



# Status of the Multi-Jet Trigger

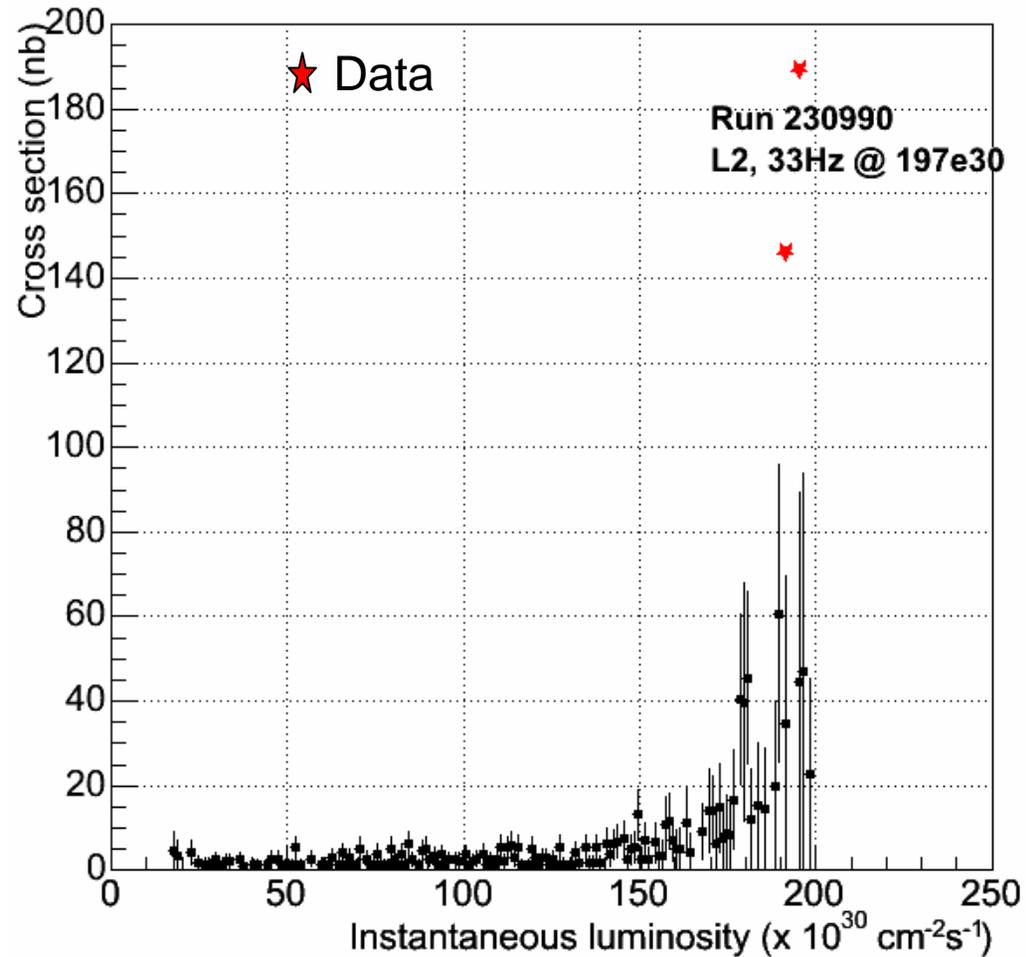
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# Introduction

- **The AS/Penn group are studying the  $W/Z H \rightarrow qqbb$  channel**
- **Current triggers are not very efficient for this channel**
  - ▶ TOP\_MULTI\_JET or HIGGS\_HIGH\_PT\_B\_JET are 30% - 40% efficient
- **The proposed multi-jet trigger could be ~70% efficient**
  - ▶ Proposed Logic
    - ▶ L1\_JET10\_&\_SUMET90\_v-5
    - ▶ L2\_TWO\_CJET20\_&\_JET15\_SUMET100
    - ▶ L3 NULL (may consider 3 x 15GeV jets)
- **Trigger tested 26 December 2006 (Run 230990)**

