

First look at LQ LQ? $\mu\mu$.jj

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WARNING!

This is very preliminary analysis

Just to remind everybody...

- Leptoquarks are particles which decay to quarks and leptons
- $LQ \rightarrow l q$ or $LQ \rightarrow \nu q$
- $Br(LQ \rightarrow l q) = \beta$ and $Br(LQ \rightarrow \nu q) = 1 - \beta$ where β is an unknown parameter
- There are supposed to be 3 generations of leptoquarks
 1. LQ1 decay into e/ν_e and ud quarks
 2. LQ2 decay into μ/ν_μ and cs quarks
 3. LQ3 decay into τ, ν_τ and b, t quarks

We are interested in second generation

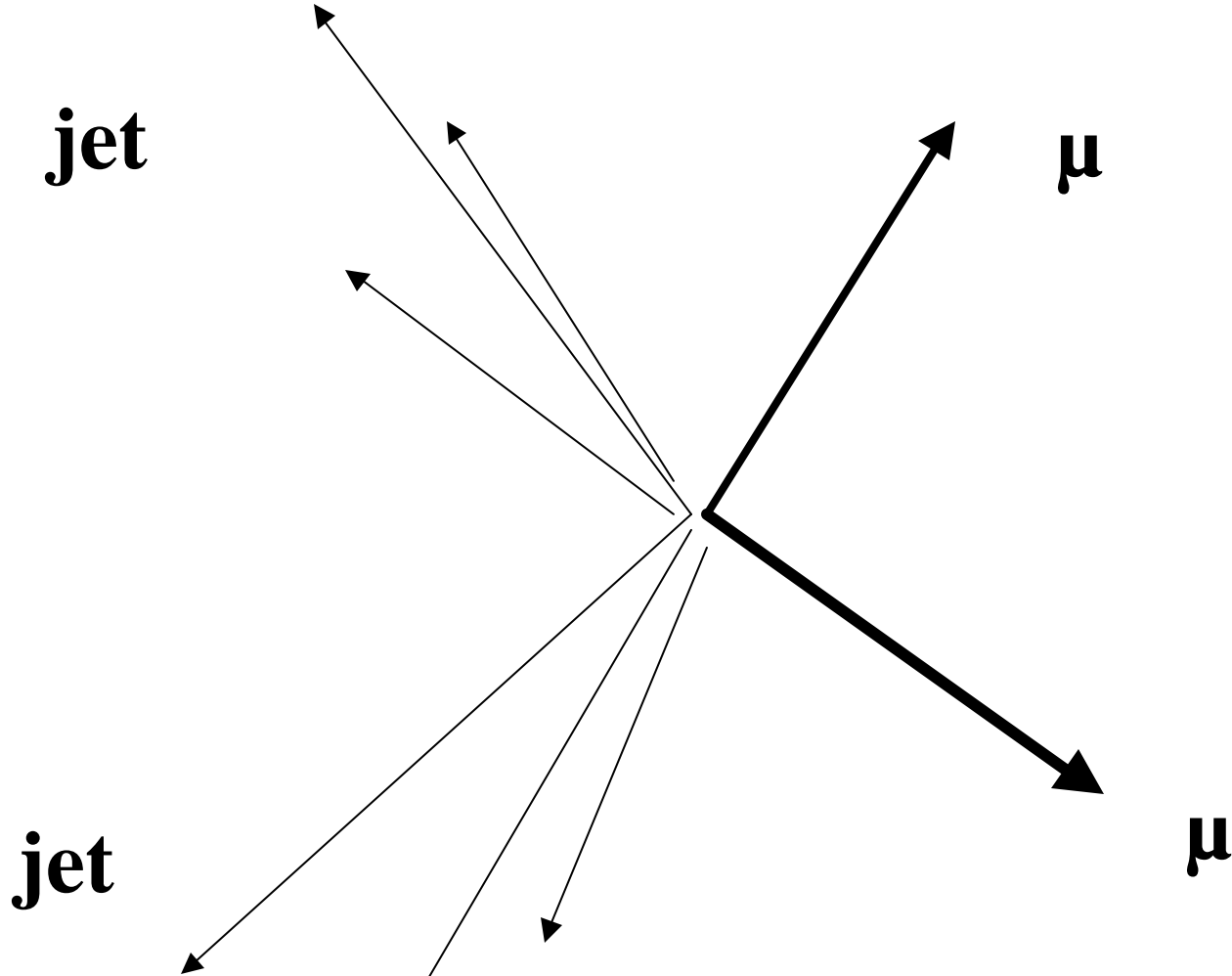
LQ pairs can lead to 3 final states:

- $LQ LQ ? (\mu \text{ jet}) (\mu \text{ jet})$
- $LQ LQ ? (? \text{ jet}) (\mu \text{ jet})$
- $LQ LQ ? (? \text{ jet}) (? \text{ jet})$

*All three channels must be combined to exclude
LQ independent of β*

We are interested in $(\mu \text{ jet}) (\mu \text{ jet})$ channel

What are we looking for

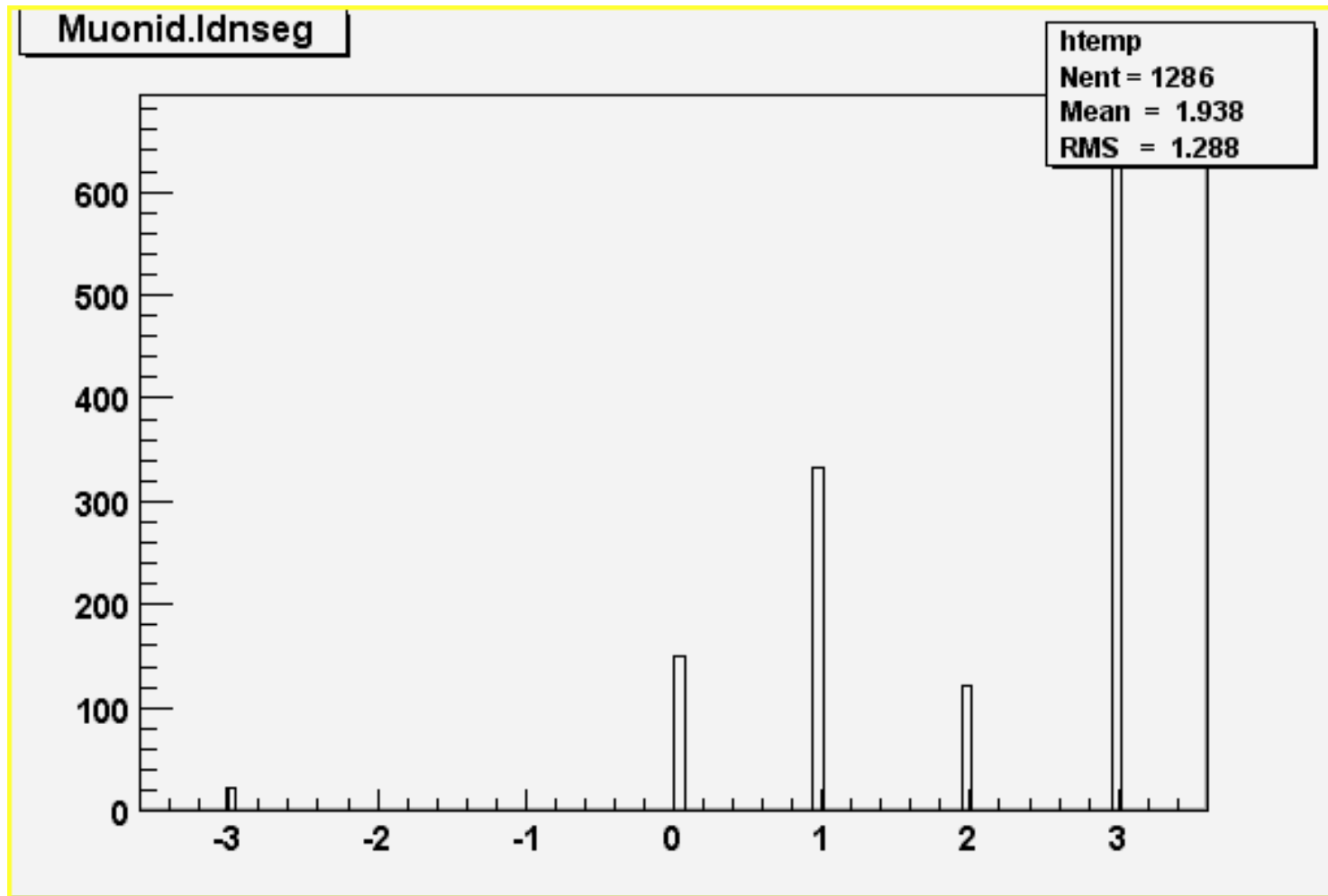


At UTA MC farm we have prepared a signal MC sample ...

