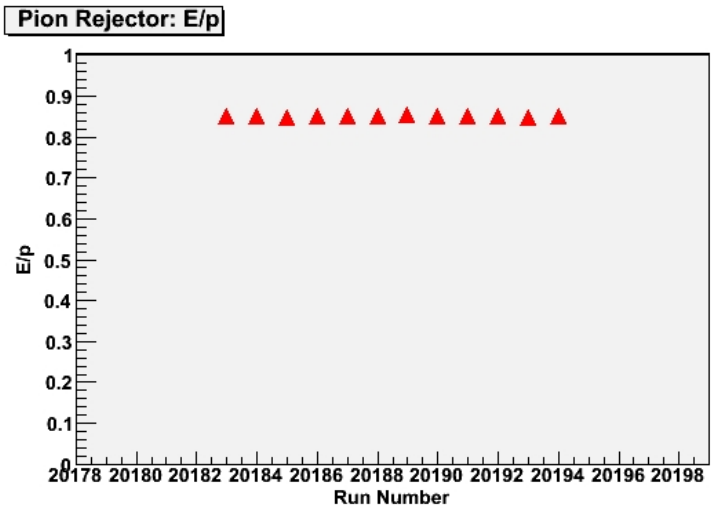
Run Lists and Kinematic Points (2)

GC and PR Data: $p = 0.7$ GeV, $E_b = 5.89$ GeV



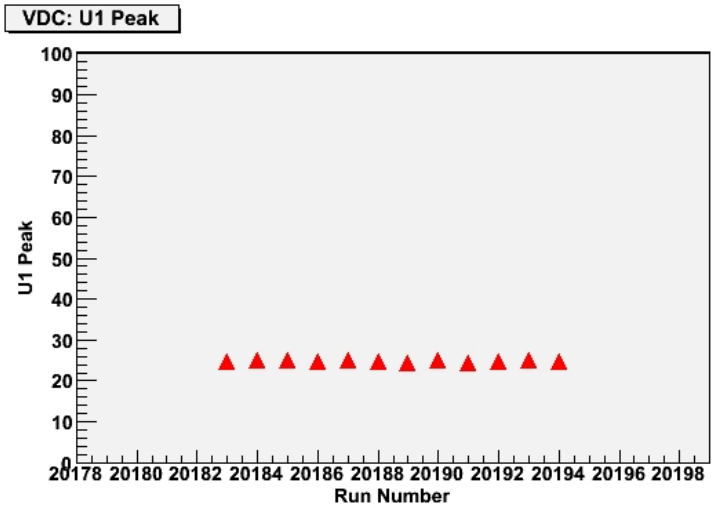


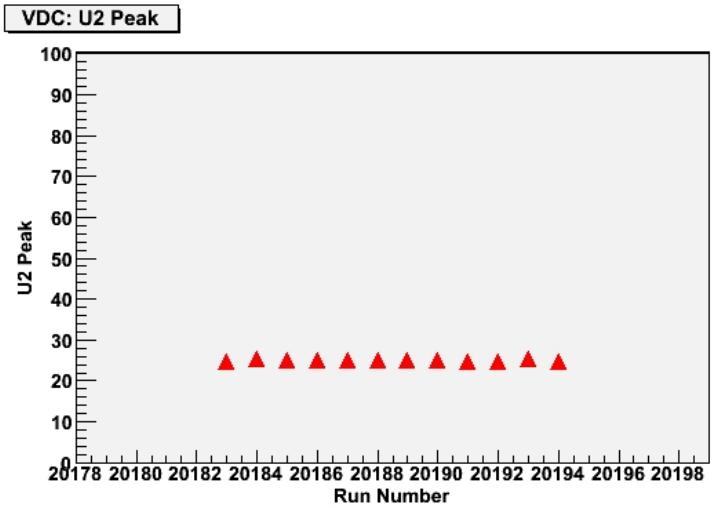


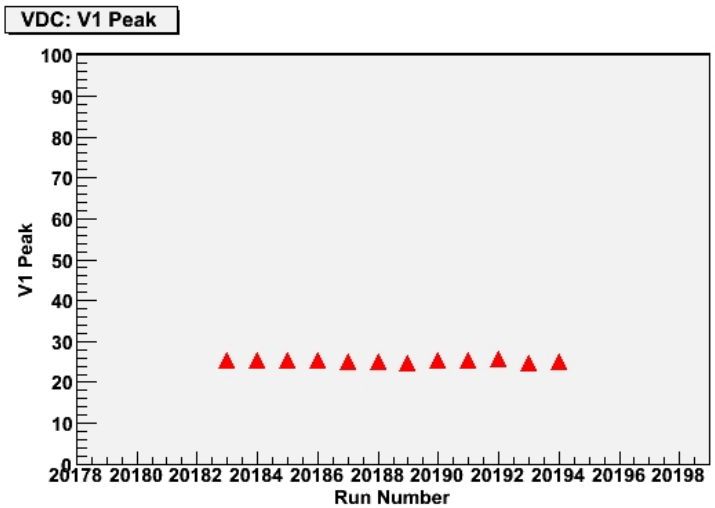


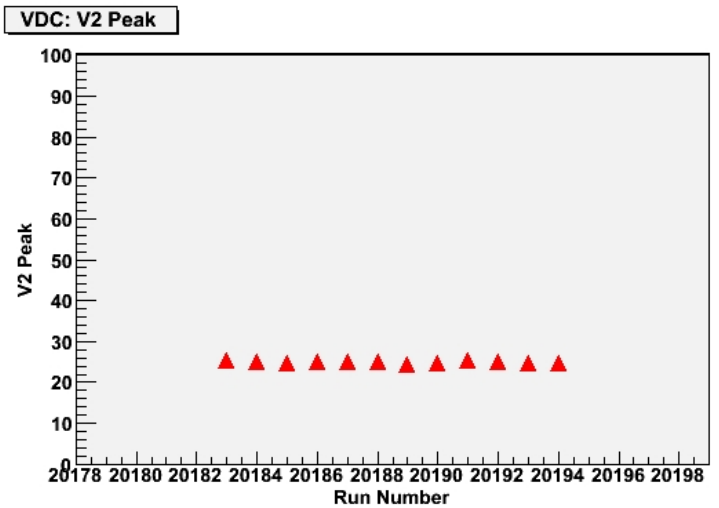
Run Lists and Kinematic Points (3)

