Level-2 Muon Times

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Trigger Board Meeting

(04-16-04)

- Introduction
- Time Gates
- Rejection
- Efficiency

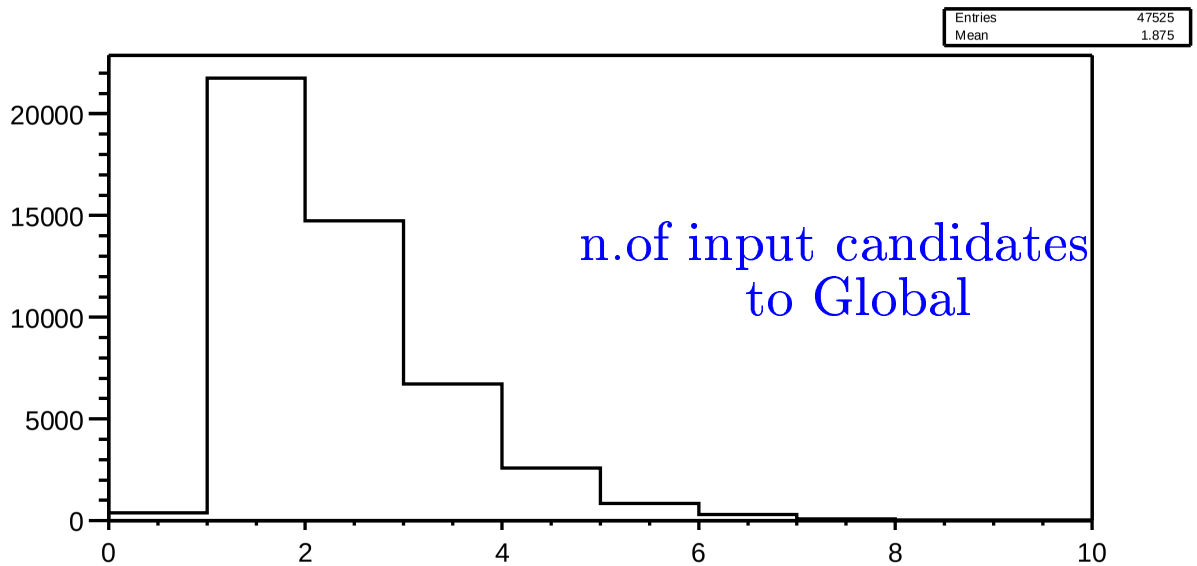
Introduction

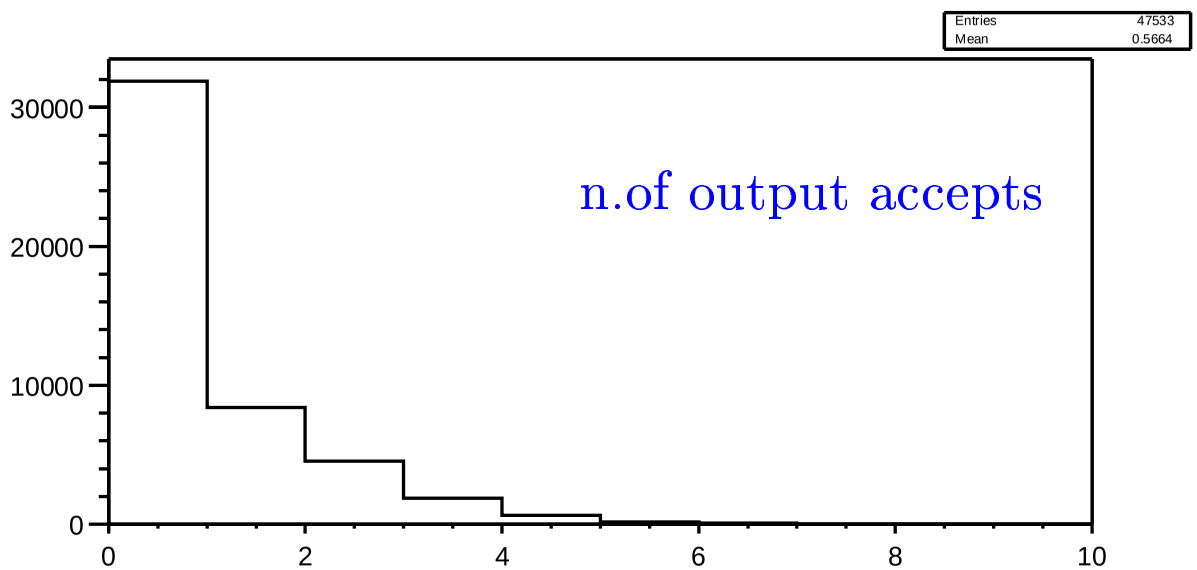
- Scint. hits are being used only as position hits at L2
- We investigate here the use of trigger time gates at L2
- Looking at real data:
  - special run 191322, test version global_CMT-v13
  - running active L1 and L2 triggers, L3 in *M&Pass*
  - TMB reco p14.06.00, with d0correct v00-00-06
- Event selection requires no L1 muon bias
  - 111K evts recorded, 47.5K unbiased

L2 SLICS	L2 BETAS	L2 GLOBAL
A and BC stub finding (times recorded)	Assemble stubs into candidates	(cross region) accept/ reject

