

Problems Encountered when Using Hall D Software

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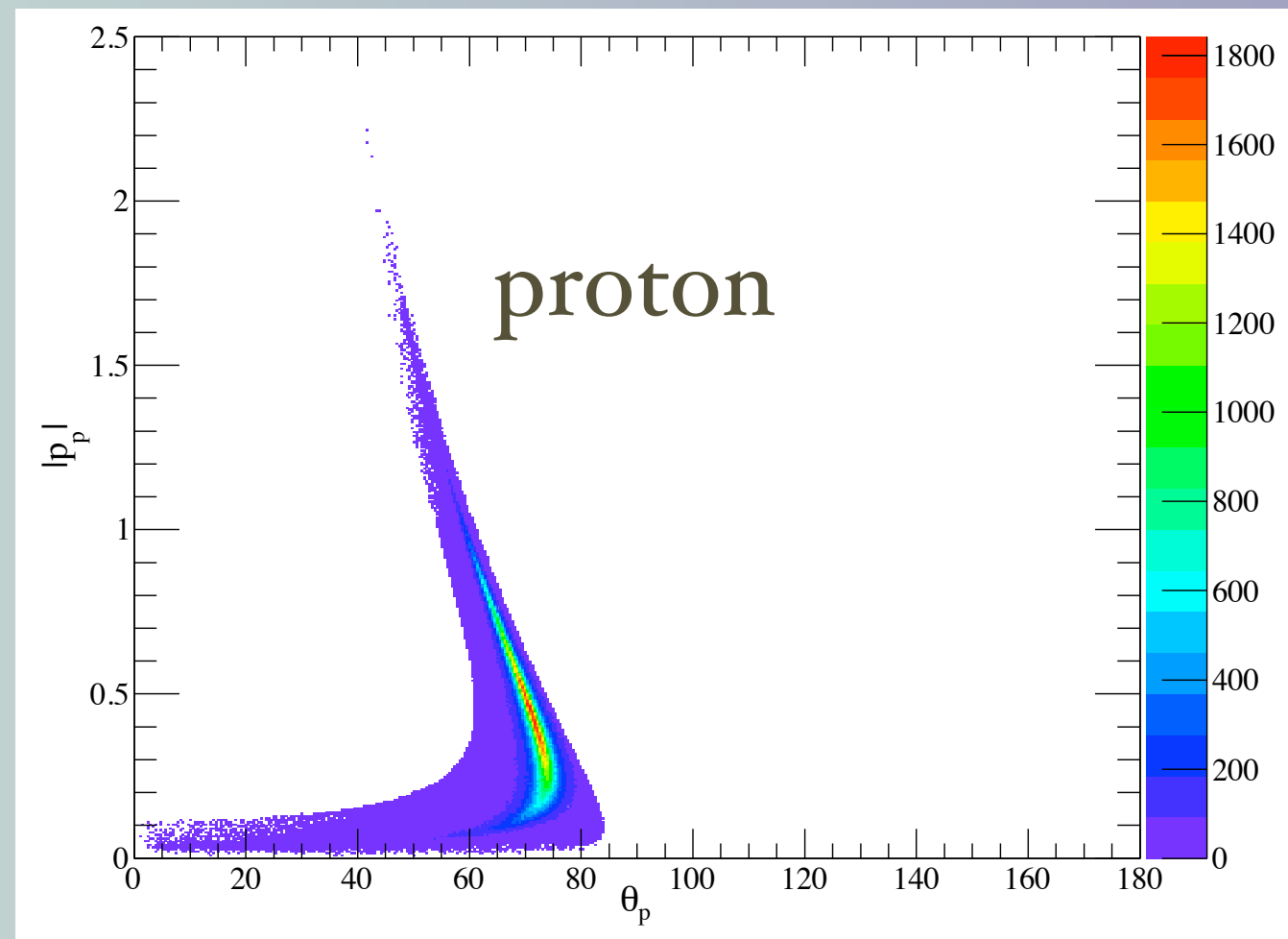
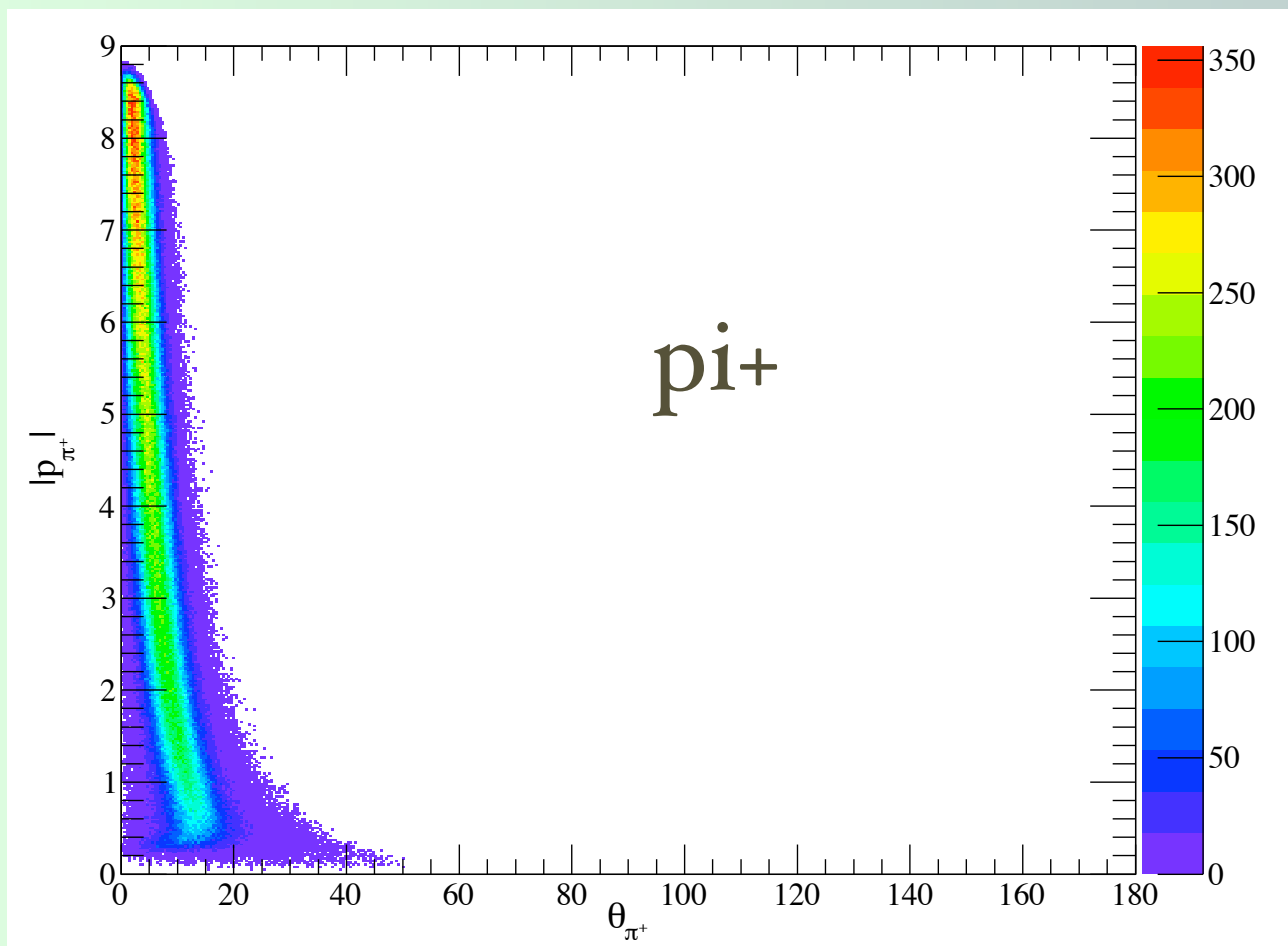
GlueX Offline Software Meeting