# Recap from the last meeting

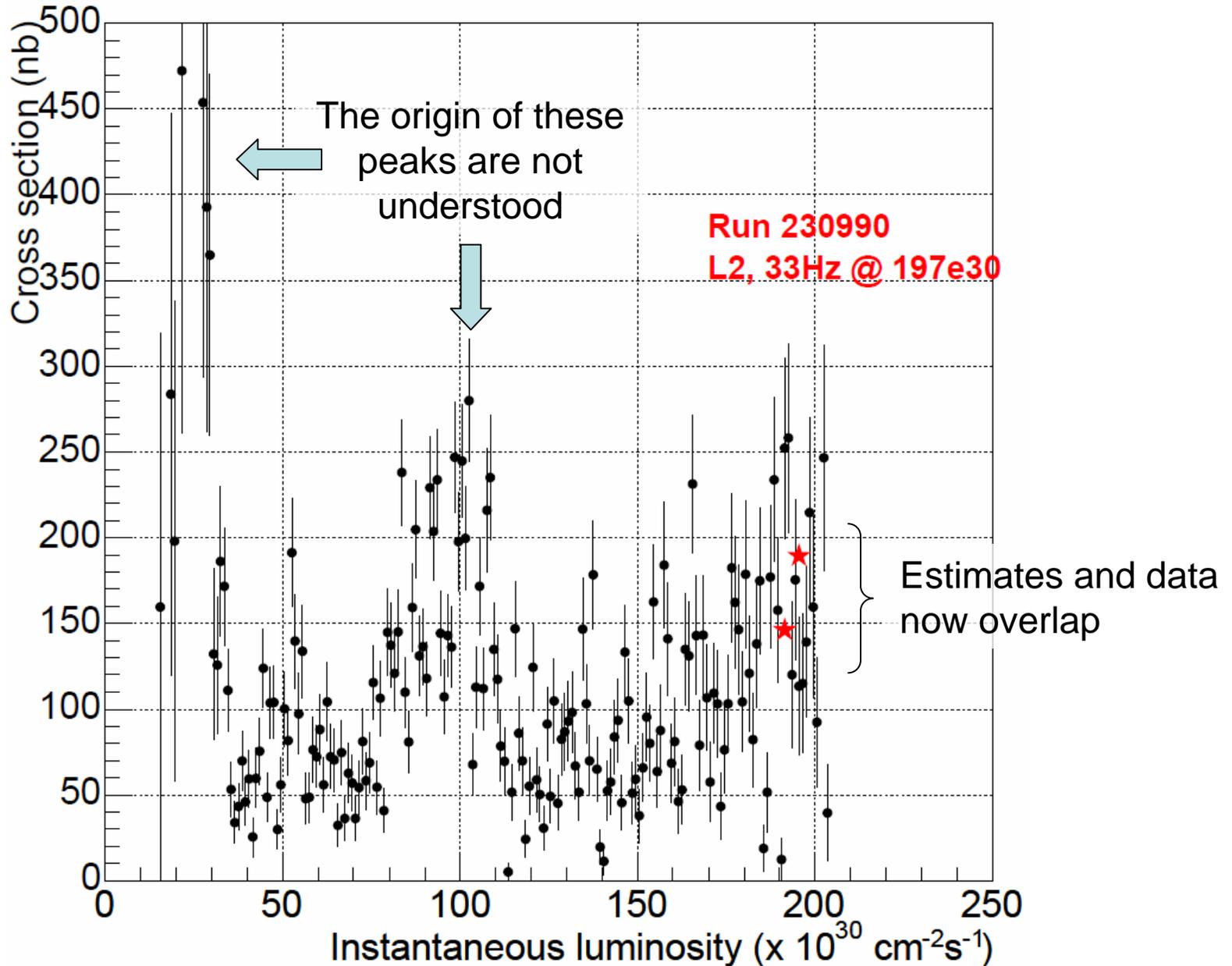
- **The measured rate of the test trigger was larger than expected**
  - ▶ Expected 40nb @ 200E30
  - ▶ Measured 200nb @ 200E30
- **Difference was traced to 2 errors:**
  - ▶ Rate estimate used L2\_CJET10\_JET10 bit. But has L1\_MET25 in the trigger path. This biased the result.
  - ▶ Offline eta cut for central jets used rather than online value



# Re-estimate of multi-jet trigger

- **Use the JET\_CAL\_SINGLETOWER\_10**
  - ▶ L1\_JET\_10\_PS8
  - ▶ L2\_PS125\_L1\_JET10 } Overall prescale of  $8*125 = x1000$
- ***Official* HTTF samples are too small to use this trigger path.**
- **Copied data from the look area from 13<sup>th</sup> Jan to 19<sup>th</sup> Jan (Run 232062 → Run 232493)**