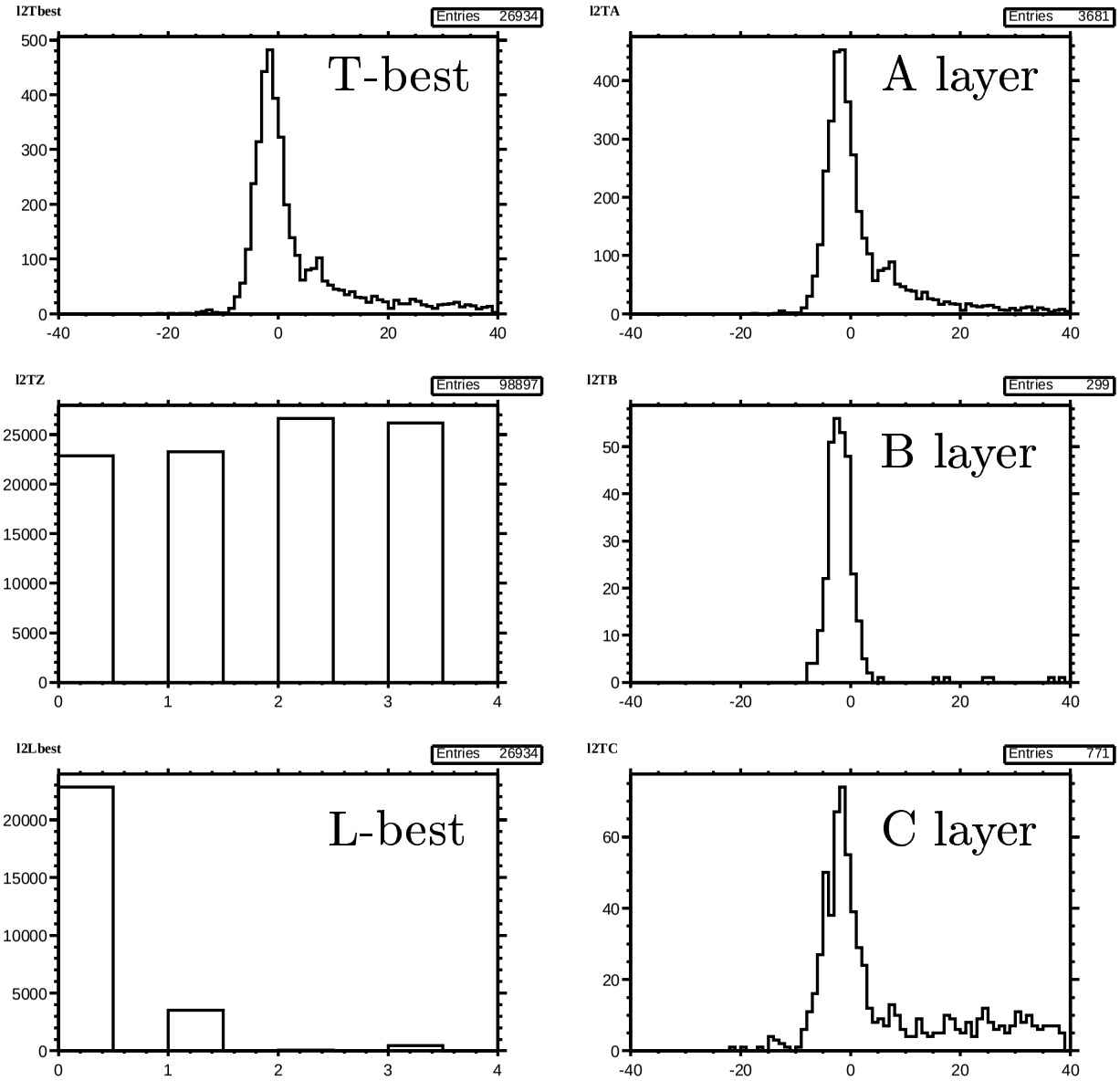
L2 Output-Only Analysis

- Study considers only L2-Global *output* objects.
- These objects have already passed current L2 terms.
- All Rej&Eff quoted are on top of what already is in place.



