Update on B-jet Cross Section measurement

(O. Peters, NIKHEF)

- Goal: Have a 'reasonable' b-jet cross section measurement in time for Moriond
- How can we get there, what is 'reasonable'?
- Current status
- Todo / Plans

How can we get there?

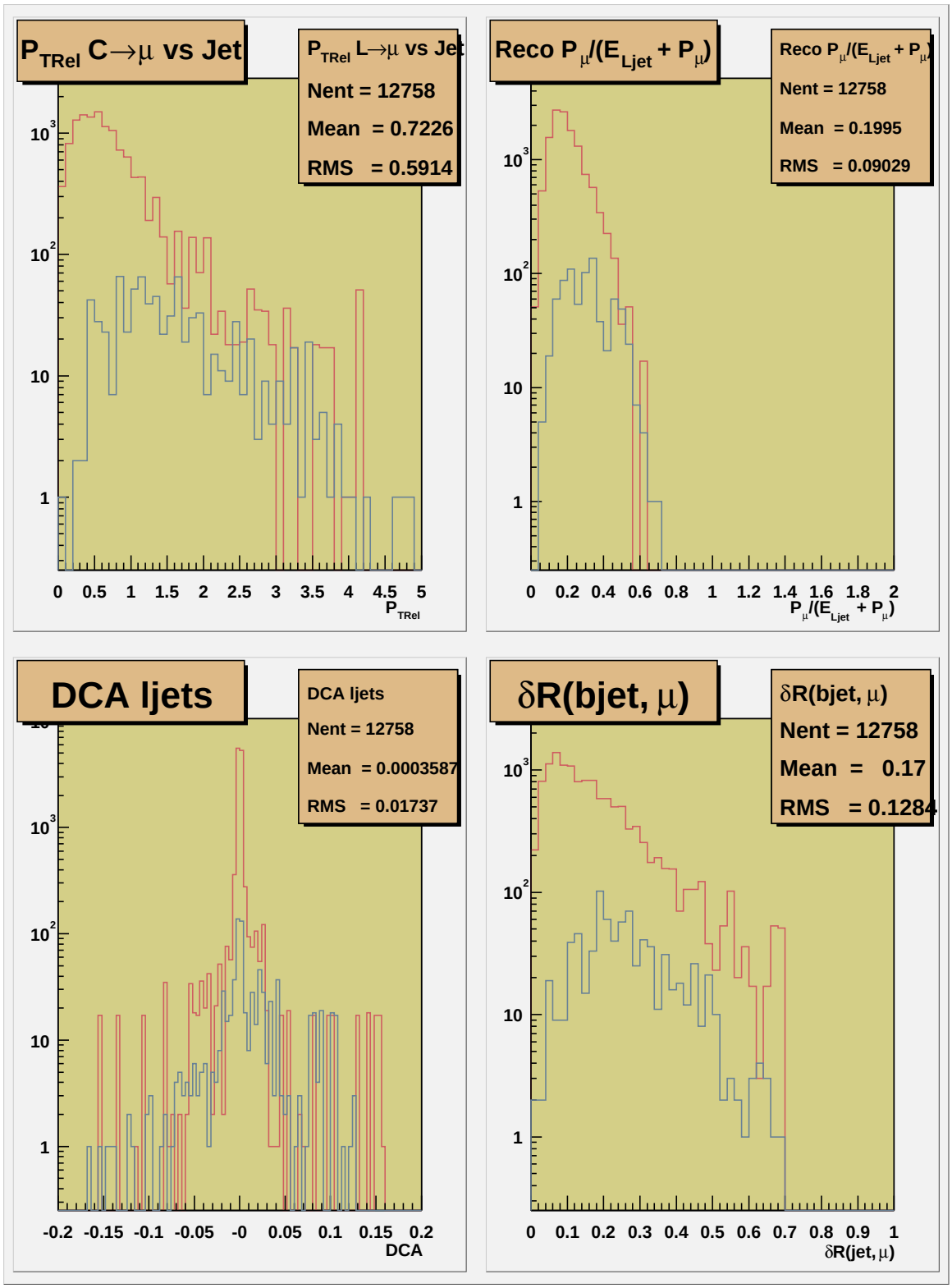
- B-jet tagging with muons ☺
  - Calculate efficiencies/rejection on MC
- Non isolated Muon Reconstruction + ID ☺
  - Efficiency/purity: MC
- Jet Reconstruction + ID 😐
  - Efficiency/purity: MC
- Level 3 trigger ☹
  - Use L3 Jet AND L3 Muon
    - Muon L3 not certified…
  - Calculate efficiency/rejection on MC
- Level 2 trigger ☹
  - Will not be used for Moriond
- Level 1 trigger 😐
  - Only use muon trigger
  - No CTT
  - Use A+C scintillator coincidence filter
- Luminosity 😐
  - Have to get it from somewhere…