Sketch of analysis

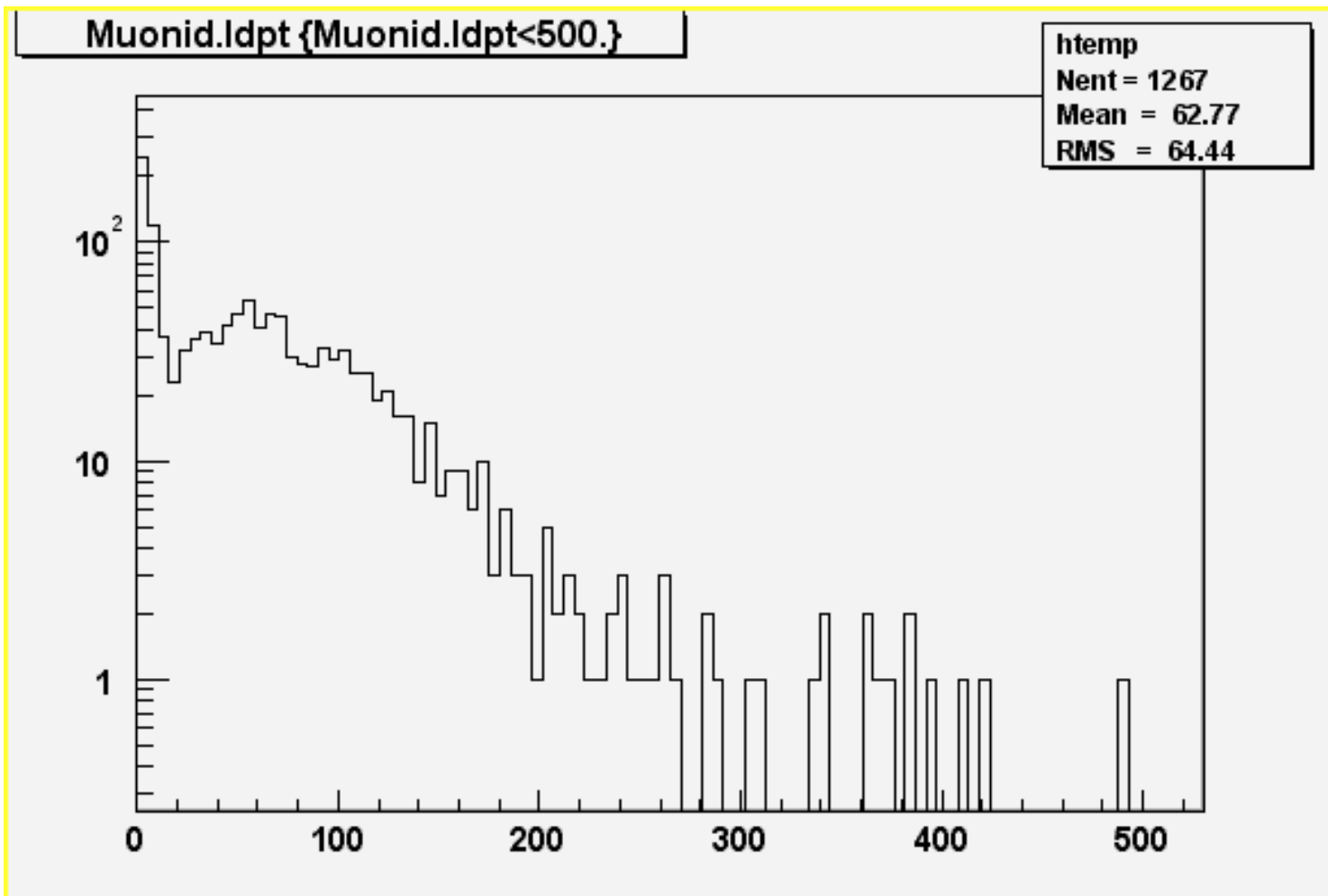
- **2 jets (or more)**
- **Jets must have $P_t > ???$**
- **2 muons (or more)**
- **Muons must have $P_t > ???$**
- **Muons must be isolated from jets by ...**
- **Invariant mass of muon-jet system must be consistent with $m(LQ)$ (*whatever that means – for example both muon jet systems should have, after kinematic fit, equal masses*)**
- **Veto contamination from Z,W production**