VDC Data: $p = 0.7$ GeV, $E_b = 5.89$ GeV



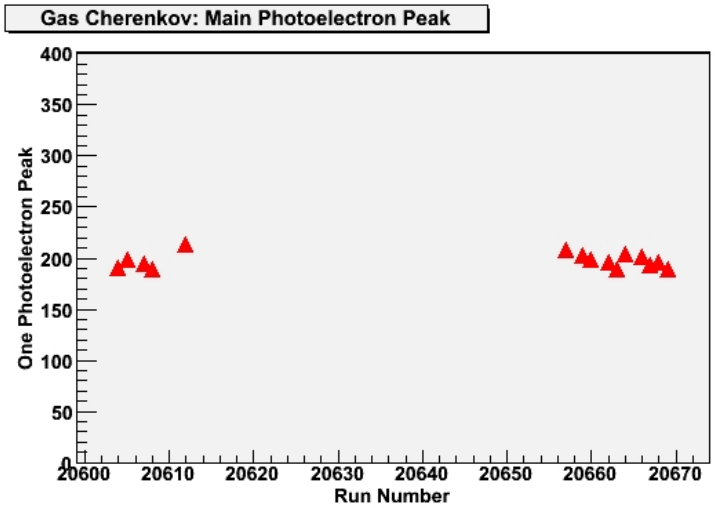


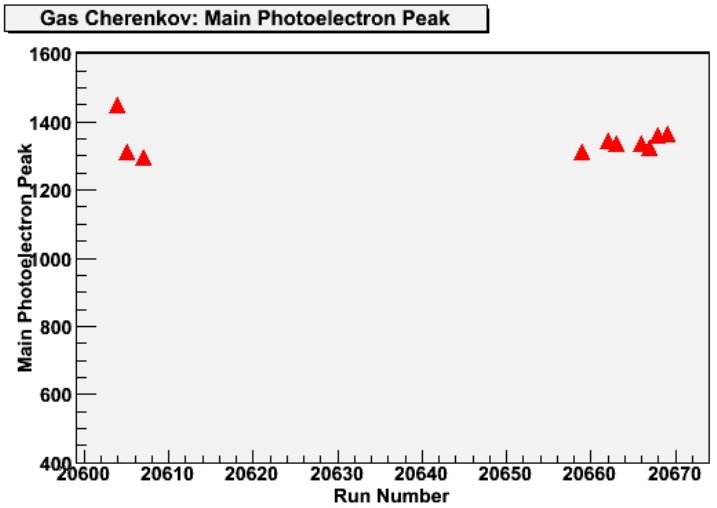


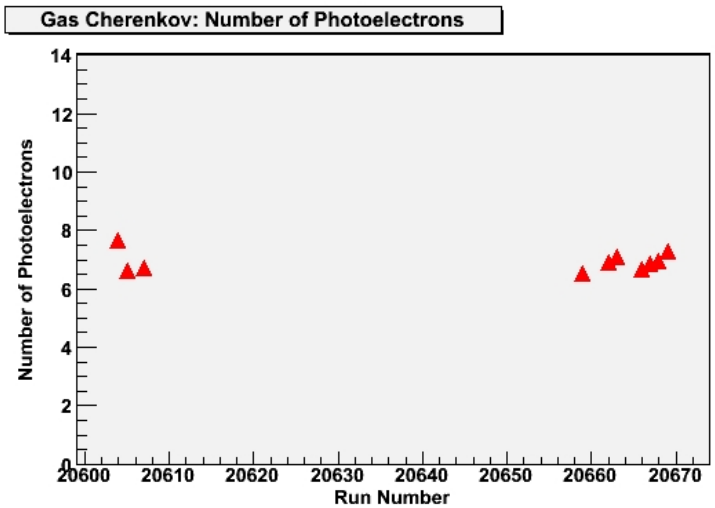


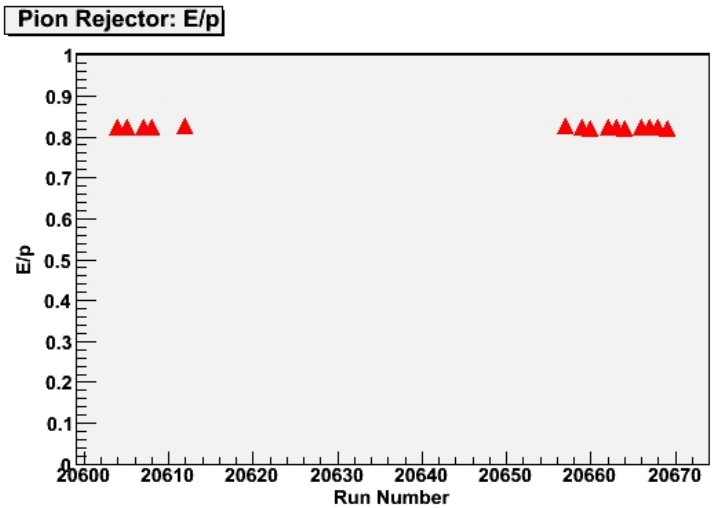
Run Lists and Kinematic Points (4)