Current status

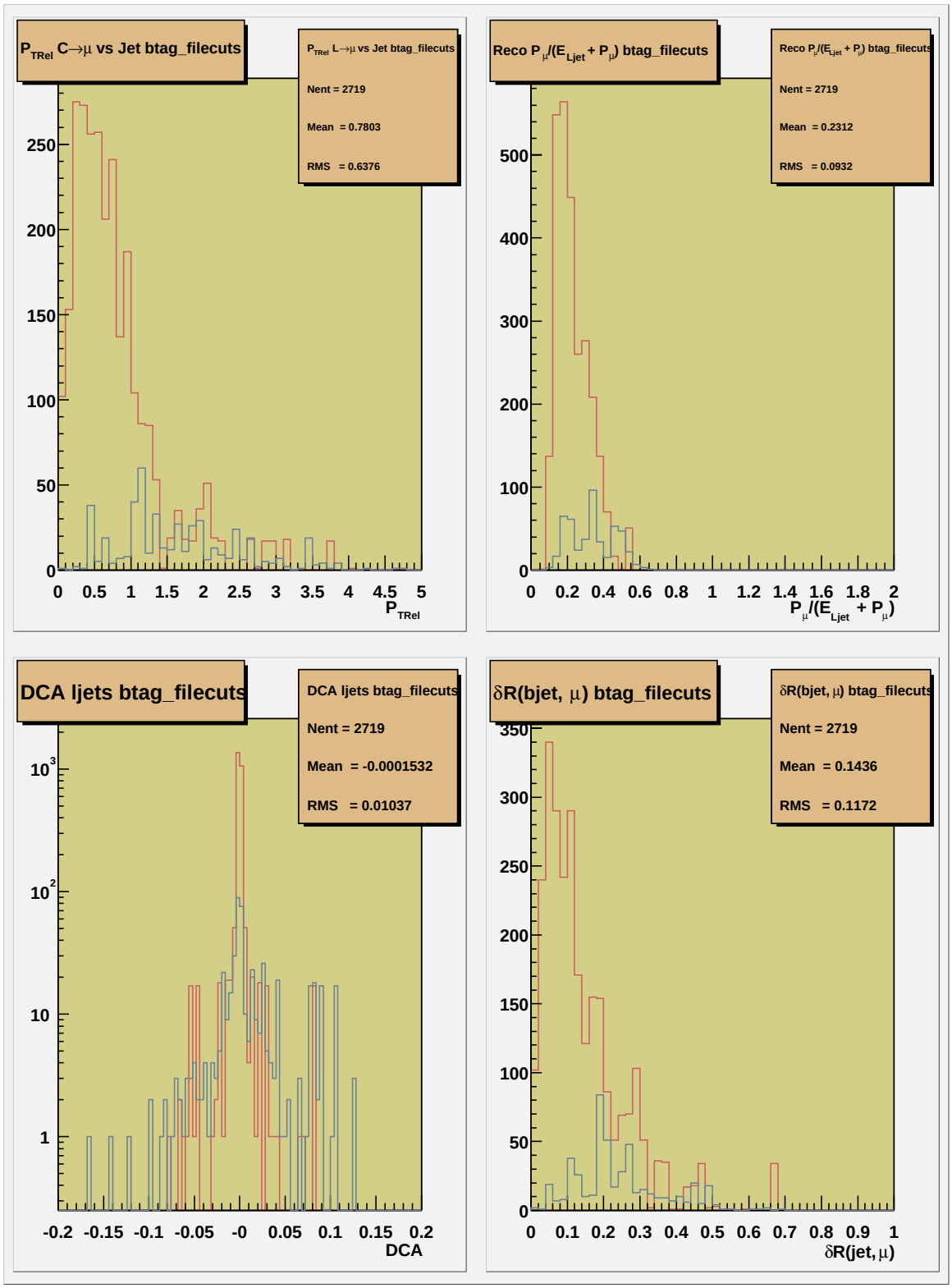
- B-tagging is progressing well
- Working on non-isolated muon ID
  - To be presented in Saclay in 12/2001
- Got a handle on reconstruction efficiencies
- No time for triggers - big problem

B-tagging studies

- Used bb mc file, 900 events, one b decay forced to direct mu (p10.07.01)
- Used QCD file, 18060 events
  - Multiplied by 17 to get ~correct bb/qcd ratio