Motivation

- Find optimal PID for Hall D
- Find bugs/instabilities
- Start with p π^+ π^-
 - p/ π^+ PID should be easiest
 - move on to p/K and p/ π separation?
 - neutrals?

Generated Events

- very simple rho meson production
- distribution of $|p|$ vs theta (lab)



Problem #0

- event processing hangs every ~1000 events
- restricts processing of many events
- used `hddm_cull_events` to isolate events
- email sent out on Dec. 13, see

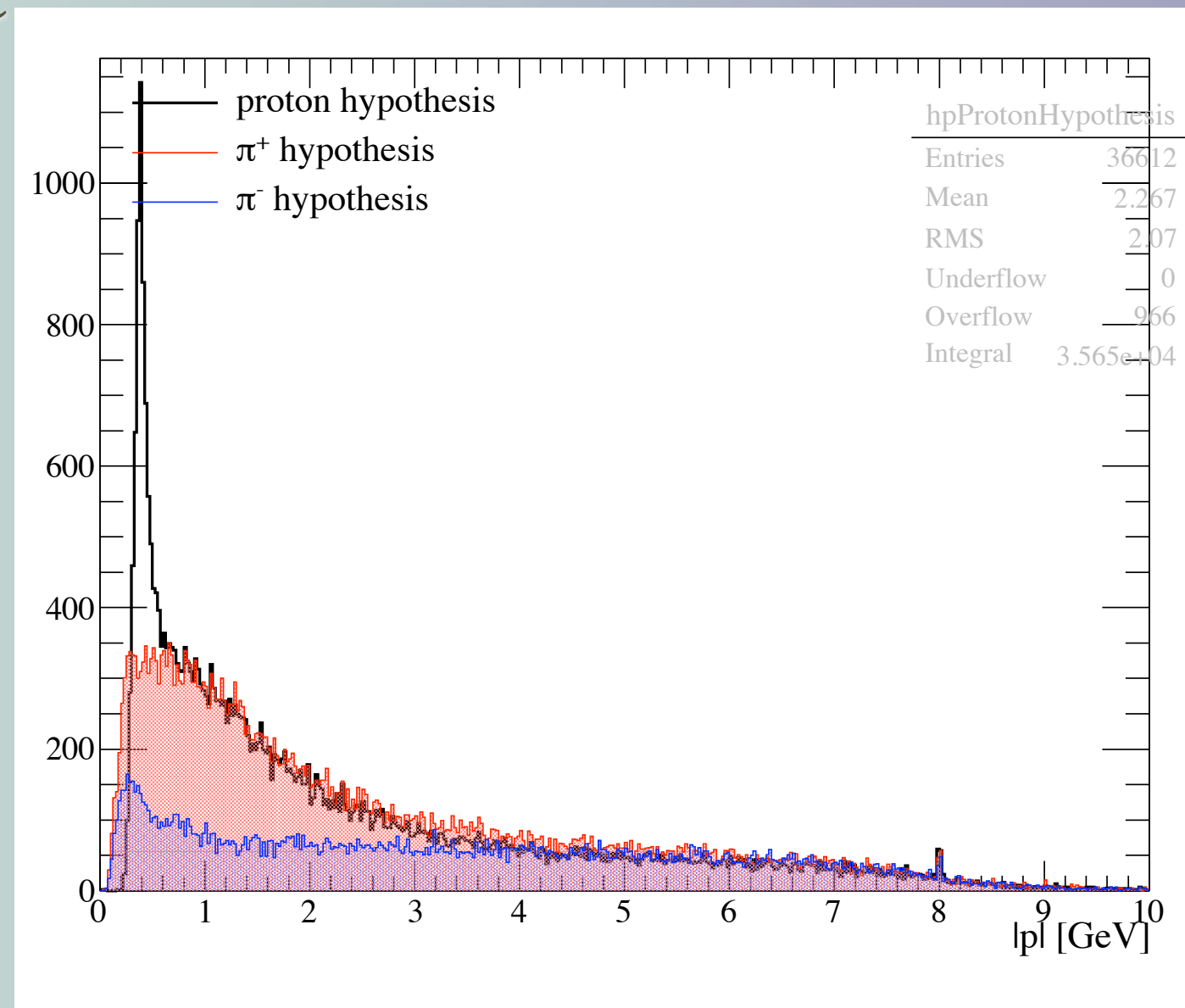
<http://dustbunny.physics.indiana.edu/~kmoriya/2010.12.13.infinitemloop/>

(previous email copied to readme.txt)

- would really be nice to get rid of this problem
- waiting for feedback, but IU also still working on this problem

Problem #1 (1/3)

- π^+ events reconstructed as proton show “spike” in momentum at ~ 0.5 GeV/c
- also small bump at 8 GeV/c
- also isolated these events
- email sent on Dec. 13, see