GC and PR Data: $p = 1.12$ GeV, $E_b = 4.73$ GeV



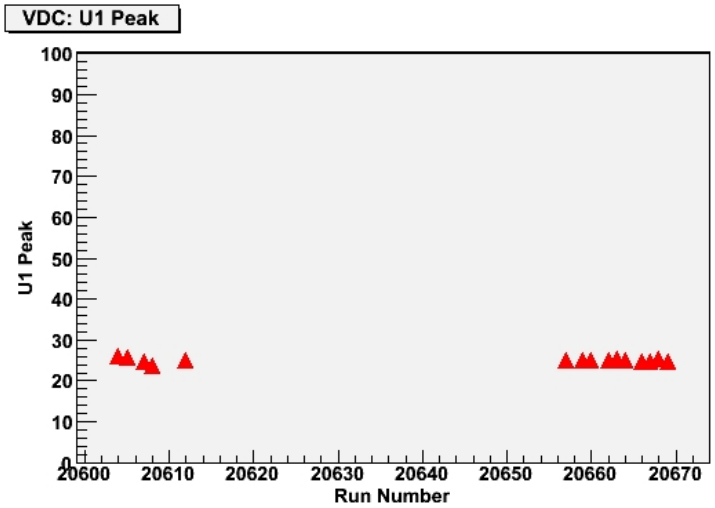


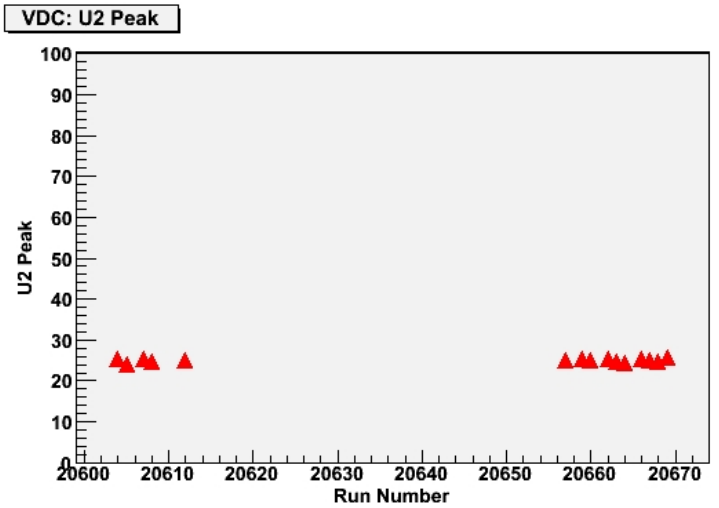


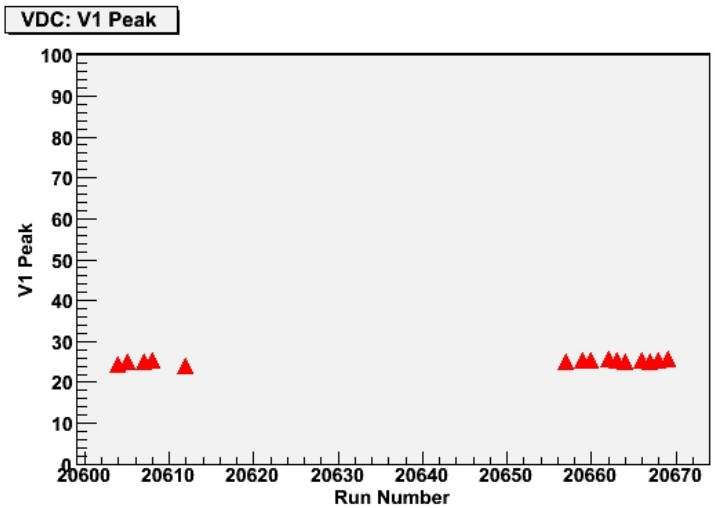


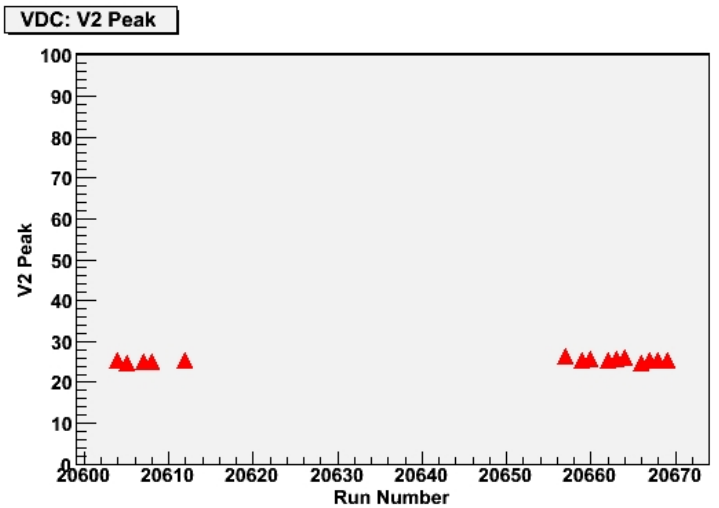
Run Lists and Kinematic Points (5)