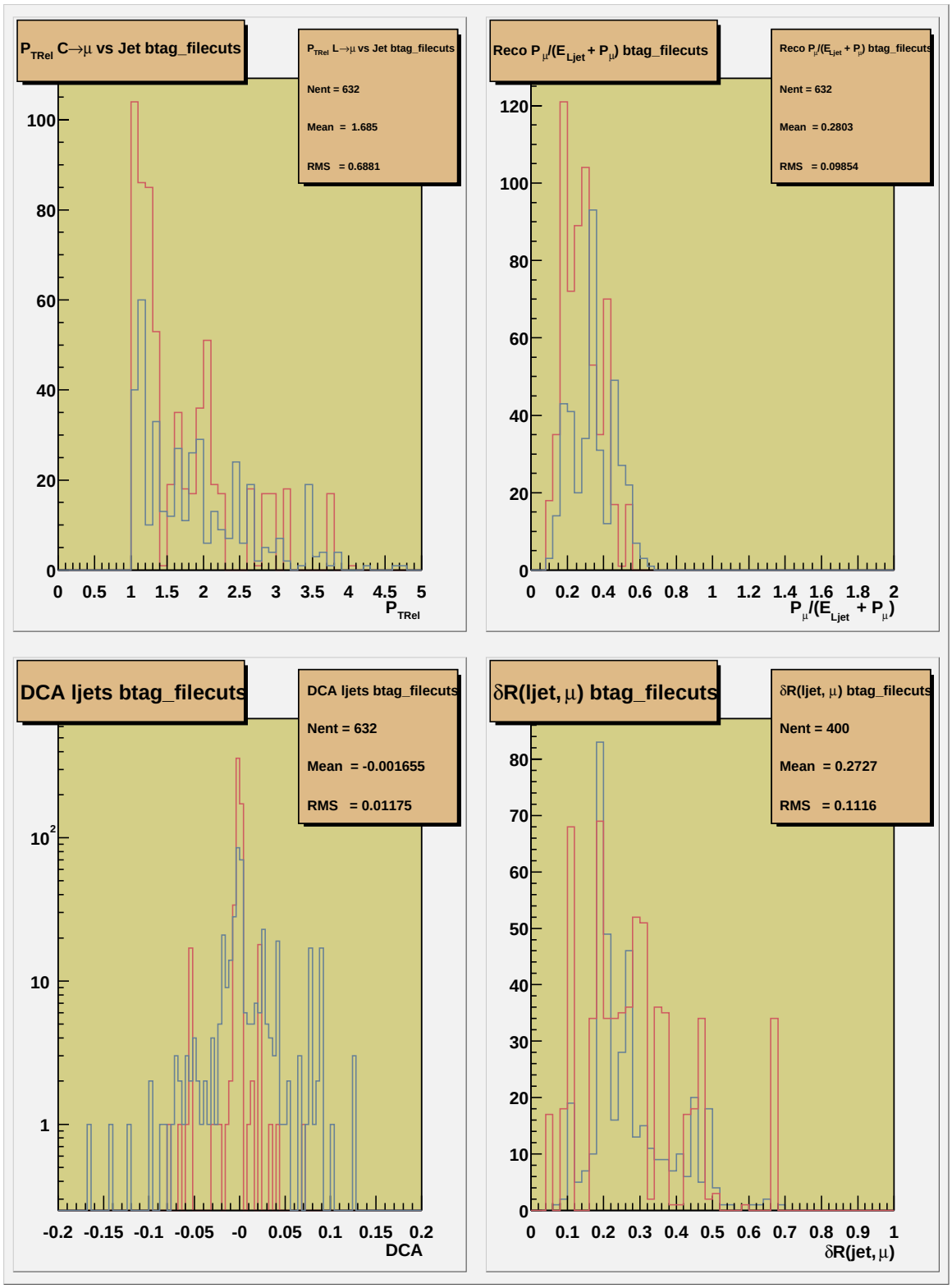


dR < 0.7, Signal: 778, BG: 12758 (S/B ≈ 0.06)

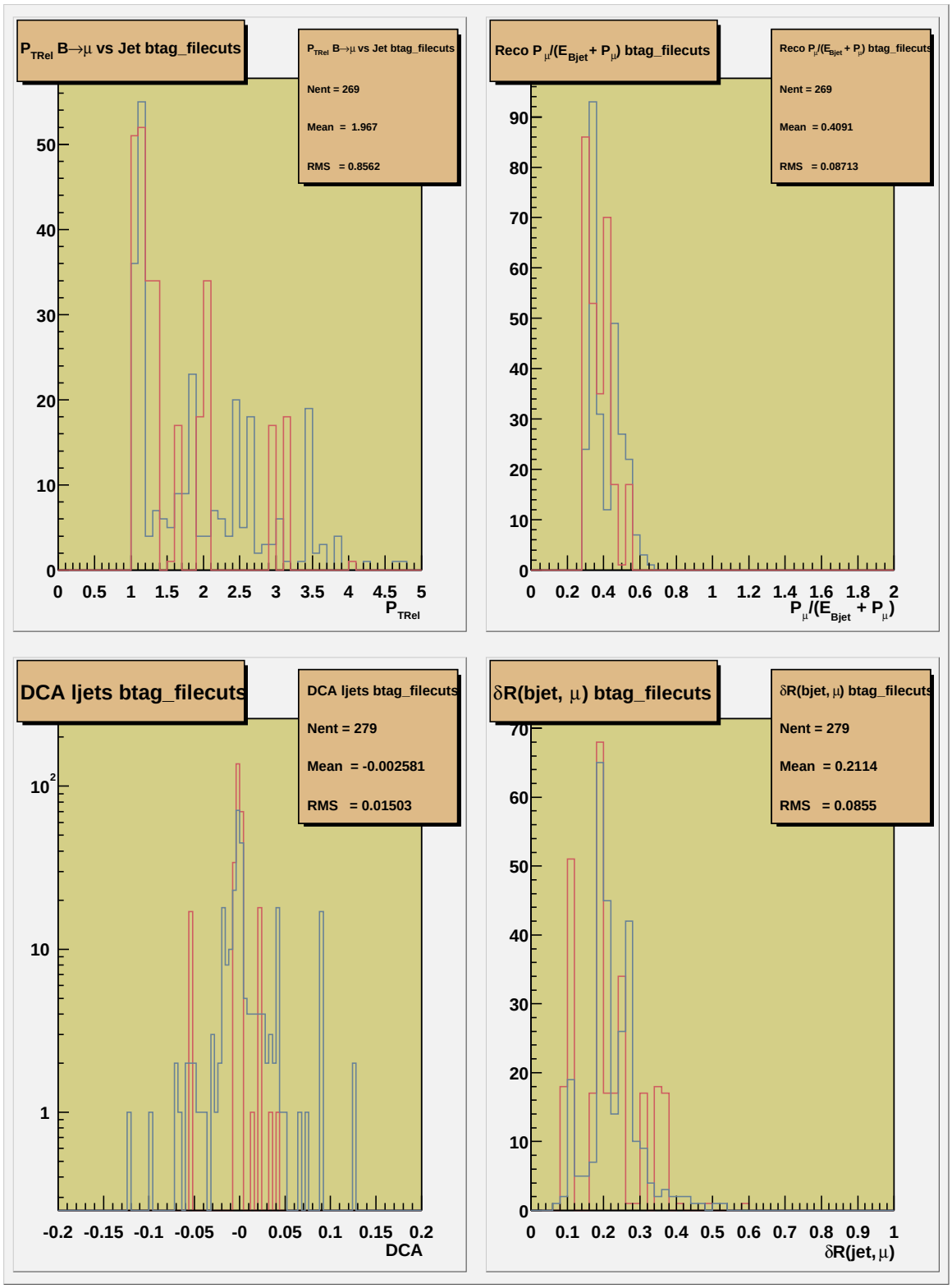


2 segments + global track for mu ('good' muon)

Signal: 485, BG: 2719 (S/B ≈ 0.18)