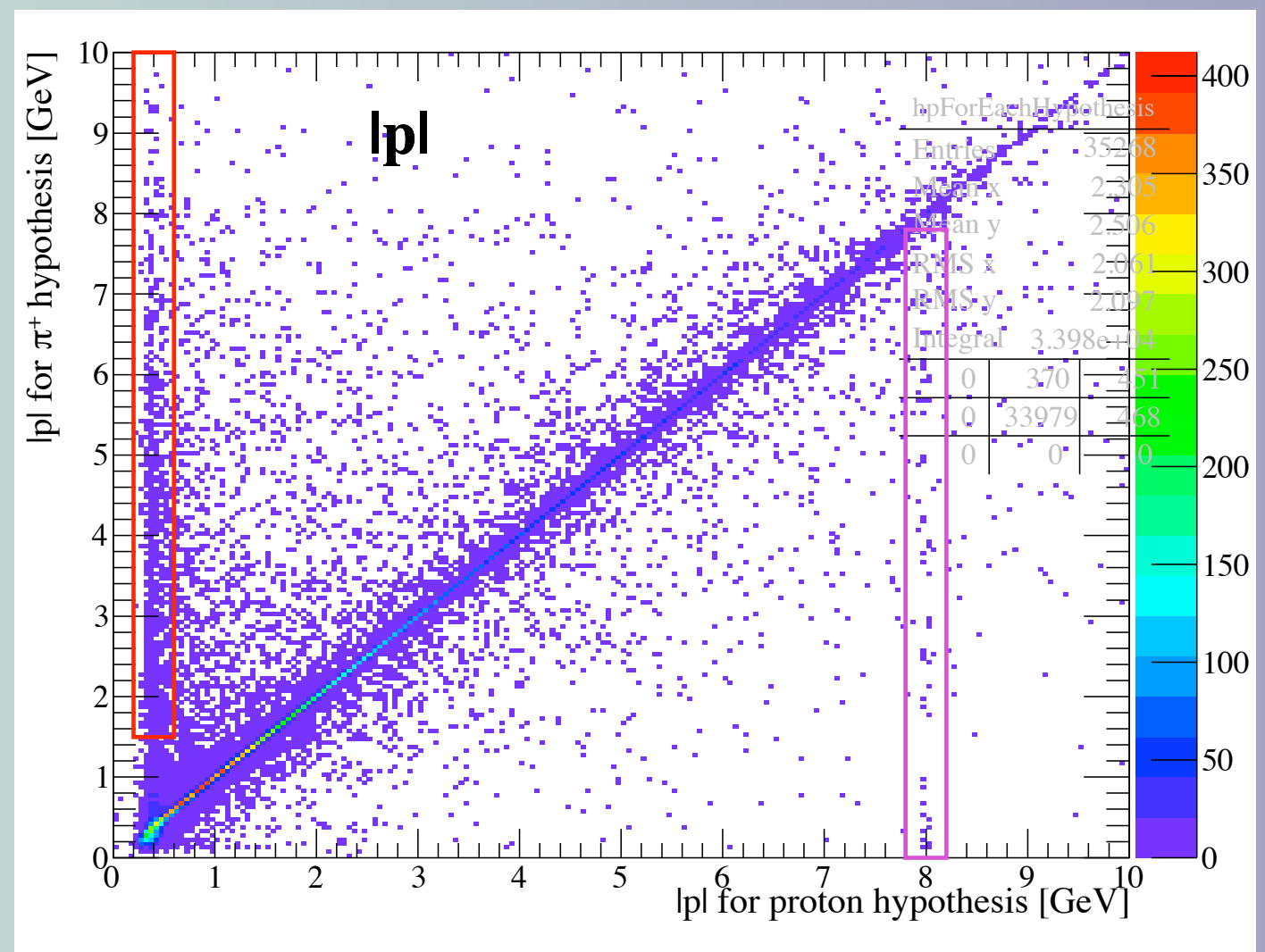


<http://dustbunny.physics.indiana.edu/~kmoriya/2010.12.13.mismatch/>

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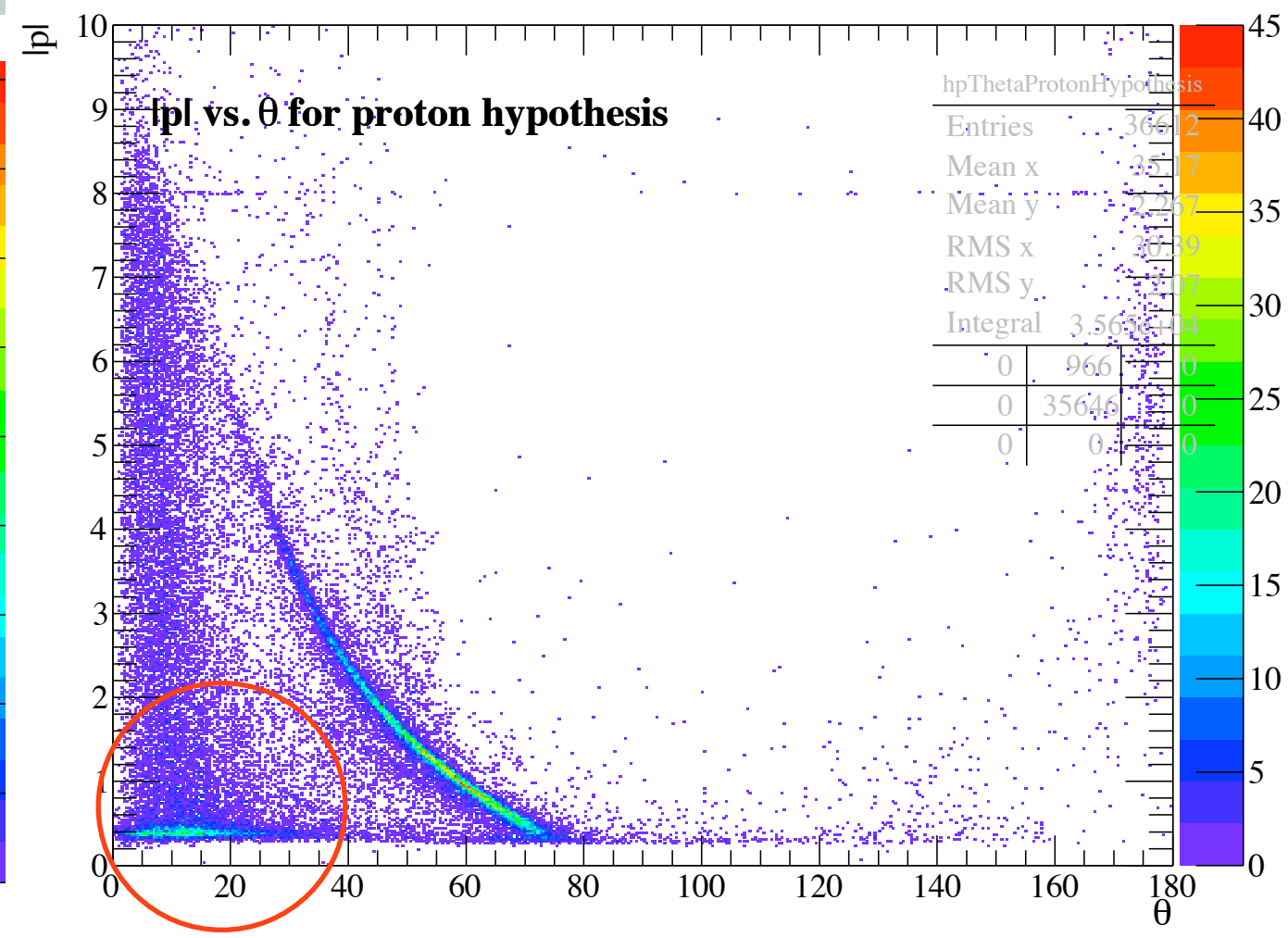