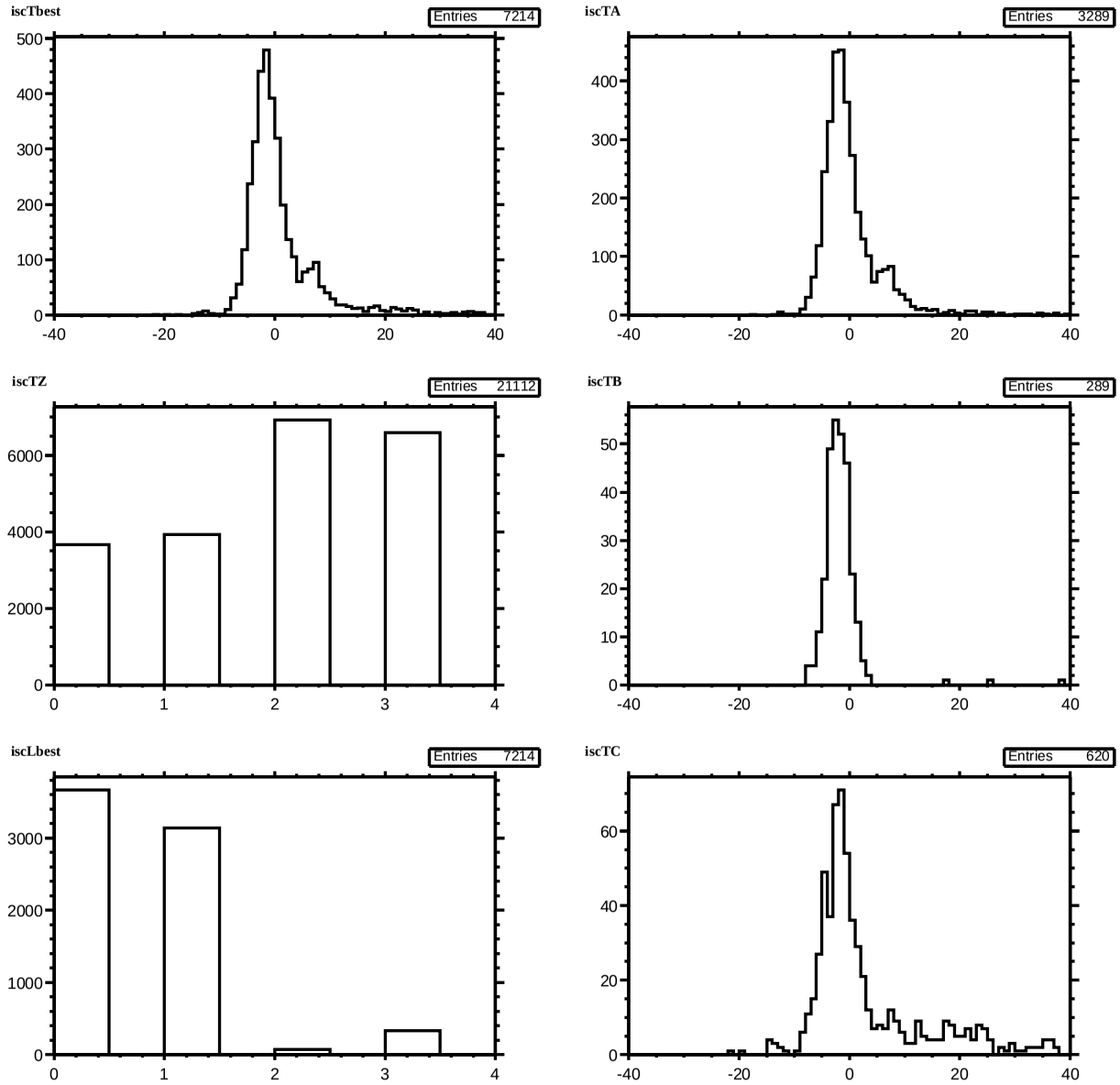


L2 Time Values



All L2 accepts of *loose* quality (times in ns)