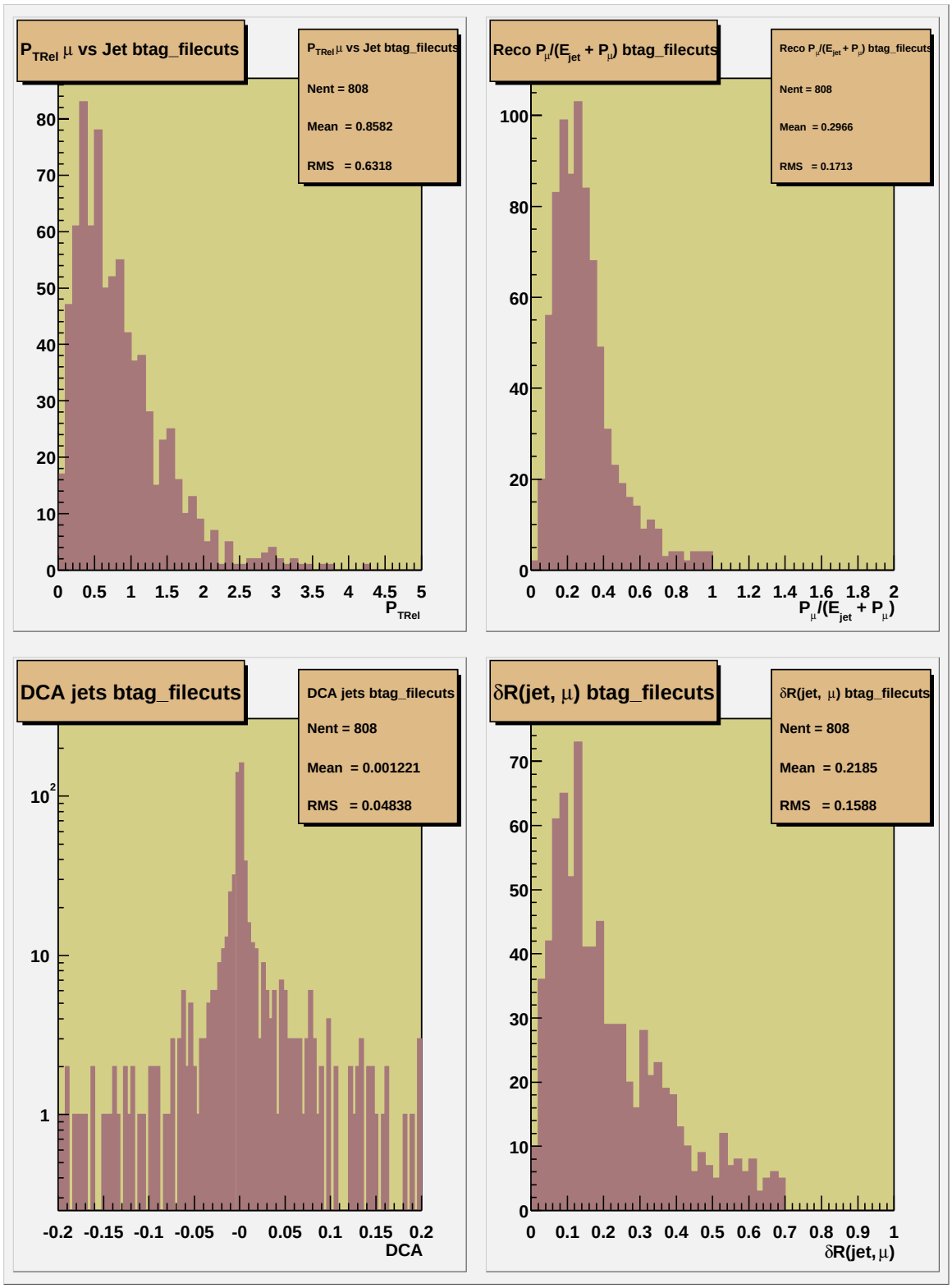


P_{TRel} > 1: Signal 400, BG 632 (S/B ≈ 0.63)