VDC Data: $p = 1.12$ GeV, $E_b = 4.73$ GeV



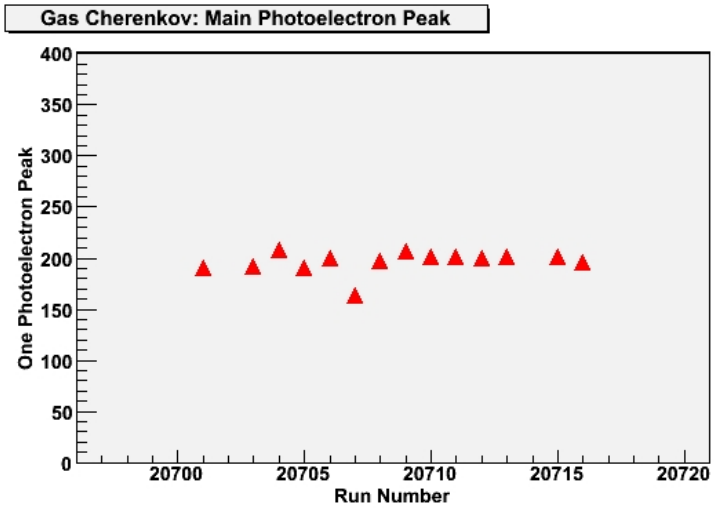


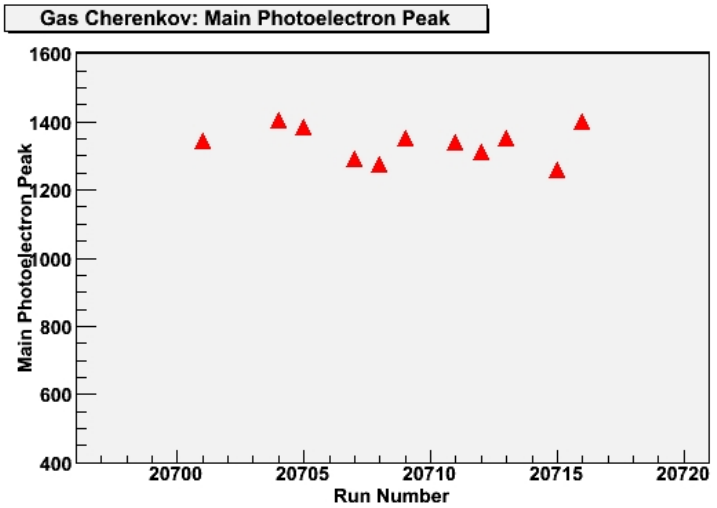


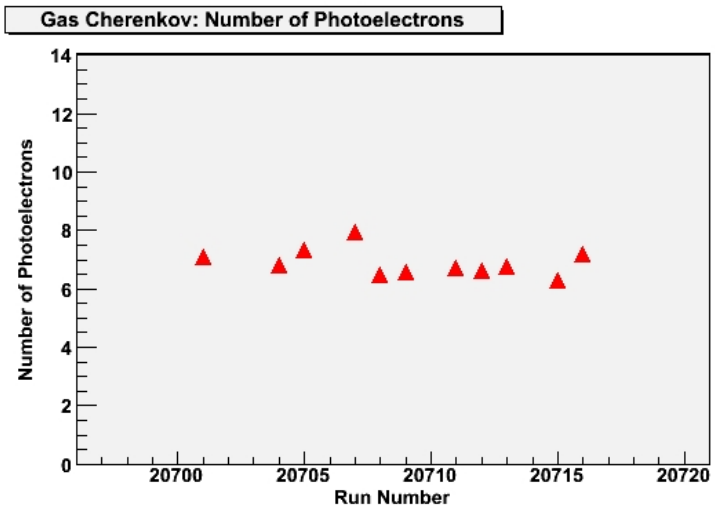


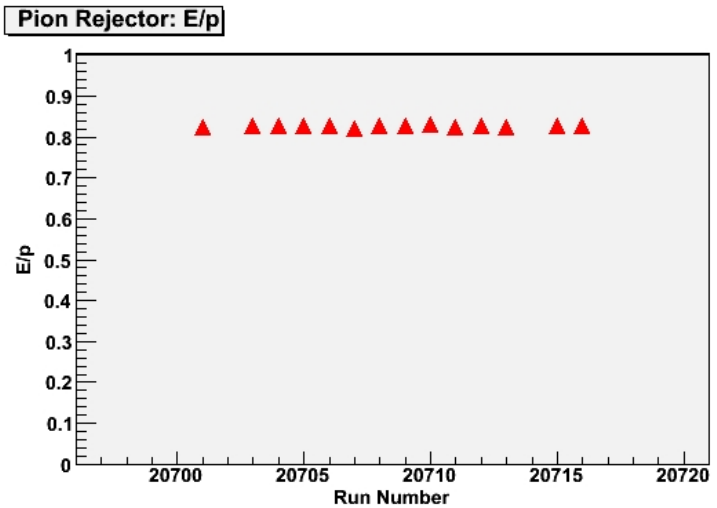
Run Lists and Kinematic Points (6)