L2 Time Values



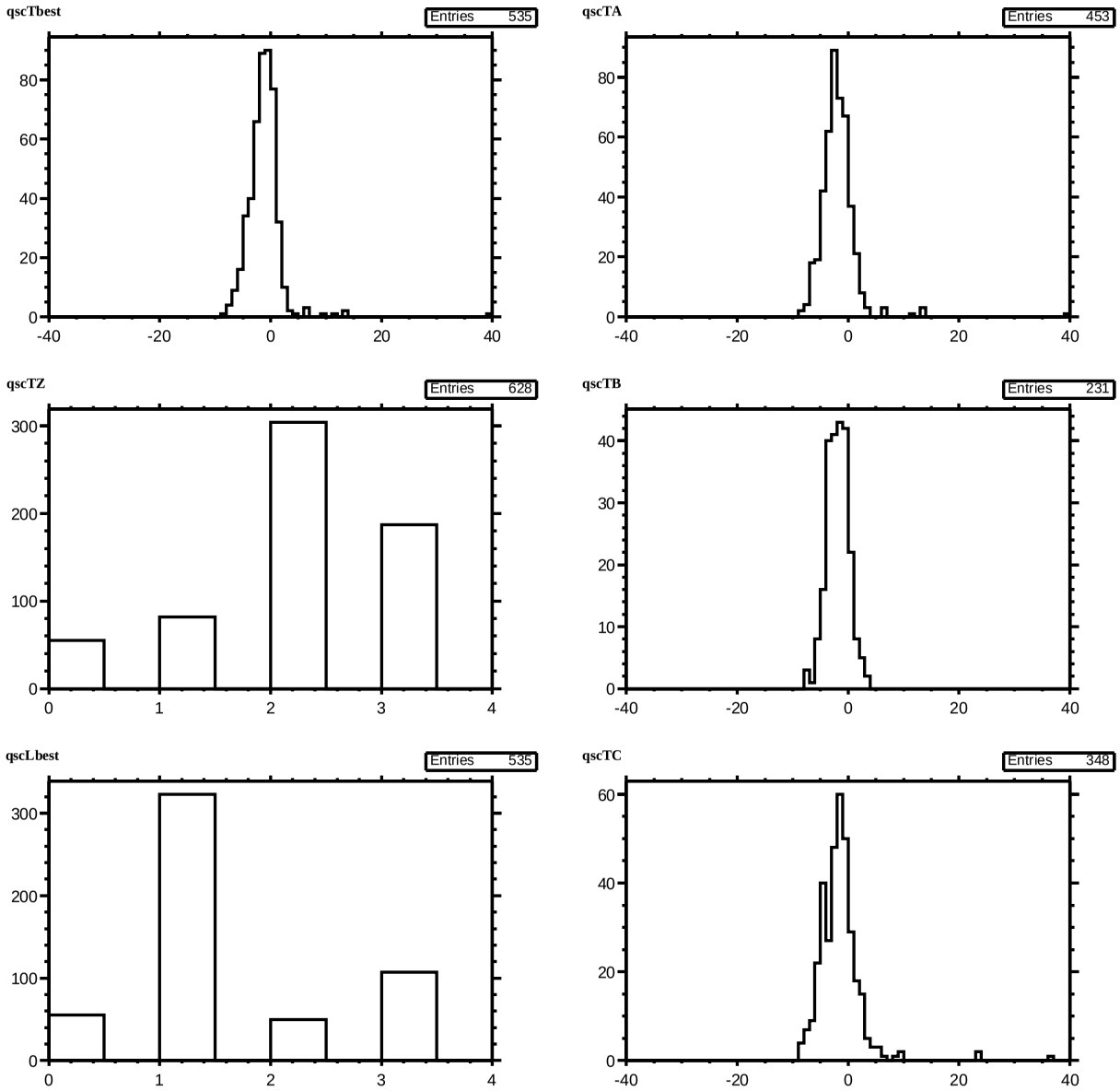
sub-set

inside

L1-fired

octants

L2 Time Values



sub-set

matching

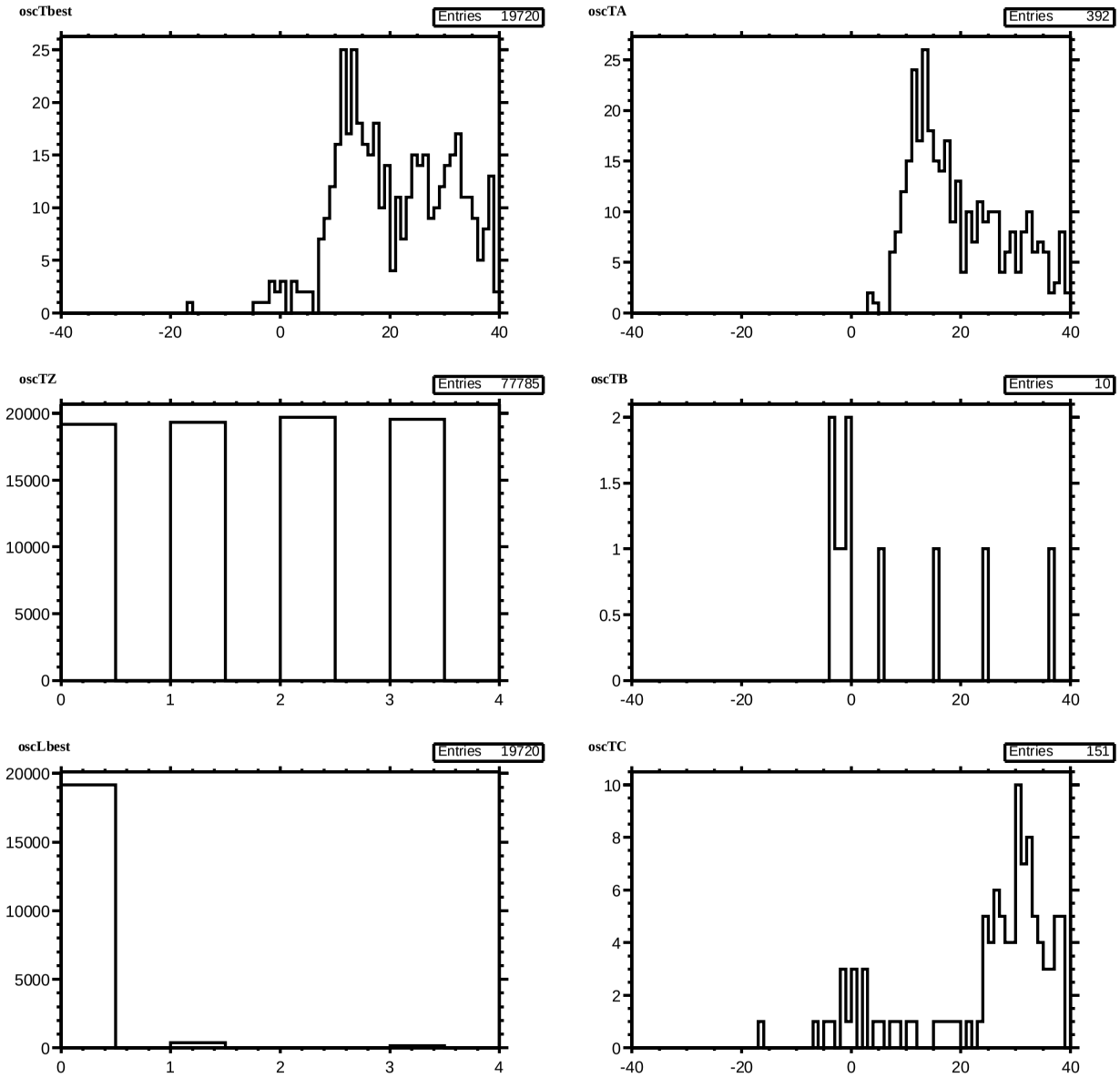
a good

offline

"MuoCandidate"

(time gate $\approx 10ns$)