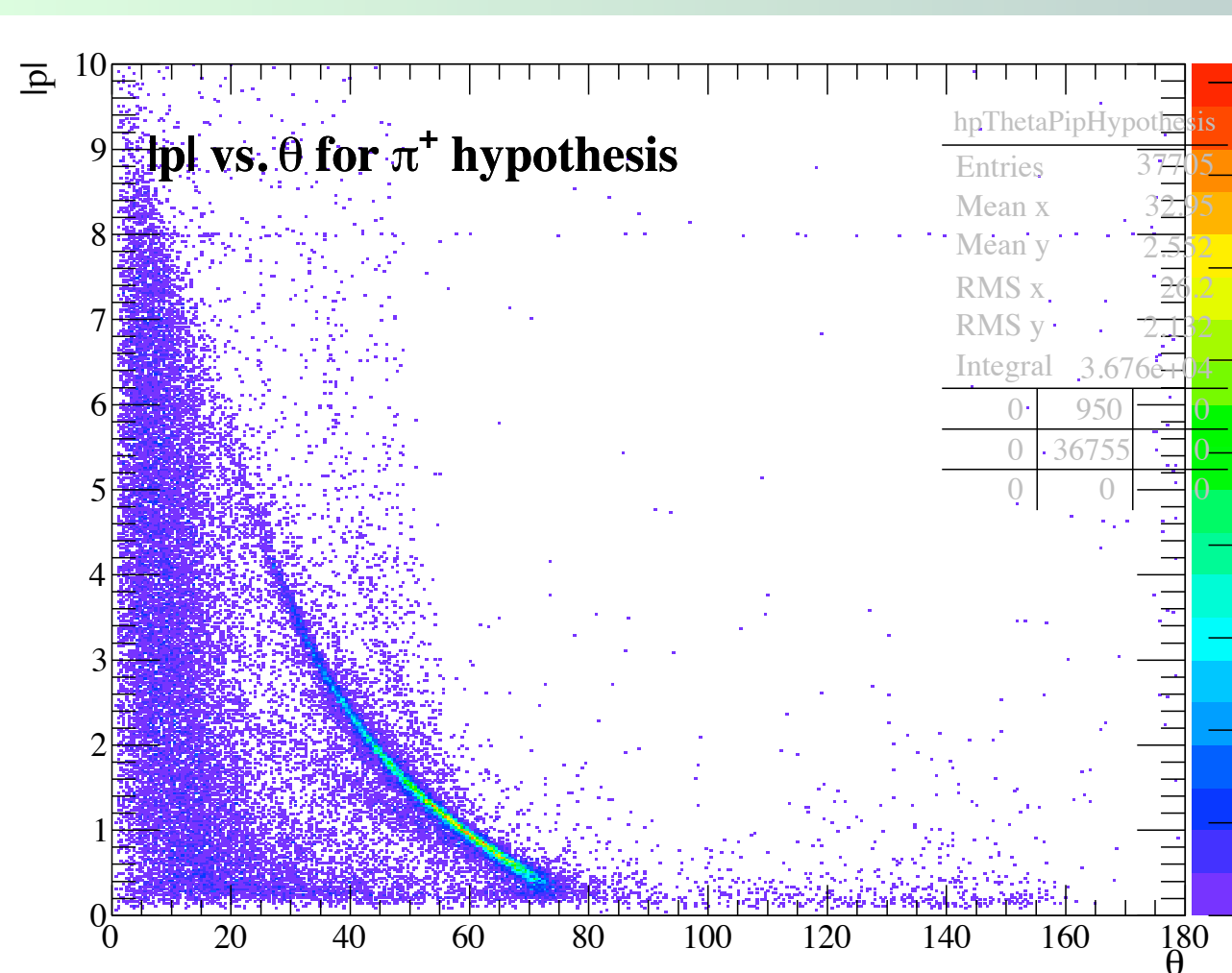
Problem #1 (2/3)

- plot magnitude of momentum for each hypothesis
- proton momentum $|p| \sim 0.5 \text{ GeV}/c$
- π^+ momentum $|p| = 1\text{--}8 \text{ GeV}/c$