GC and PR Data: $p = 1.19$ GeV, $E_b = 4.73$ GeV



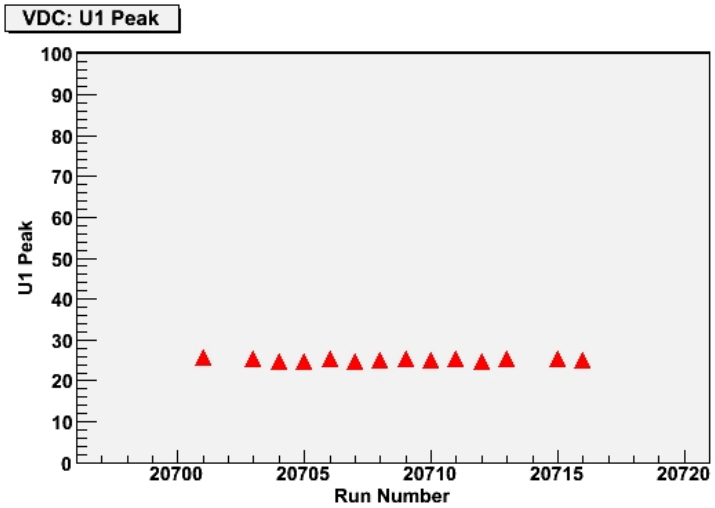


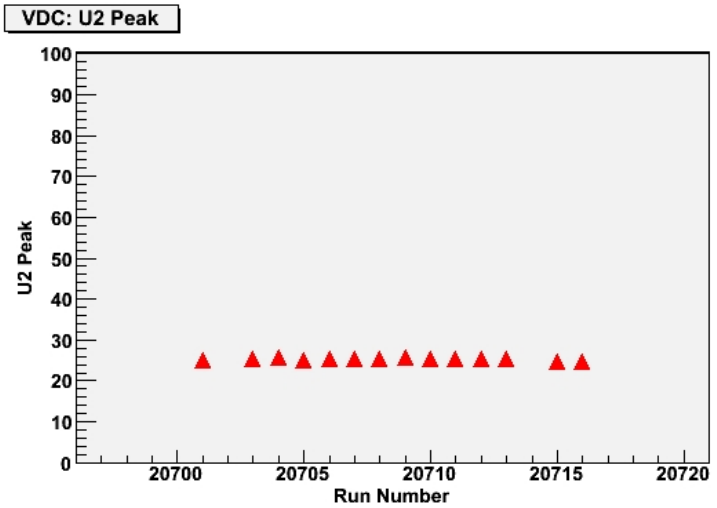


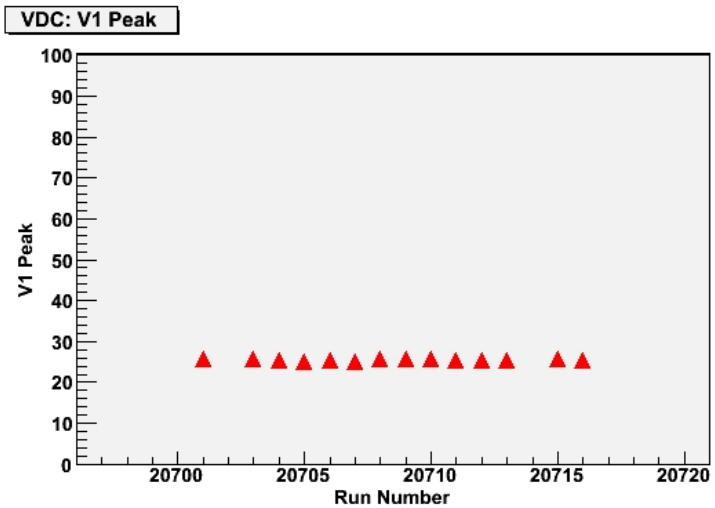


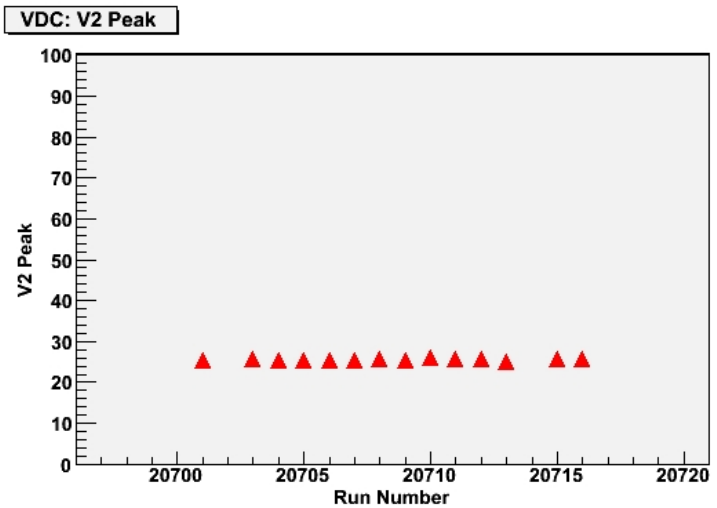
Run Lists and Kinematic Points (7)

VDC Data: $p = 1.19$ GeV, $E_b = 4.73$ GeV



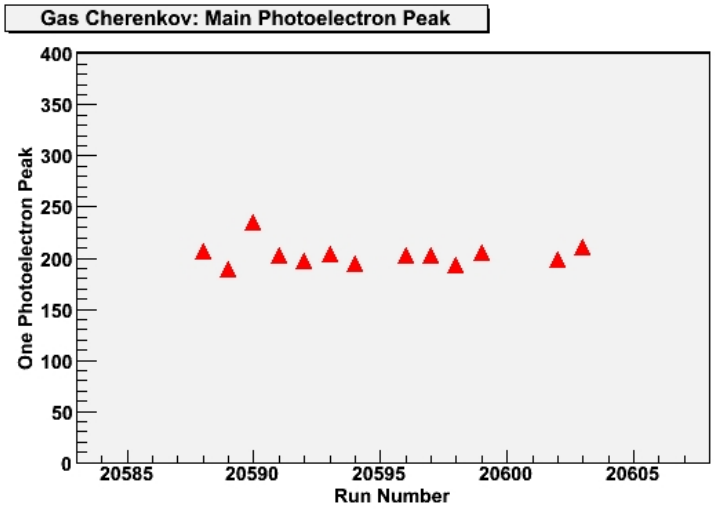


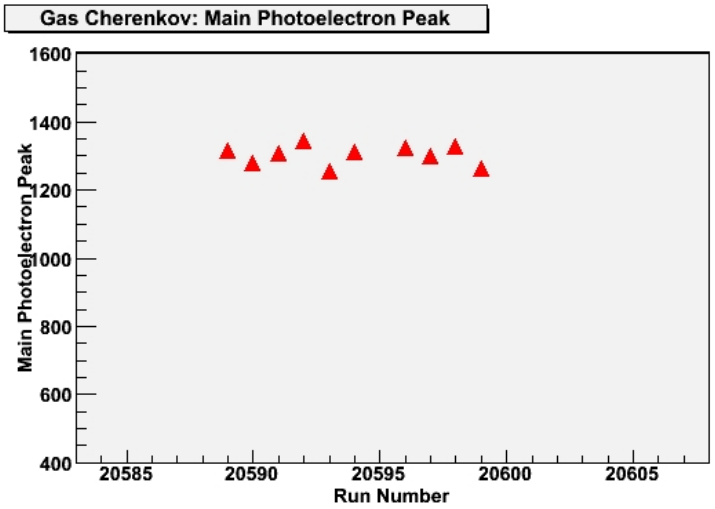


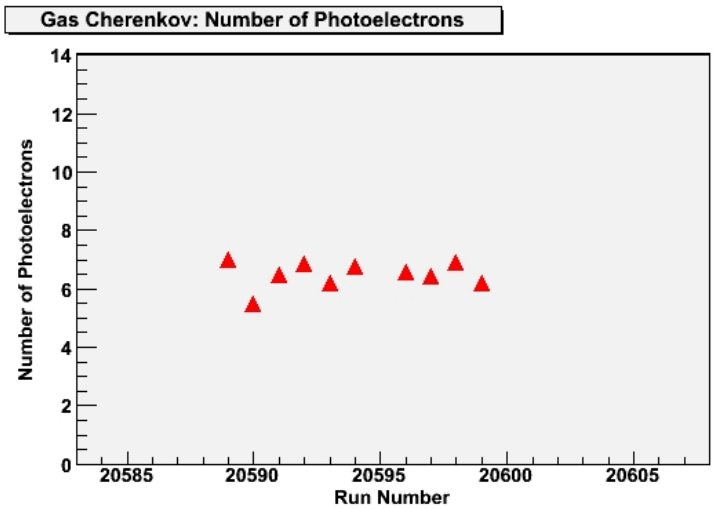


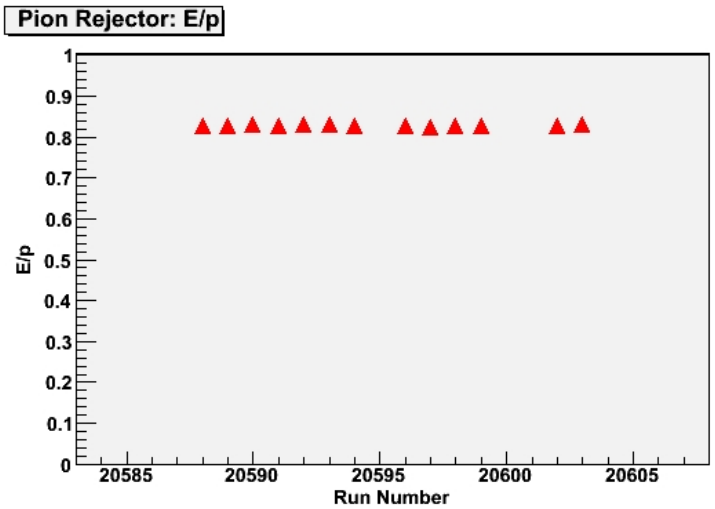
Run Lists and Kinematic Points (8)