L2 Time Values



sub-set

outside

L1-fired

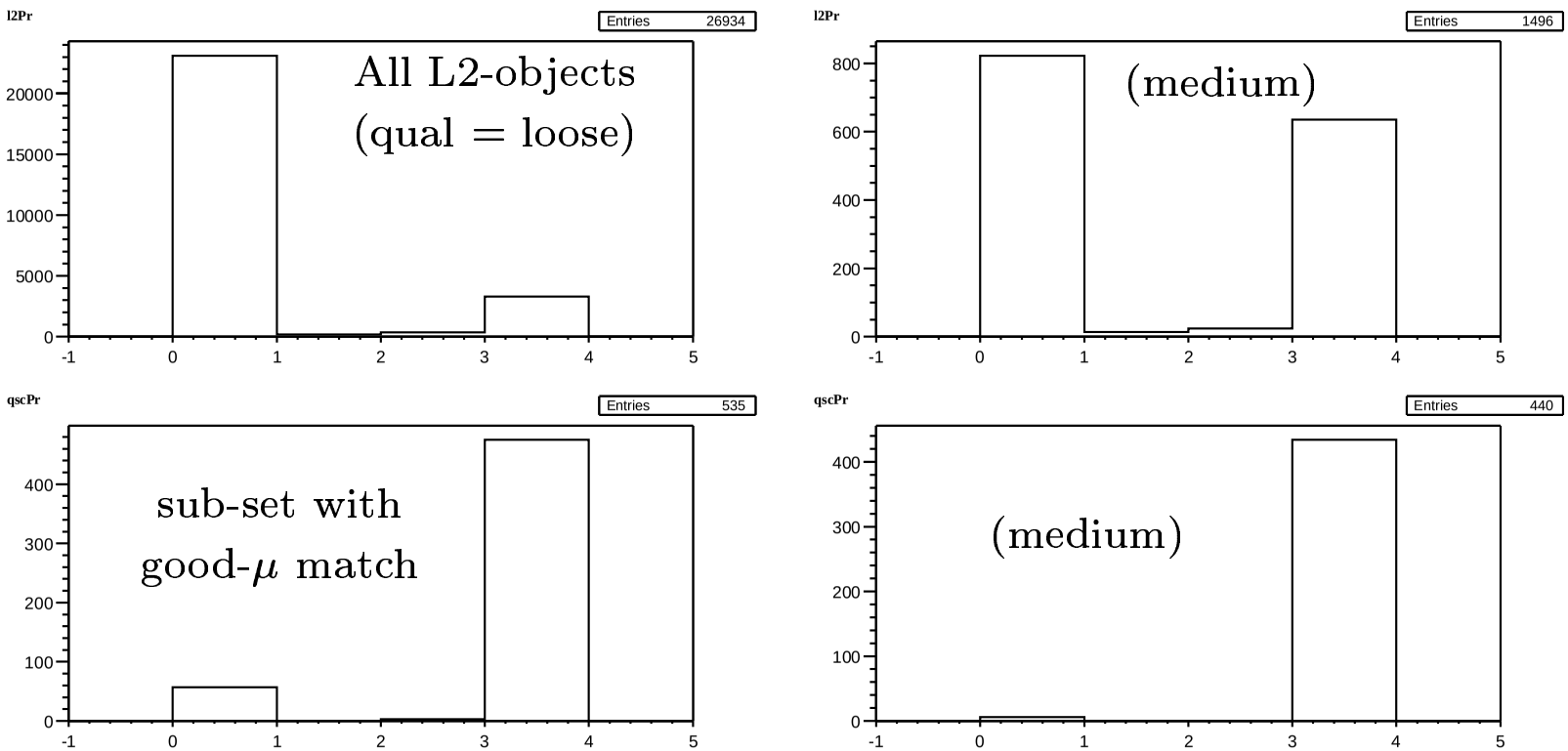
octants

(junk)

Time Based Selection

- L2 objects v13 carrying an encoded 2-bit field called "prompt"
  - absence of any hits makes $prompt = 0$. Otherwise,