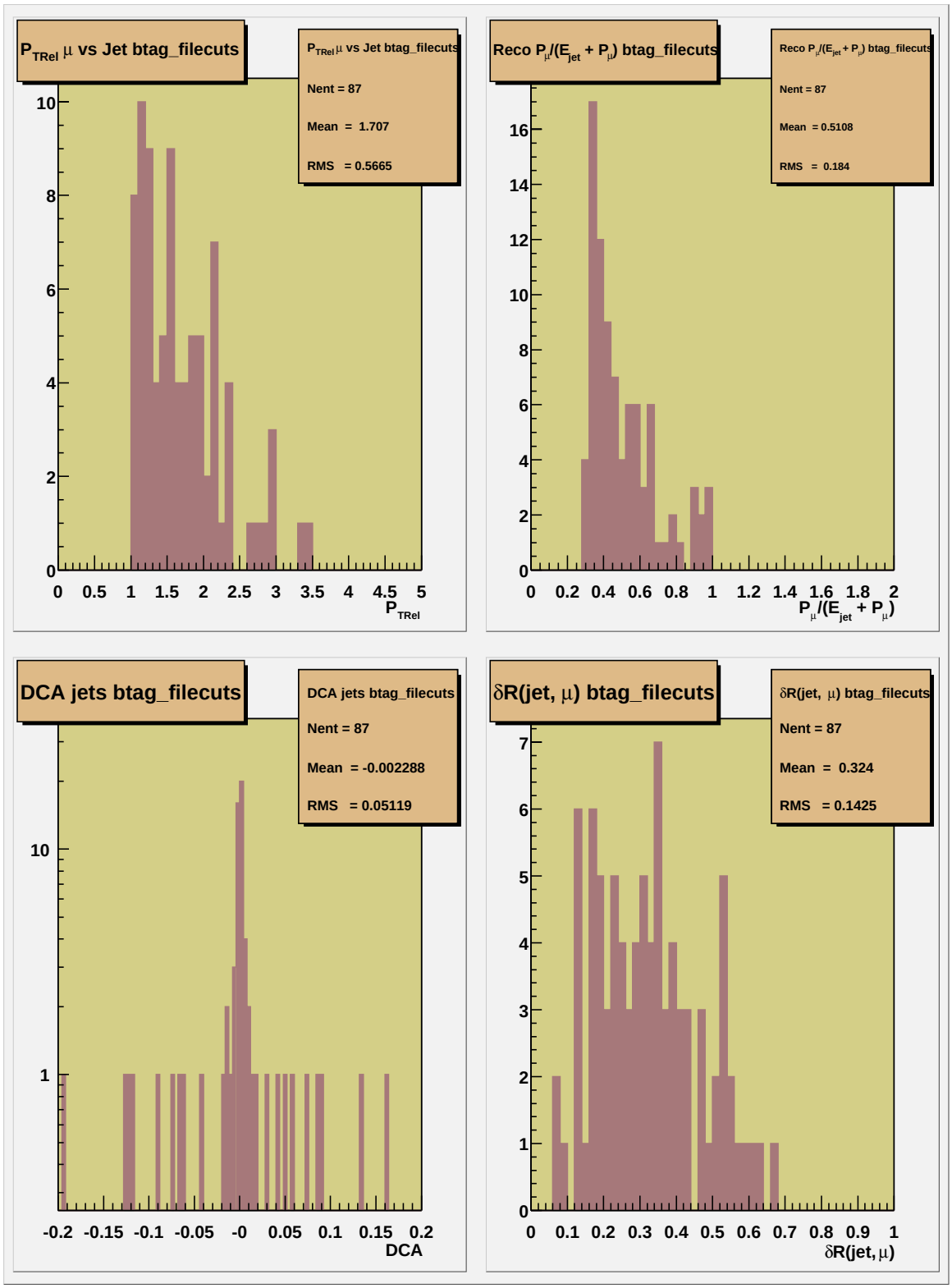


P/E >0.3: Signal 269, BG 279 (S/B ≈ 0.96)

- With these tight cuts:
  - Efficiency to tag reco'd muon+bjet as b-jet: 34%
  - Efficiency to tag reco'd muon+qcd as b-jet: 2.2%
  - Total efficiency to tag any b-jet: 1.3% (reco efficiency included, BR included)
  - Total efficiency to tag any light jet: <0.09%