GC and PR Data: $p = 1.26$ GeV, $E_b = 4.73$ GeV



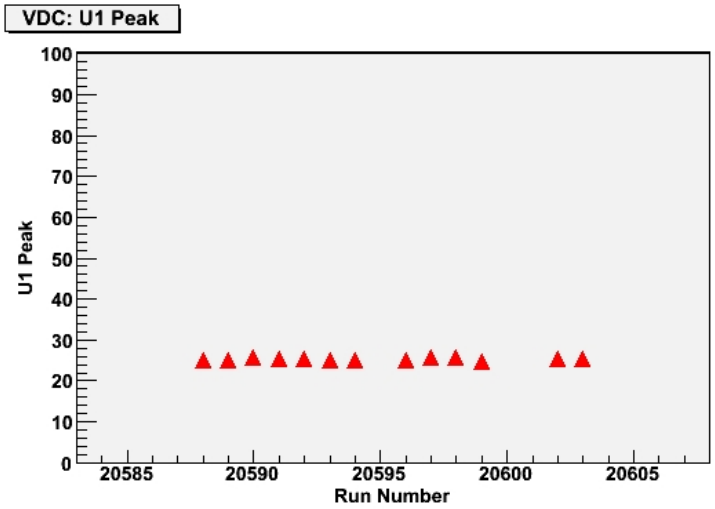


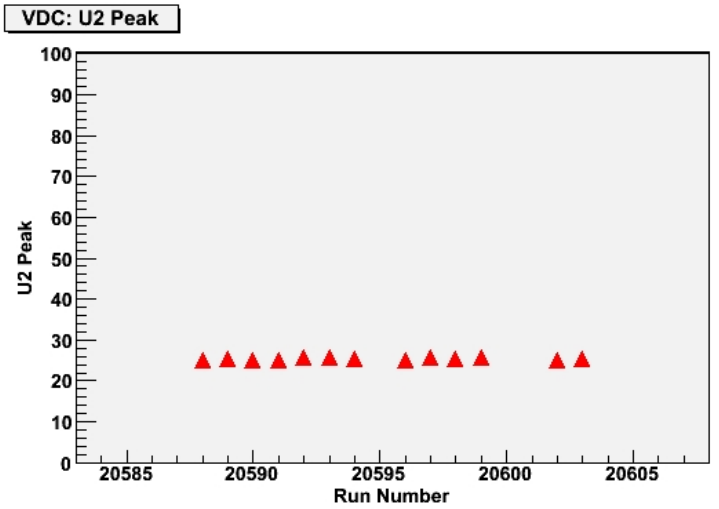


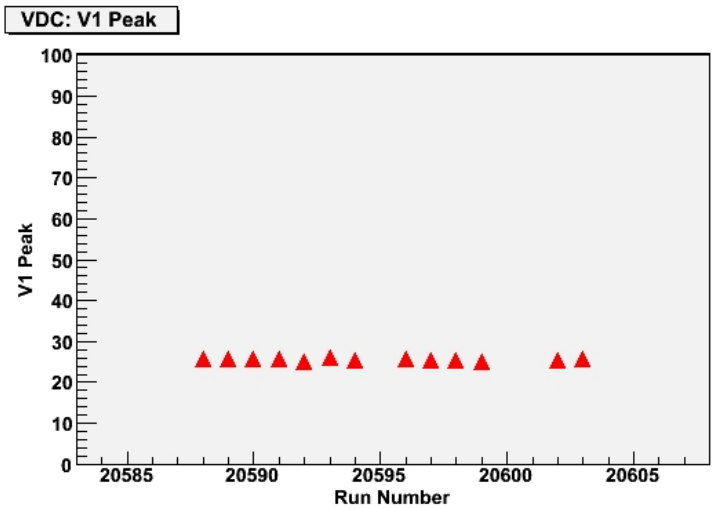


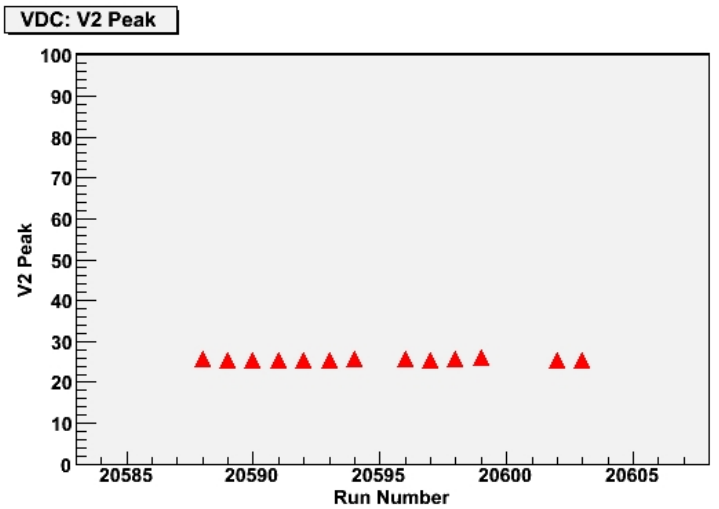
Run Lists and Kinematic Points (9)