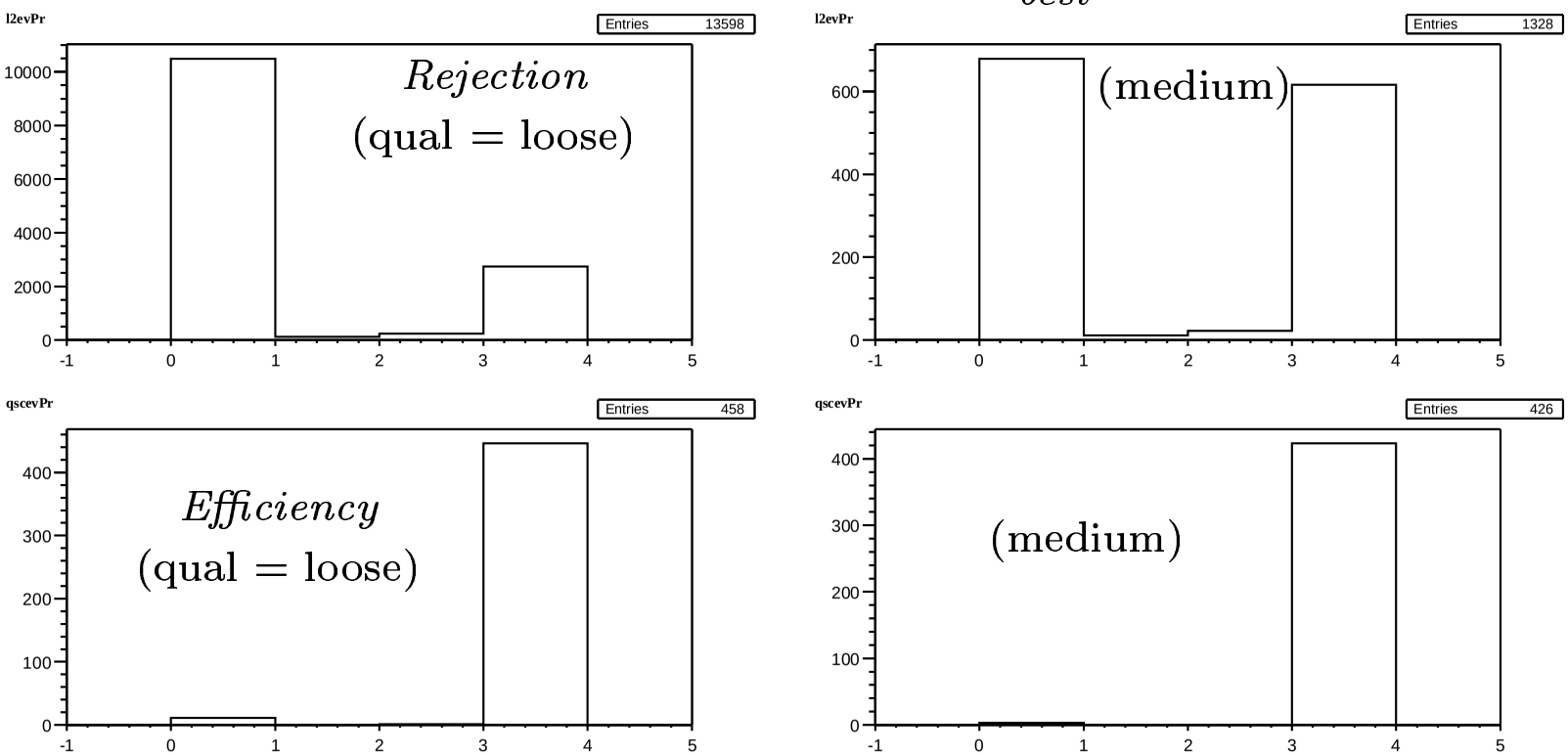
$abs(T_{best}) < (ns)$	10	20	30	else
$prompt$	3 (tgt)	2 (med)	1 (lse)	0



Rejection.vs.Efficiency (extra)

- The base sample for rejection has L2-output objects which
  - passed any L1 muon trigger and a (lse,med) L2 trigger.
- The base sample for efficiency has L2-output objects which
  - are matched to a L1 trigger and an offline good muon.

(entries are per-event – T^{evt}_{best})



Rejection.vs.Efficiency (extra)

- The "tight" choice ($abs(T^{evt}_{best}) < 10ns$) translates into numbers acc.to the tables below. Efficiency and rejection are defined as;

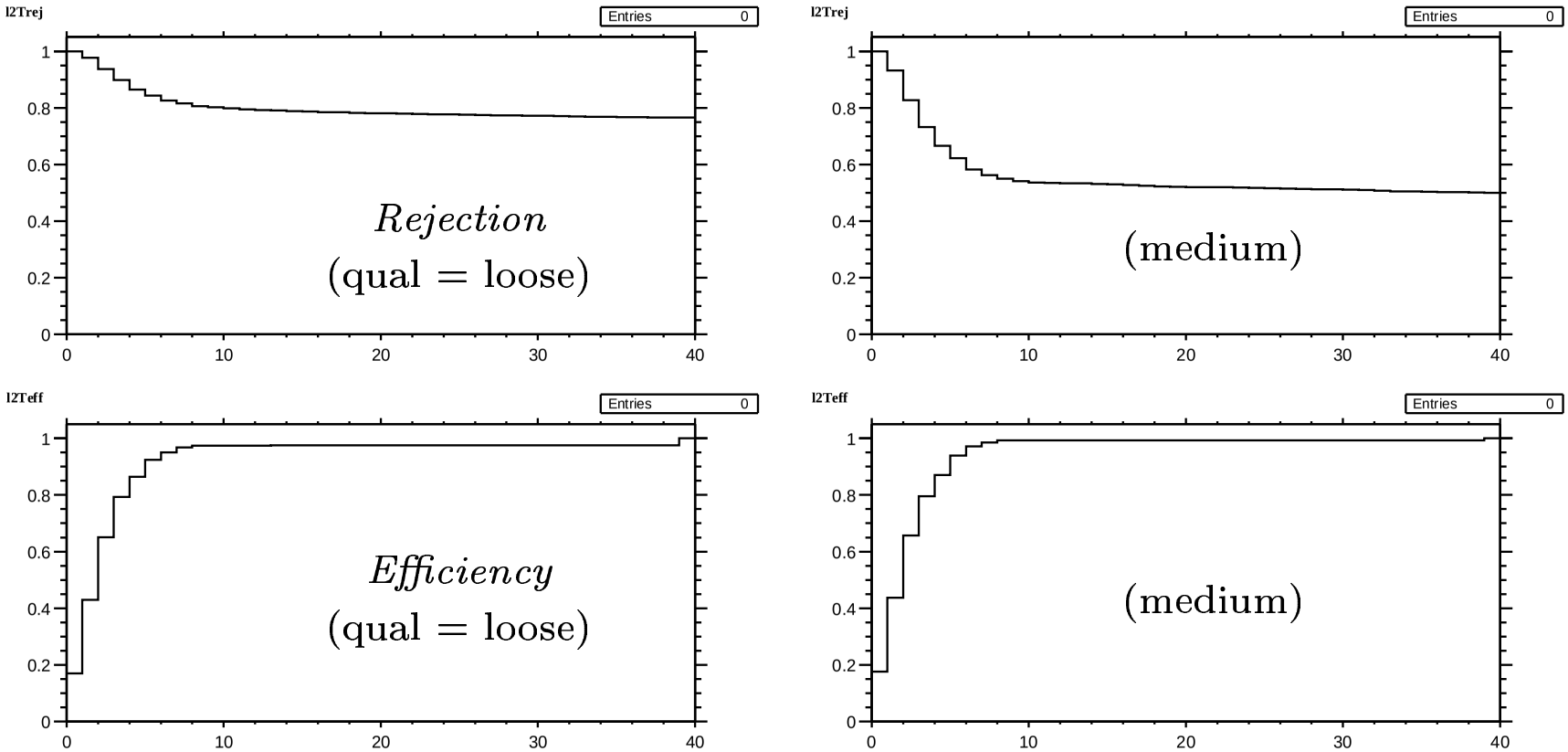
$$e = \frac{N_{evts}(passed)}{(eff\ base\ sample)} \qquad r = \frac{(rej\ base\ sample)}{N_{evts}(passed)}$$