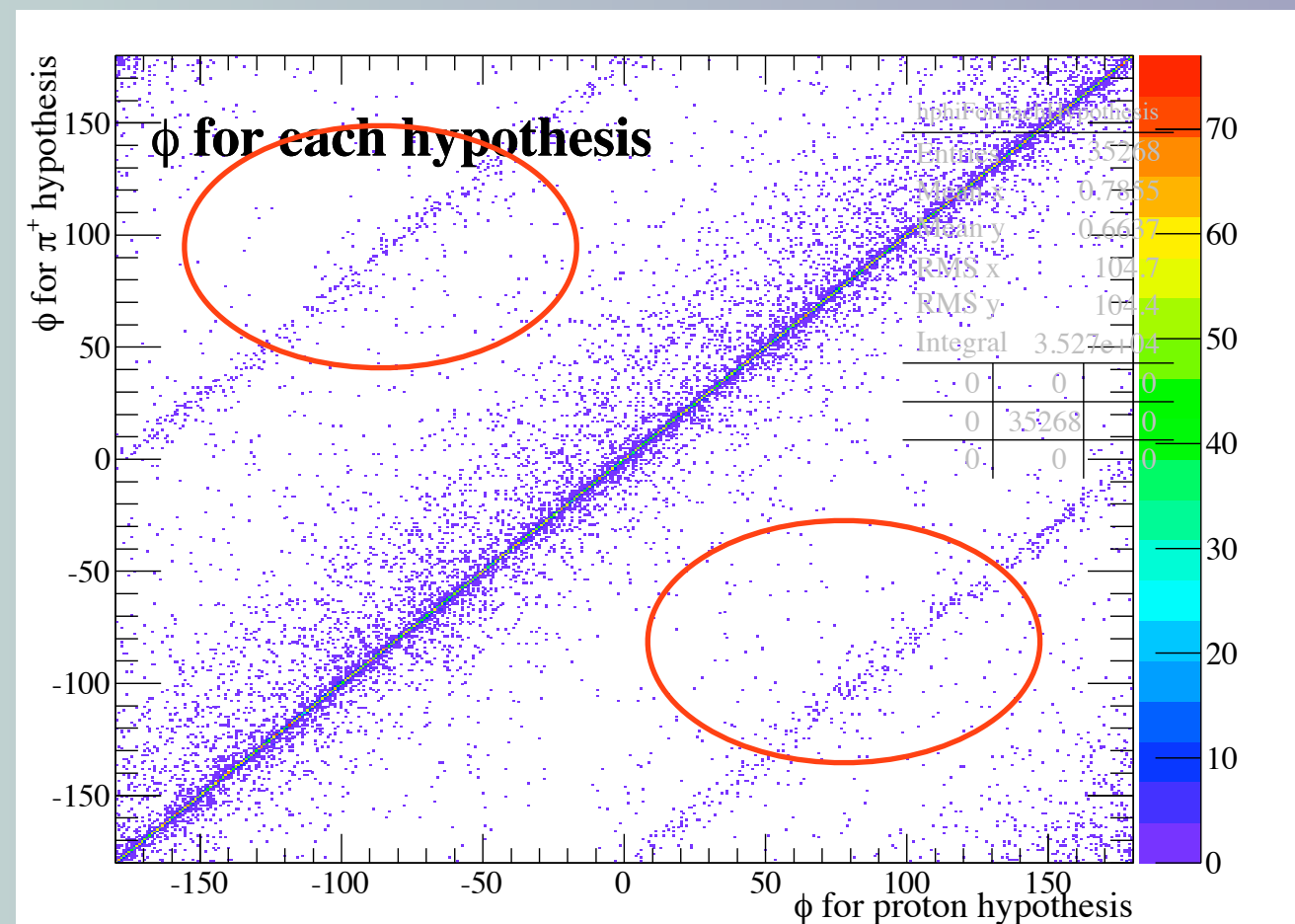
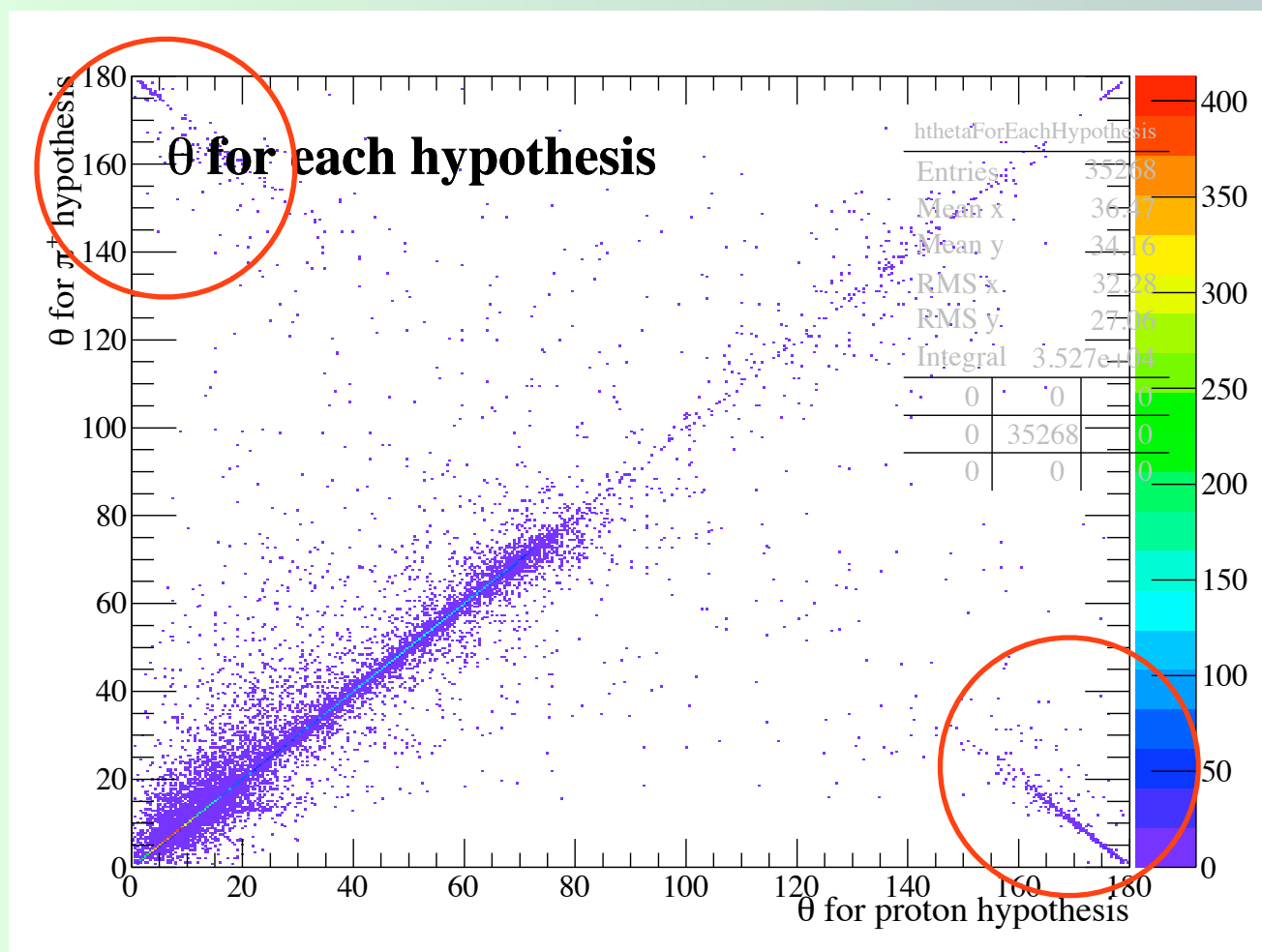
Problem #1 (3/3)