VDC Data: $p = 1.26$ GeV, $E_b = 4.73$ GeV



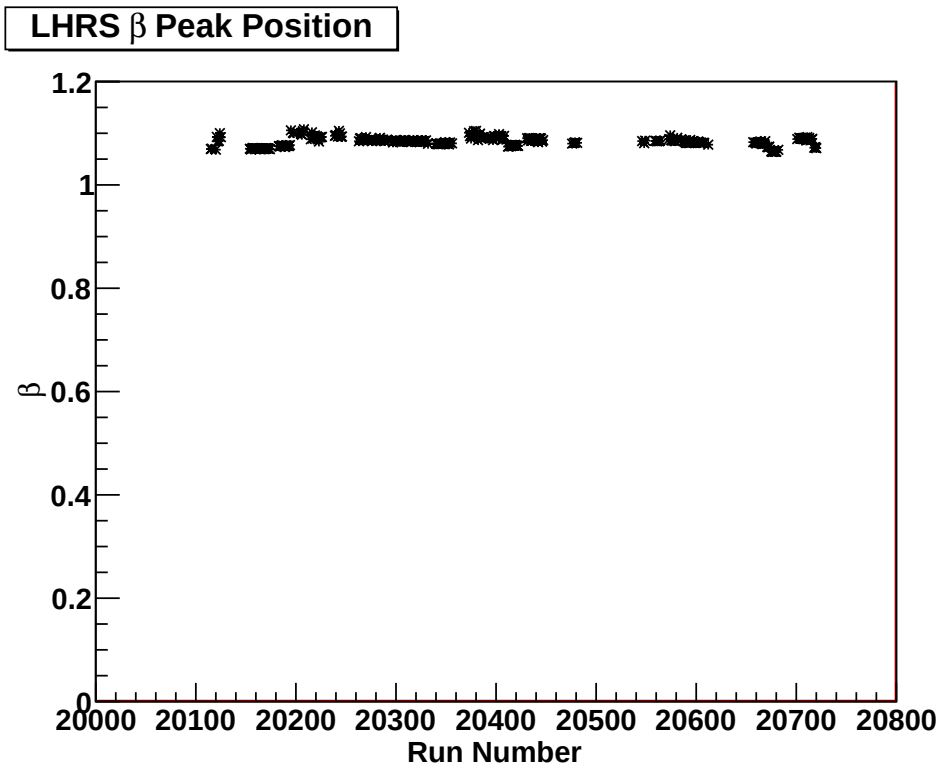






β Peak Position (1)
Testing the Scintillator Calibration

- To test the scintillator calibration files, we can look at the β peak position as a function of run number:



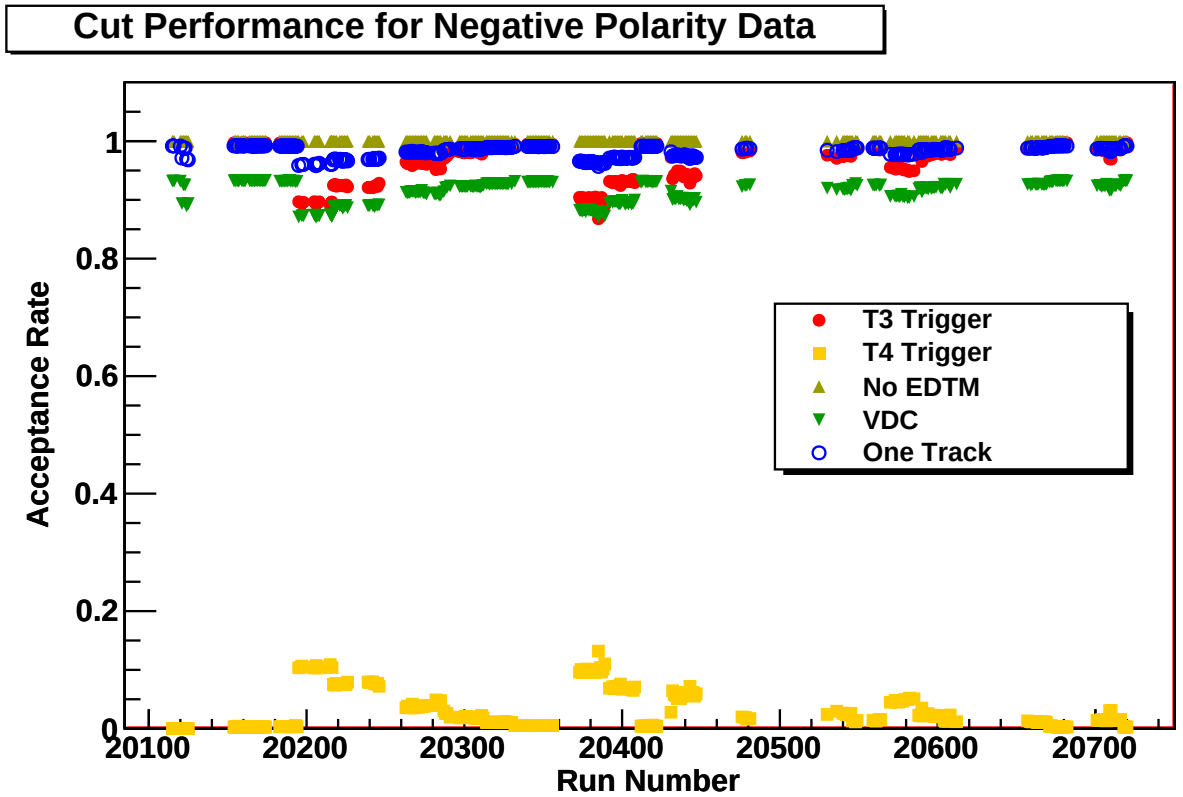
- Mean and standard deviation:

$$\mu = 1.0844$$
$$\sigma = 0.0085$$

Cut Performance Histories (1)

Cuts: T3, T4, VDC and One Track

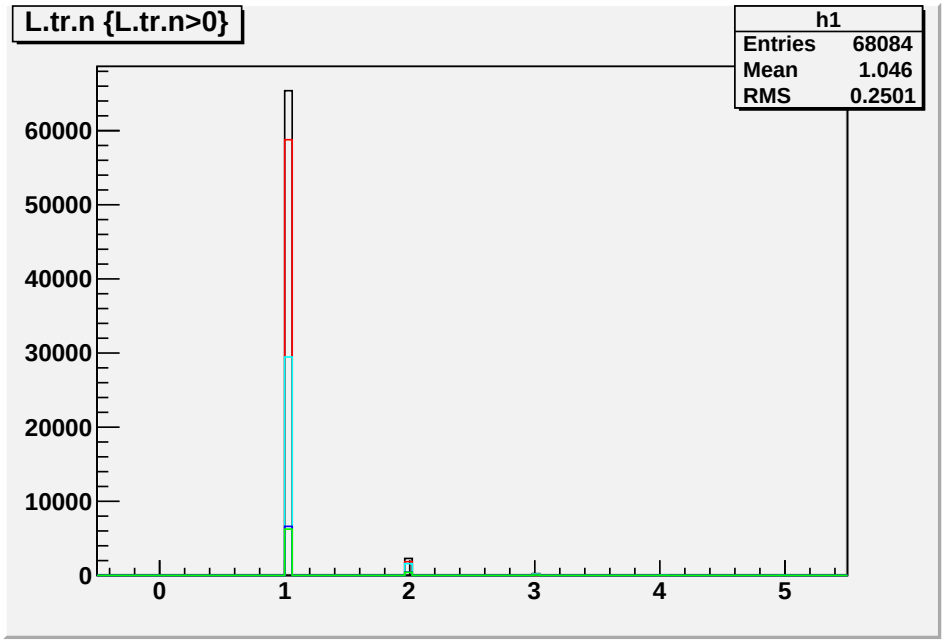
- Define the baseline cut: `L.tr.n>0`
  - Require at least one track