loose	cen+fwd	central	forward
rejection	5.0	8.4	1.5
efficiency(%)	97	91	99

medium	cen+fwd	central	forward
rejection	2.2	3.3	1.05
efficiency(%)	99	98	100

Rejection/Efficiency as a Fn. of $abs(T^{evt}_{best})$

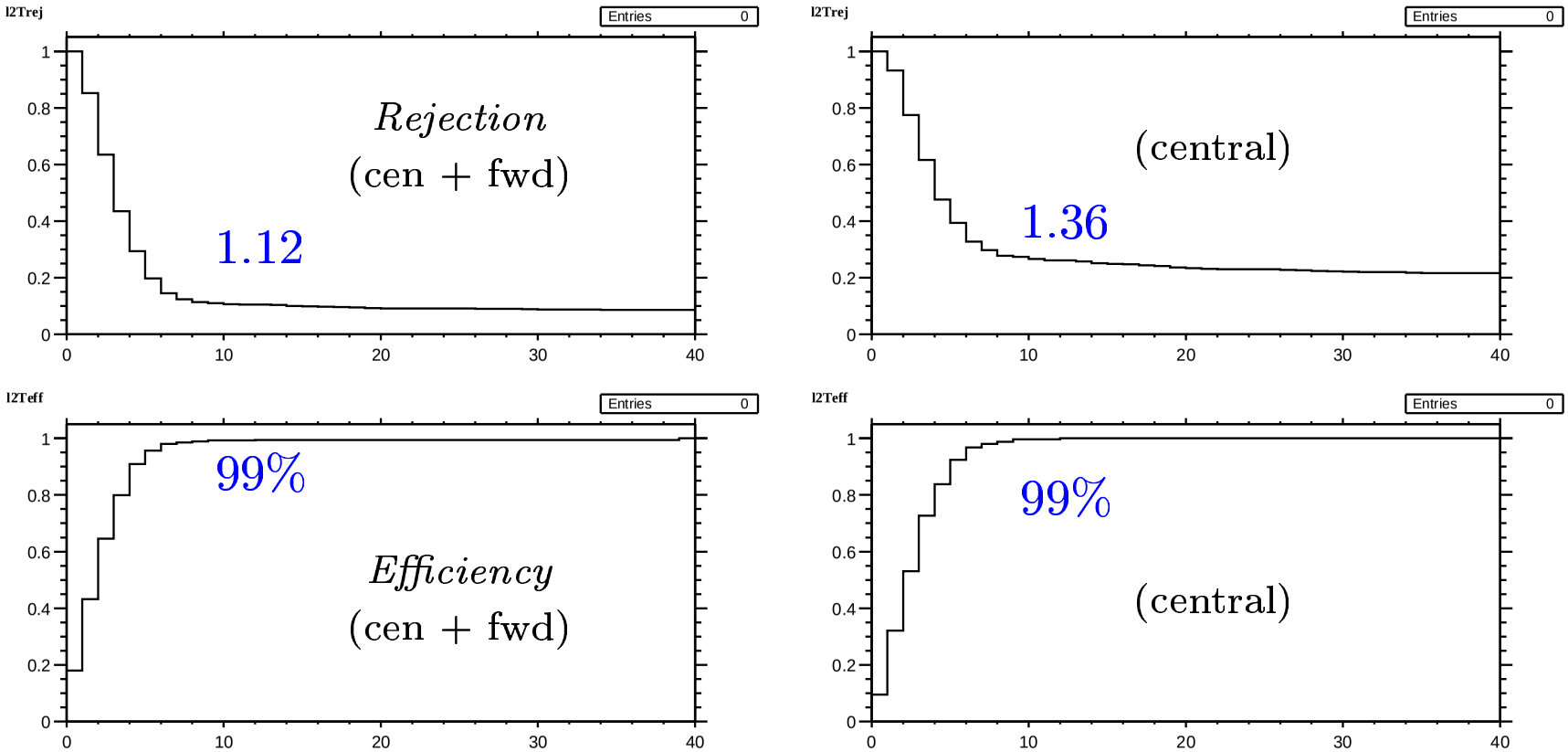
- Supports the choice of a $10ns$ wide trigger gate.