- plot $|p|$ vs. θ in lab frame
- different cutoff for low momentum



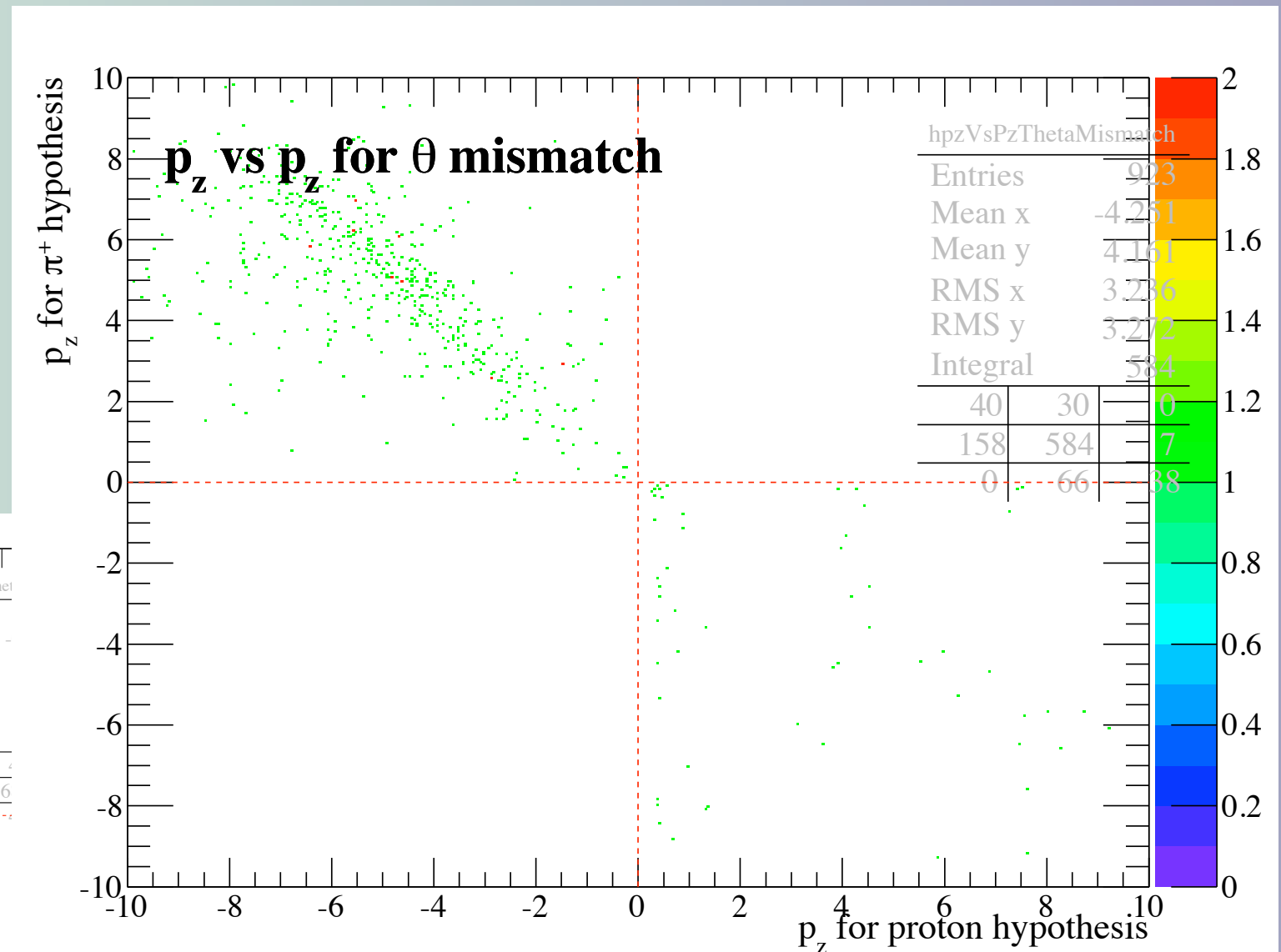
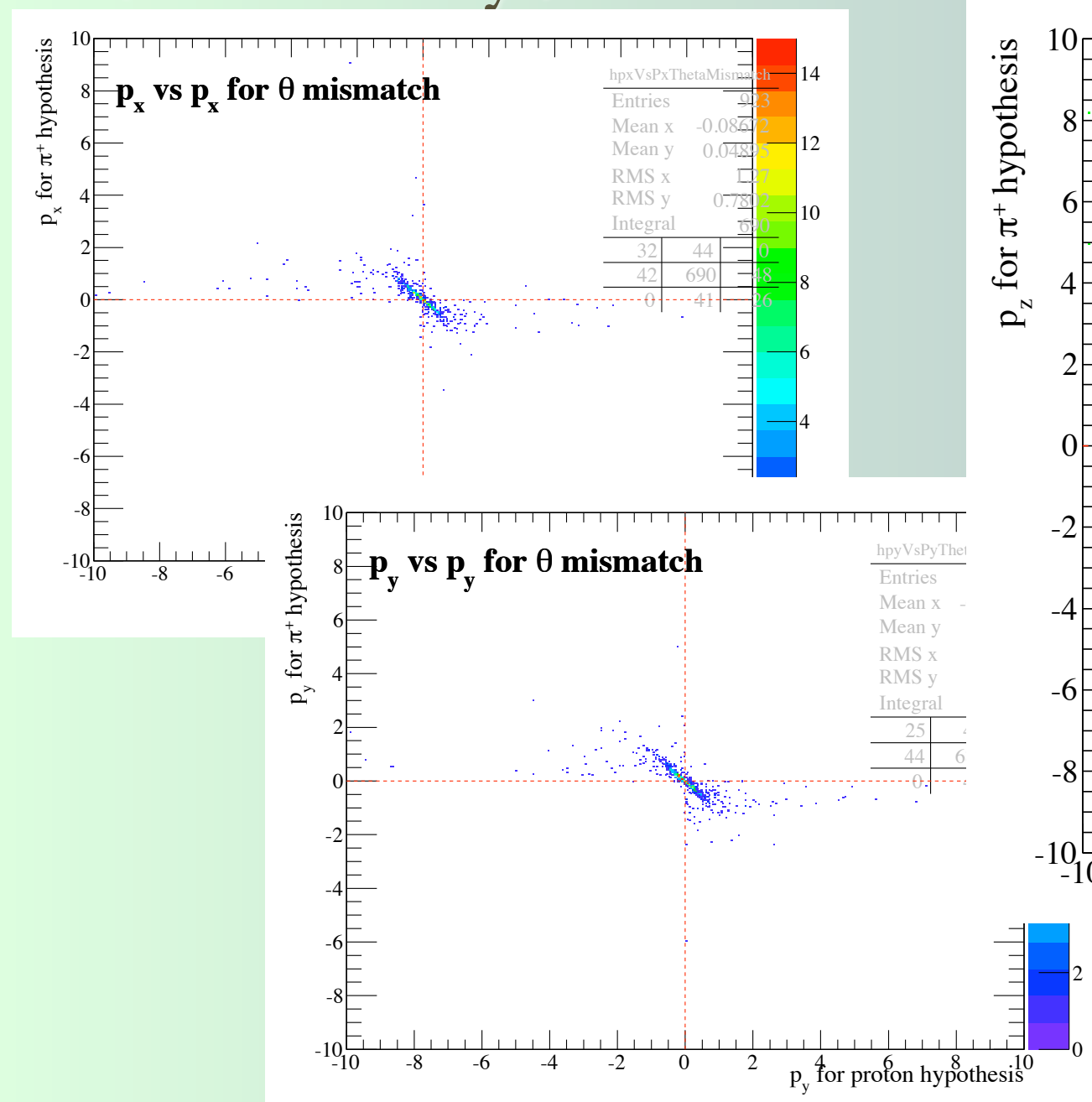
Problem #2 (1/2)