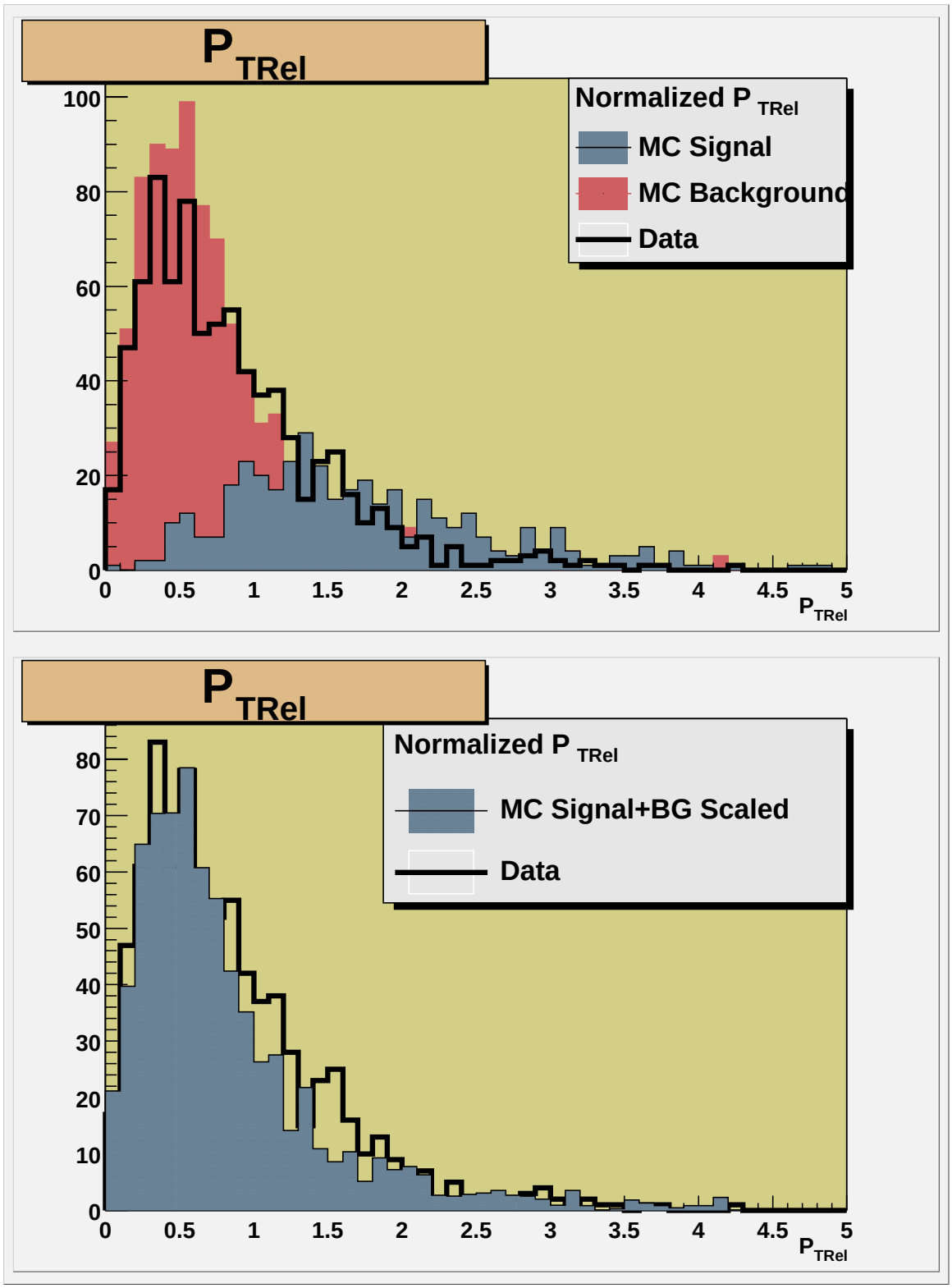


Real data, p10.07.01, out of ~1M events, δR cut



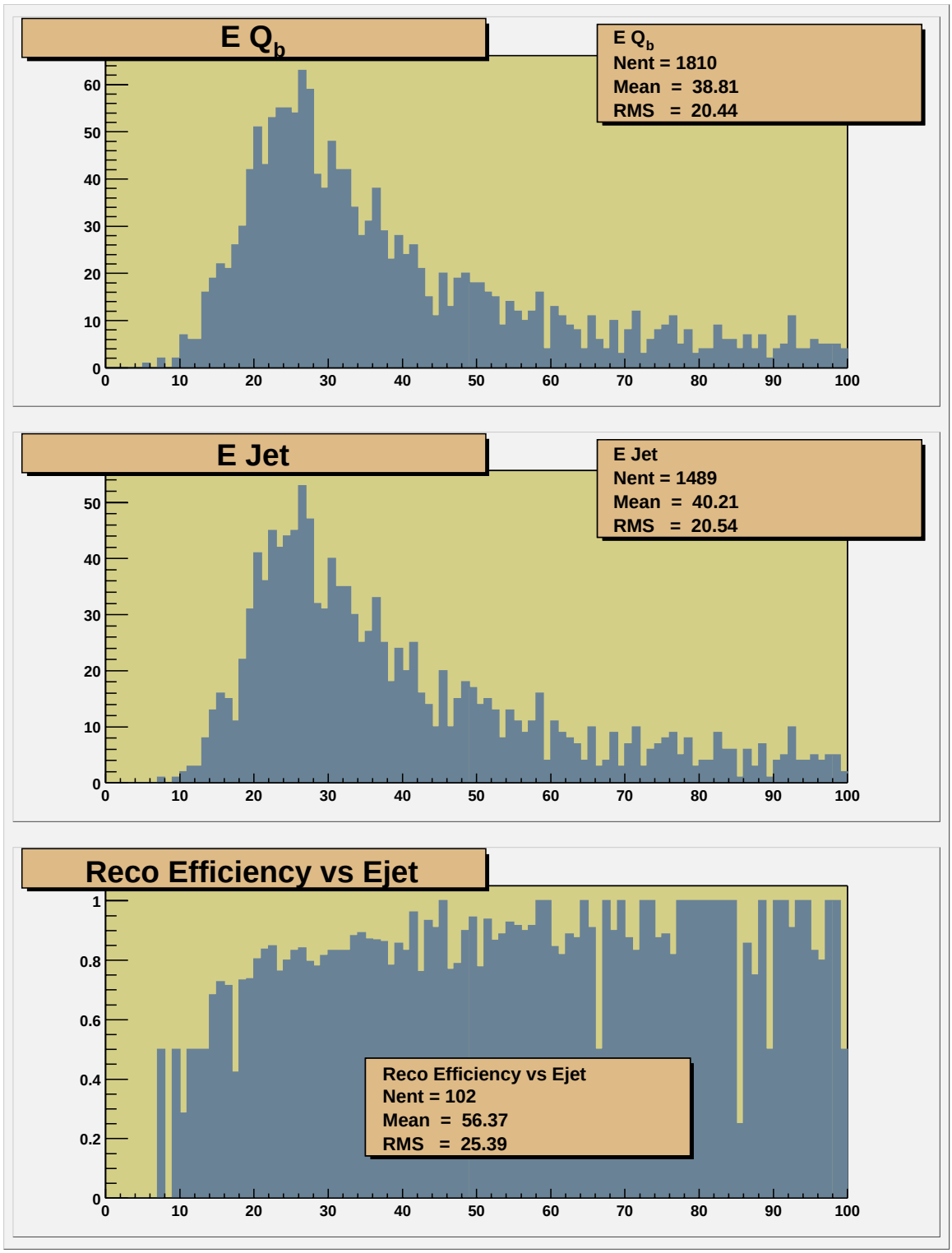
Real data, all cuts

$S/B \approx 1 \Rightarrow 43$ b-jets

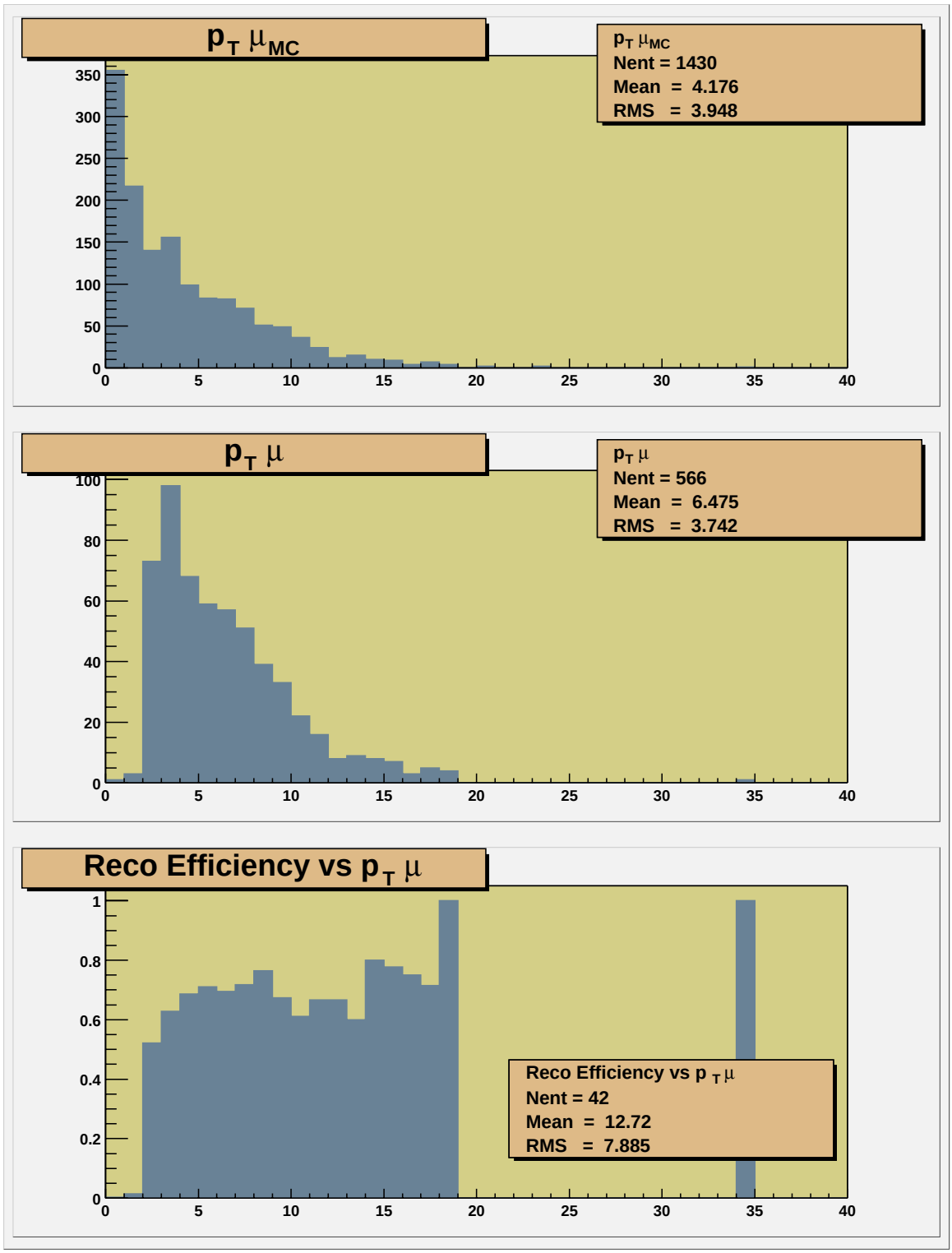


Signal: 0.1067 * 394 = 43 signal jets

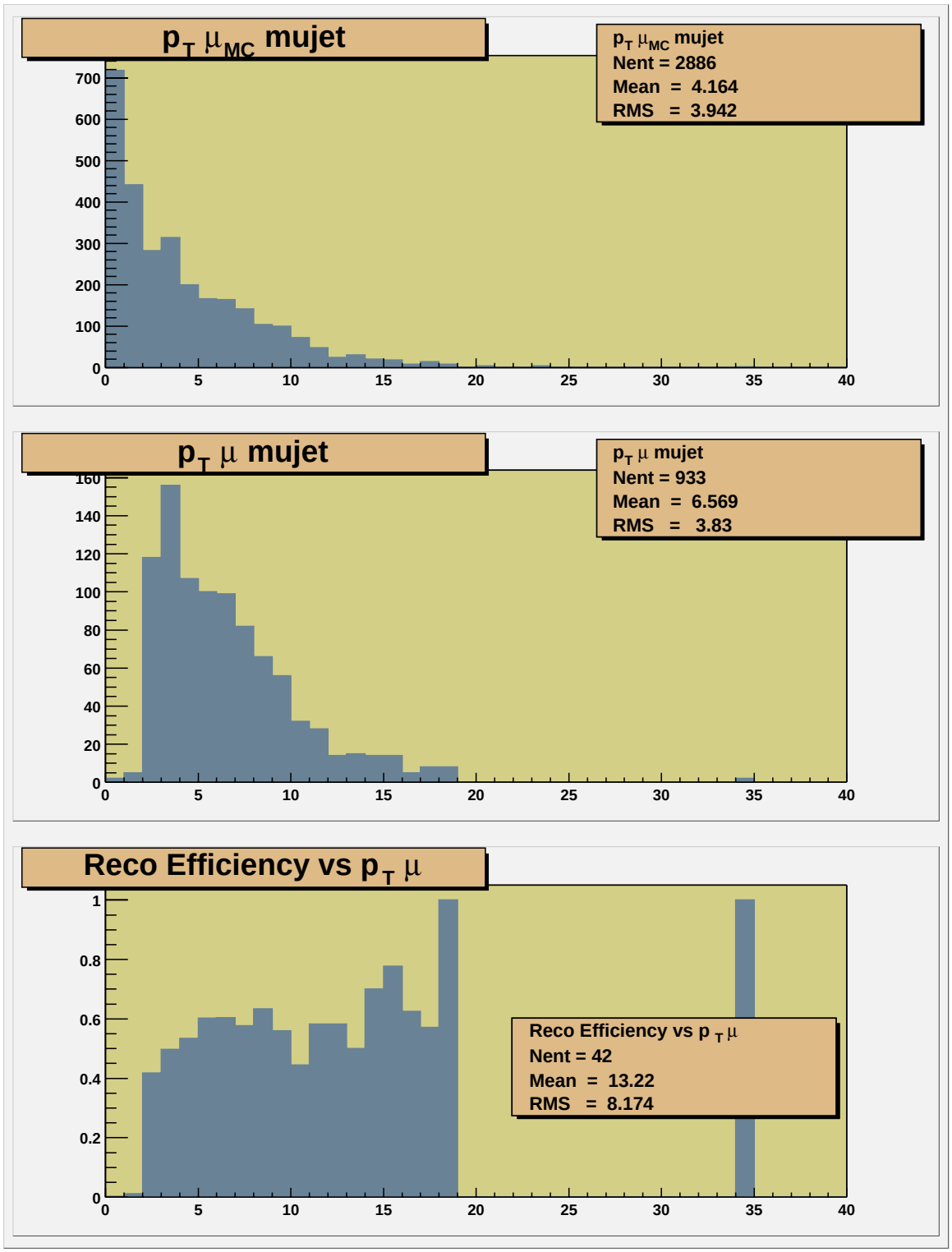
BG: 0.7794 * 886 = 691 background jets