reminder: rejections are w.r.to an "OR" of all L1-muon triggers

Rejection/Efficiency as a Fn. of $abs(T^{evt}_{best})$

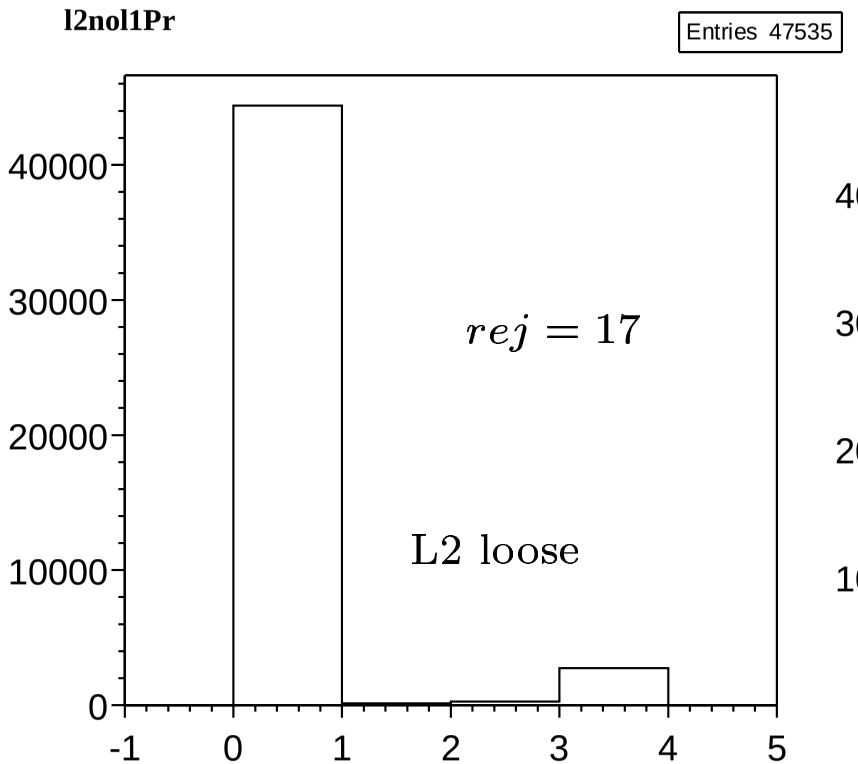
- For events passing L1 = "mu1ptxatxx"

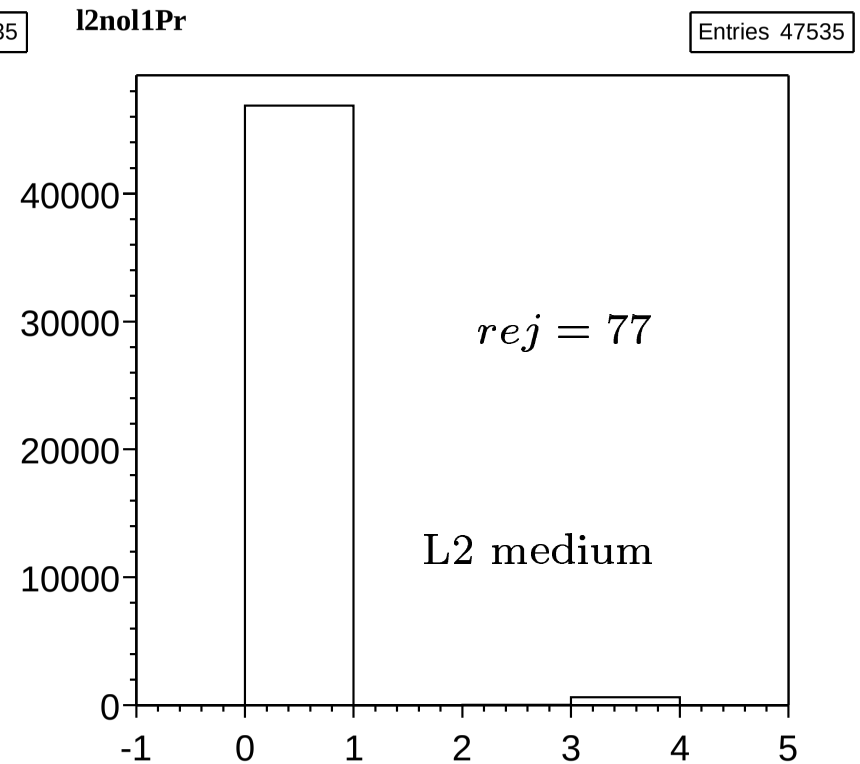


Rejection – no L1mu (Appendix)

- A question from André; what would the (total) rejection be for events without a L1-muon requirement ?
  - Base sample for rejection = muon-(L1)unbiased events.

(entries are per-event – prompt(T^{evt}_{best}) *)*





Credits/Conclusion

- Since my last talk at the T.B. – two new products for V13;
  - new hex-files prepared and VME-downloaded onto SLIC's.
    - Tested, OK. Thanks: Christos L. & Sergey U.
  - "prompt" available on L2-Global for time-gate selection
    - Tested, OK. Thanks: Adam Y. & Josh D.
- Conclusion: there is room for extra L2 rejection from the use of time gates, without significant penalty in efficiency.

  — individual L1 triggers need separate studies