Cut Performance Histories (2)

Acceptance Rate Drop for Higher Momenta

- Why the 8–10% drop in some of the T3 acceptance rates?
  - Occurs for $p_0 = 1.6, 1.7$ GeV runs
  - Tracks for which $p > 10$ GeV are responsible
- Looking at run 20207 ($p_0 = 1.7$GeV)

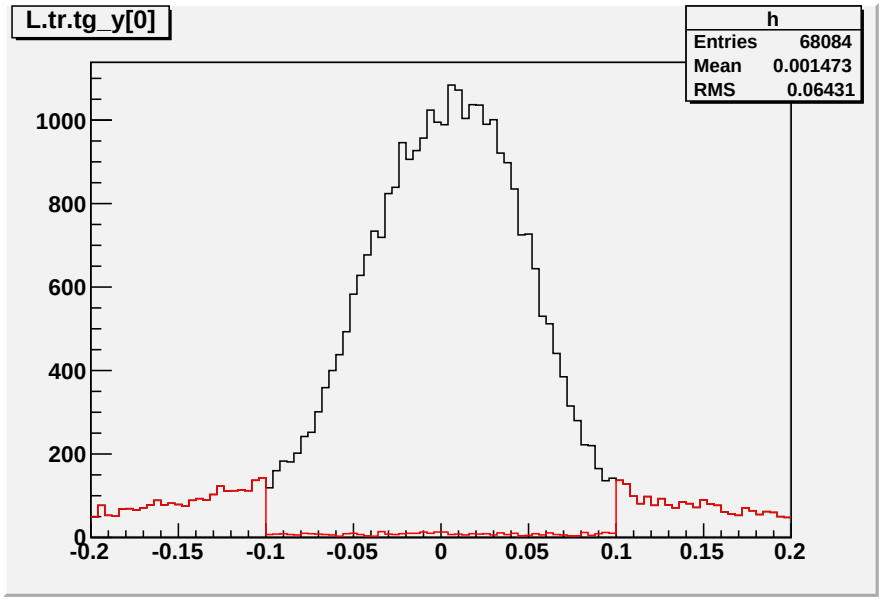


- Black: more than one track
- Red: black + T3
- Cyan: black + T3 + $p > 10$ GeV
- Blue: black + T4
- Green: black + T4 + $p > 10$ GeV

Cut Performance Histories (3)

Acceptance Rate Drop for Higher Momenta

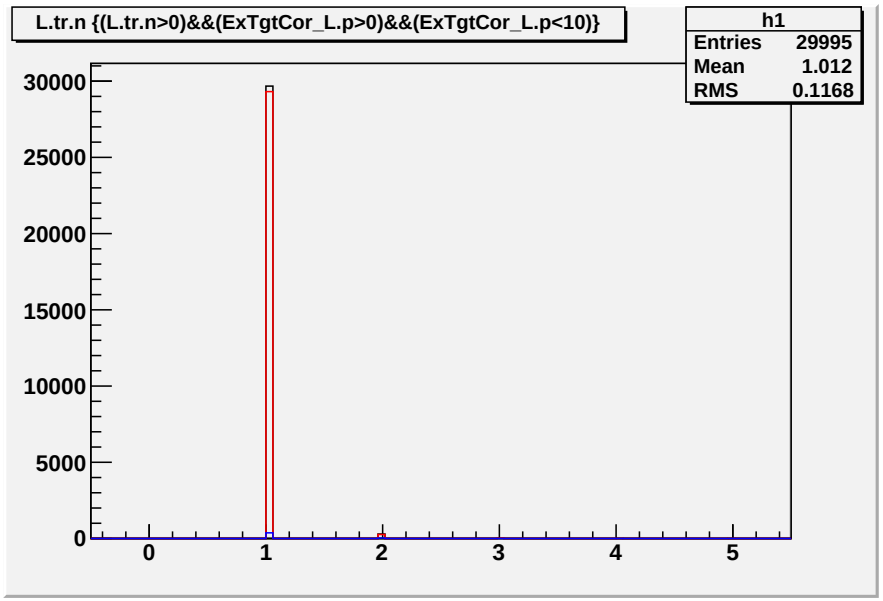
- Events with very large p account for 50% of T3s and 94% of T4s



- We know these events scatter from the target edges (so they're not good to start with)

Cut Performance Histories (4)

Acceptance Rate Drop for Higher Momenta



- Choosing a baseline cut to exclude these events explicitly yields results consistent with the rest of the run set:
  - T3 acc. rate: 97.88%
  - T4 acc. rate: 1.23%
- It would be interesting to see how these large p events populate the rest of the data set

Summary

- Data Quality:
  - New kinematic points look good
  - Scintillator calibration looks good after replay of all data
  - Cut histories for T3, T4, no EDTM, VDC and one track look good
    - Add good momentum from tracking to baseline cut (?)
- Cross section code:
  - Added statistical error calculations to σ_{raw}
  - Working on efficiency input files

What's Next?

- SAMC:
  - Look further into θ_{tg}, ϕ_{tg} (data)
  - Double-check optics (?)
- Farm replay (32-bit):
  - Get skim procedure running
- Data Quality:
  - Calculate GC, PR, VDC, T3 and β cut efficiencies for new kinematics
  - Cut performance histories:
    1. GC ADC and TDC cuts
    2. PR E/p
    3. y_{tg}, z_{react}
  - One-pass data