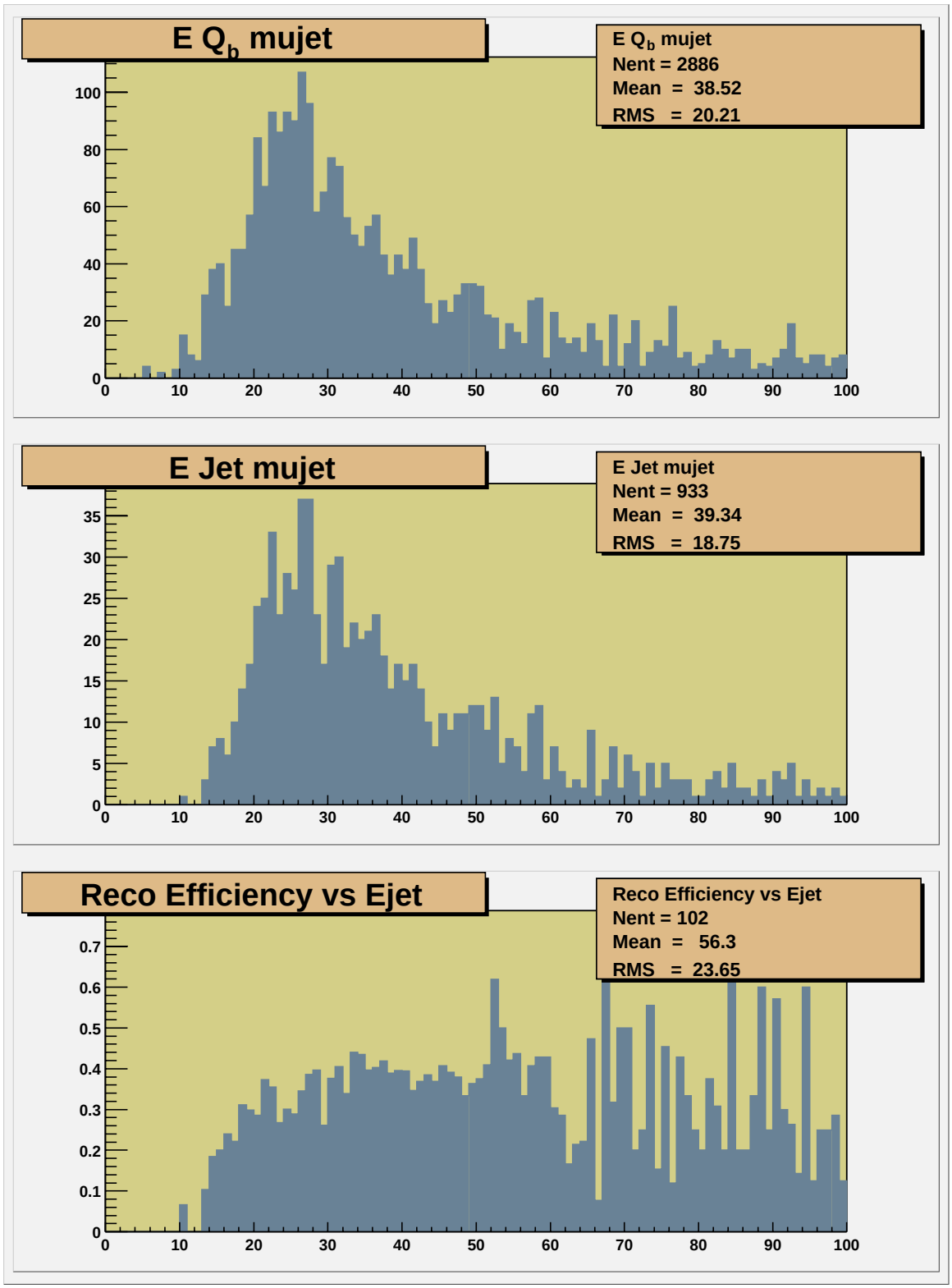
Jet Reconstruction Efficiency (in bb events)



Muon Reconstruction Efficiency (in bb events)



Muon Reconstruction Efficiency, muon from b→mu, bjet reconstructed



Jet Reconstruction Efficiency, jet from b→mu, muon reconstructed

To do & conclusions

- B-tagging
  - Get more (correct) signal & background MC
  - Analyze more p10.07 (or greater) data
  - Estimate cross-section (luminosity…)
- Offline reconstruction & ID
  - Finalize muon-ID
  - Certify efficiency plots
- Triggers
  - Nothing done yet
  - Have to get efficiencies, turn-on curves…

Concluding:

A 'reasonable' B-jet cross section can be done, but so much still needs work…