- some events have direction of momentum “reversed”
- $\theta' = 180 - \theta$, $\phi' = \phi \pm 180$



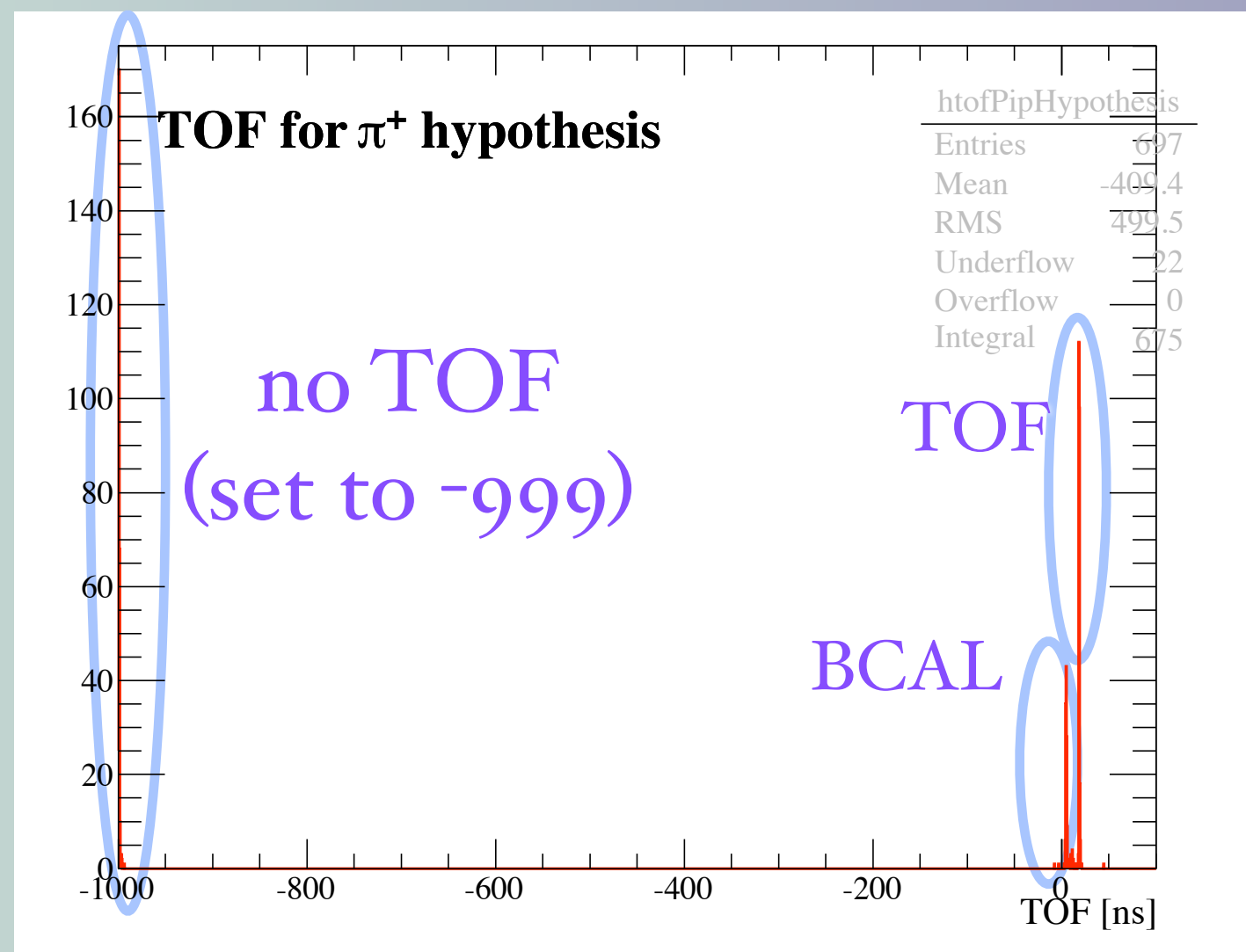
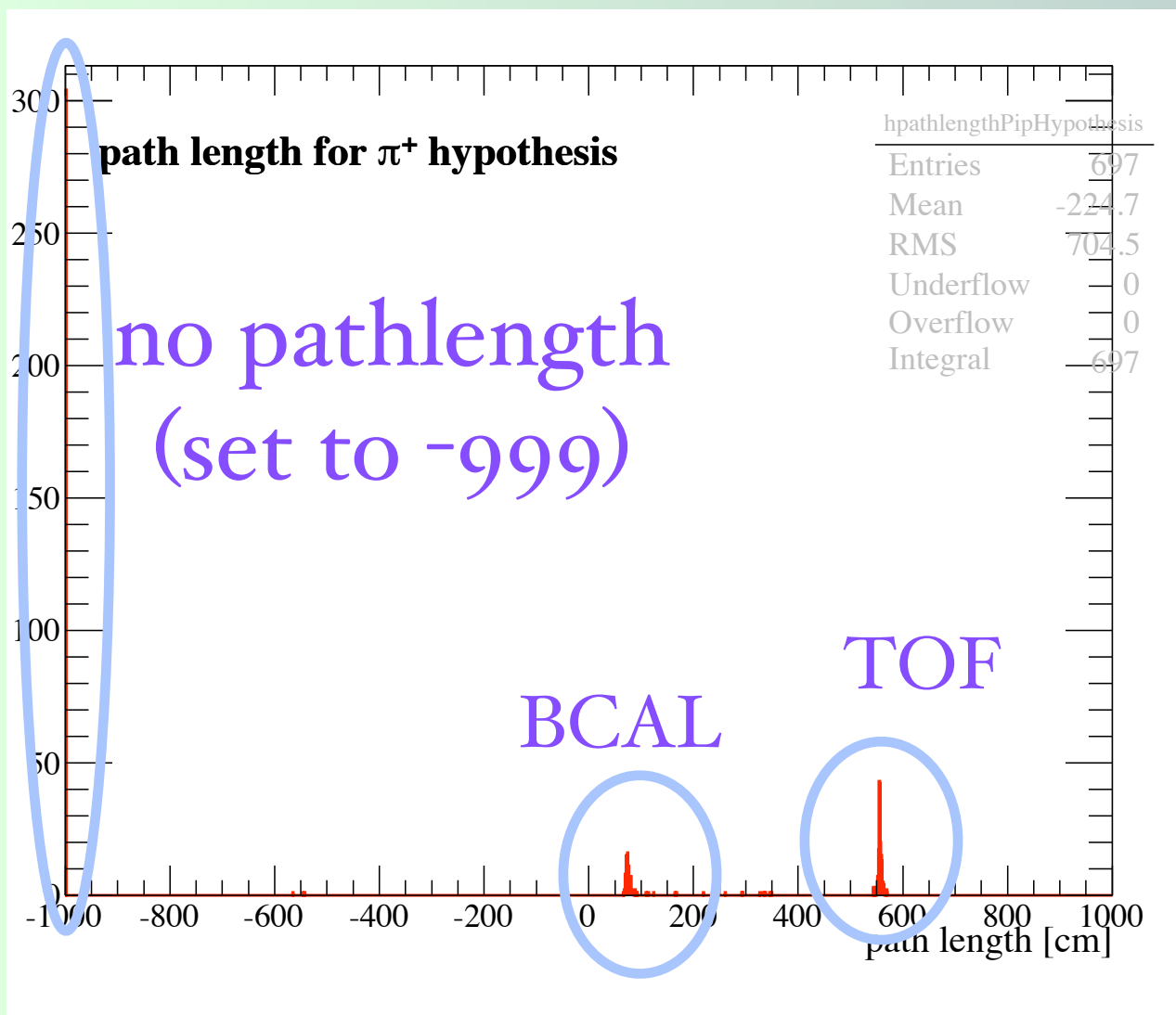
Problem #2 (2/2)