Muon identification in signal MC

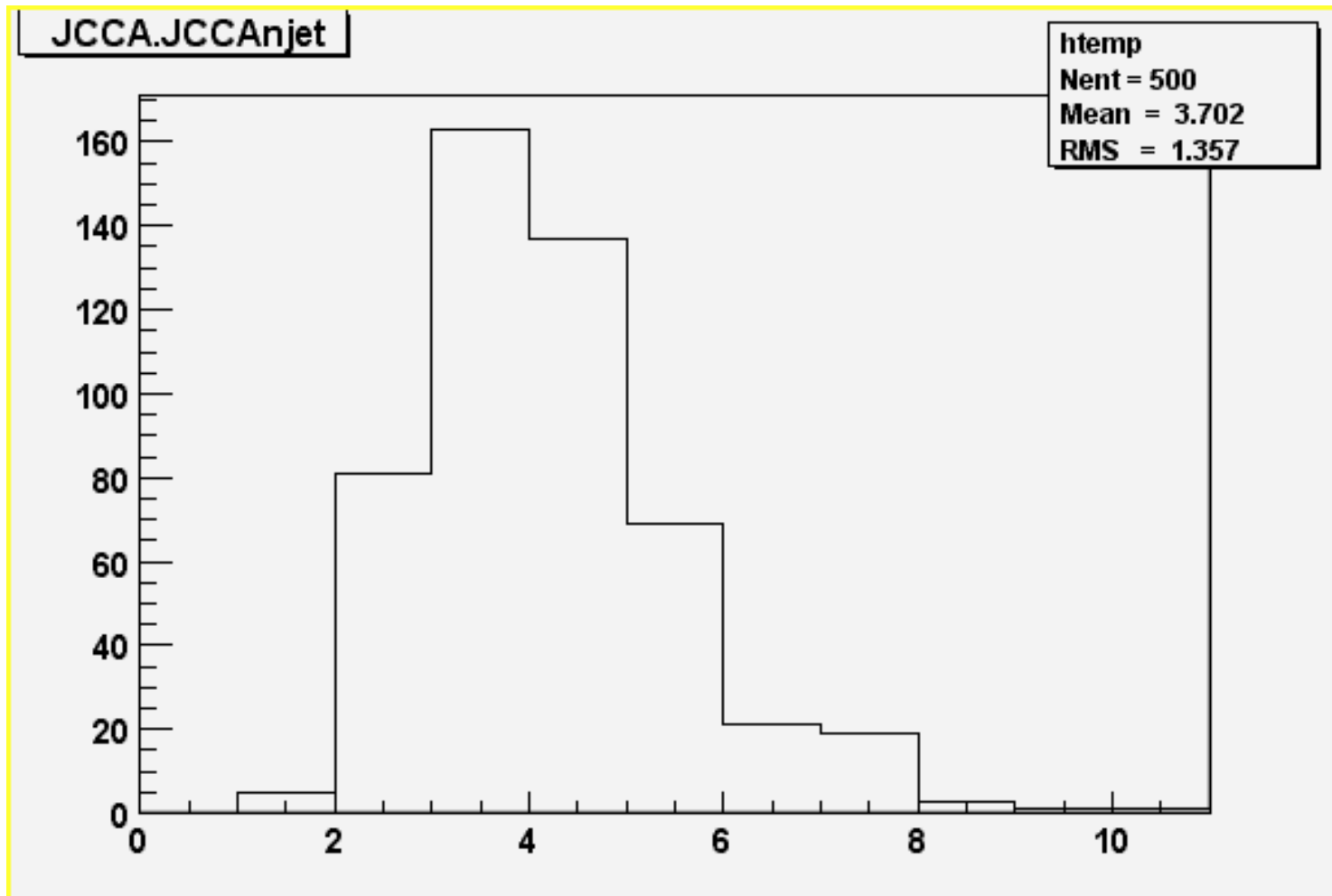


Number of segments hit

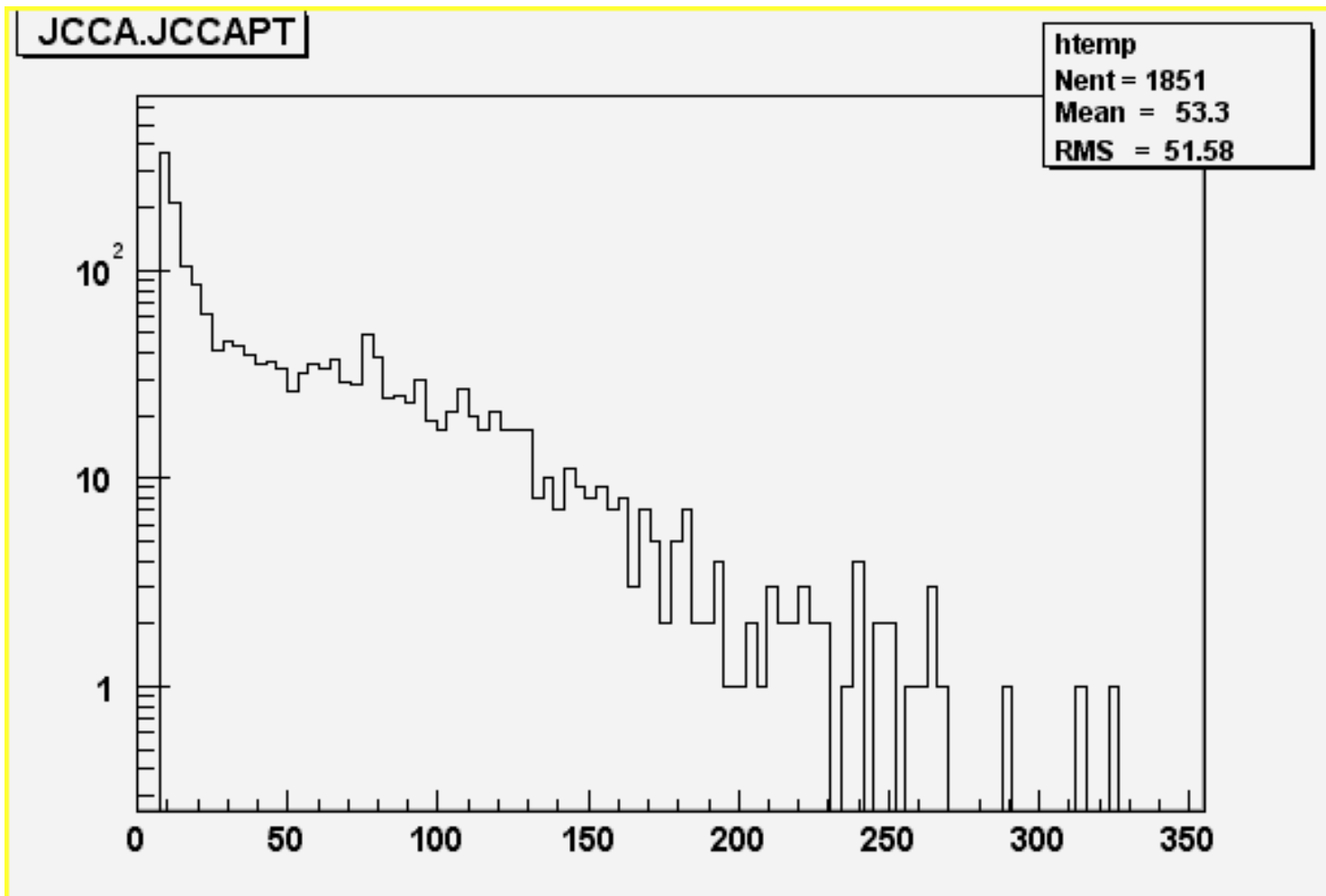
Muon Pt for signal MC



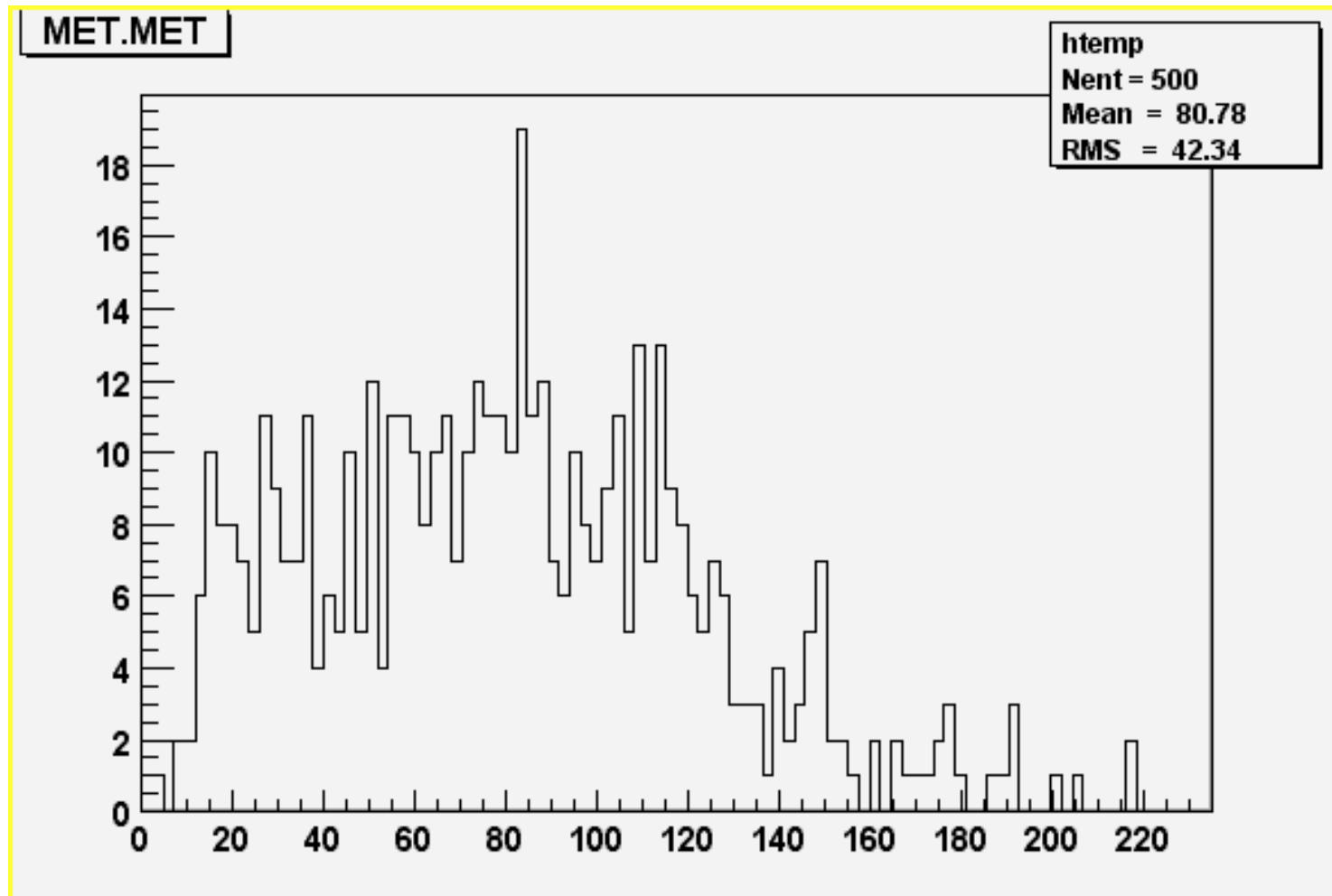
Jet multiplicity for signal MC



Jet Pt for signal MC



First problem: mET for signal does not seem to be correct in root tuples!



I would be grateful if experts could have a look at this and/or assure me that this distribution is correct.

Data

- **First di-muon trigger events were selected yesterday – can be used to tune muon ID criteria**
- **We need 100 inverse pb to repeat last D0 limits, more to improve it.**
- **First results – summer 2002?**

Conclusion:

For the time being it is still premature to claim that the D0 data sample contains conclusive evidence for the existence of second generation leptoquarks.