- for same track, momentum is *almost* reversed (not exactly!)



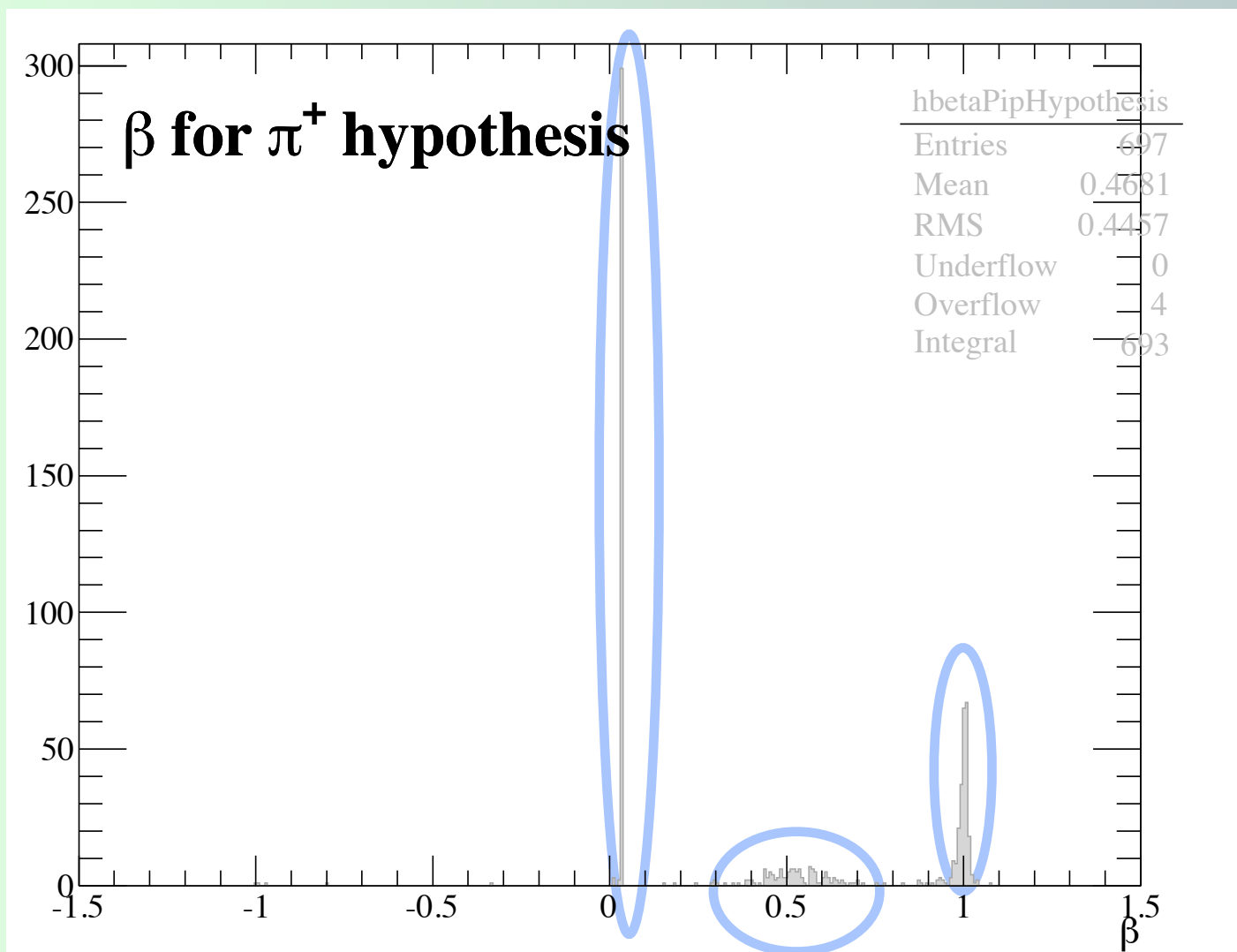
Problem #3 (1/2)

- values of variables ill-defined
- example: path length, TOF for each hypothesis



Problem #3 (2/2)

- secondary quantity, beta gives valid number!!
- $\beta = (\text{path length}) / (c * \text{TOF})$
- need stronger guard against undefined values



peak at ~ 0.03 due to
 $(-999)/(-999) / c$
($c = 29.9 \text{ cm/ns}$)

Conclusions

- various issues in Hall D analysis software found
- will keep working on these
- future studies:
 - FOM studies
 - kaons
 - kinematic fitting
 - neutrals