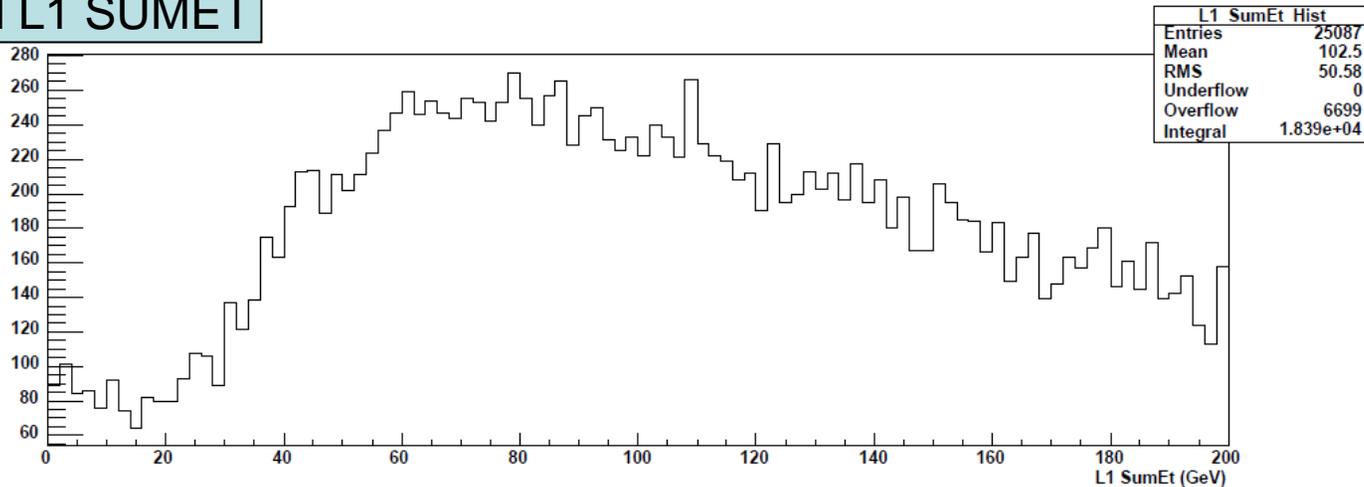
# Re-estimate of multi-jet trigger rate



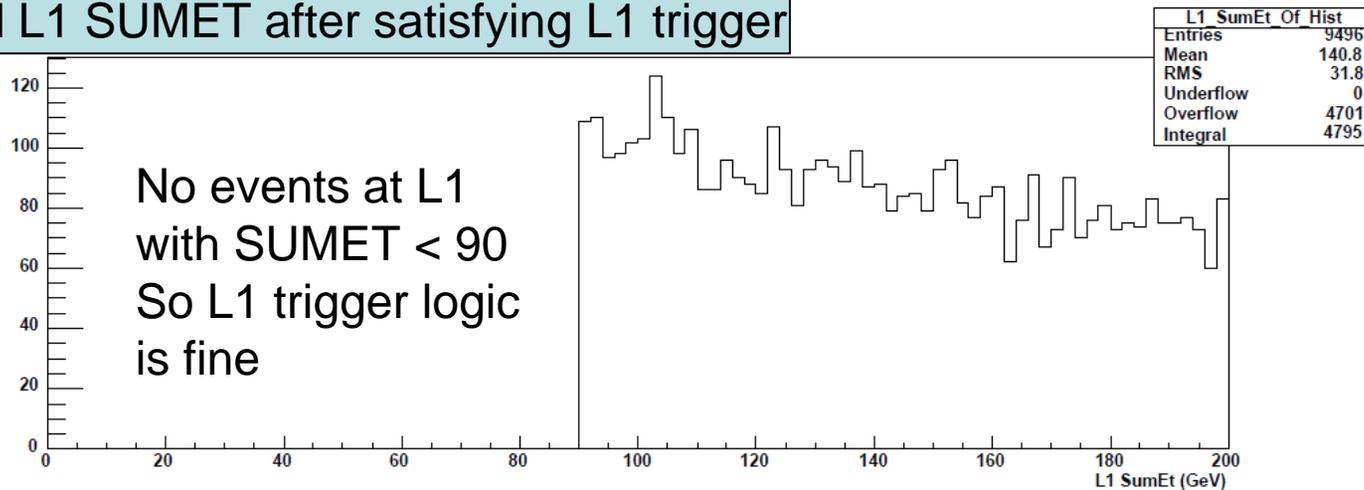
# Validation of Multi-jet trigger logic: L1

- Analysed Stream G (Jet data) for Run 230990
- L1 Trigger path: L1\_JET10\_&\_SUMET90\_v-5

Measured L1 SUMET



Measured L1 SUMET after satisfying L1 trigger

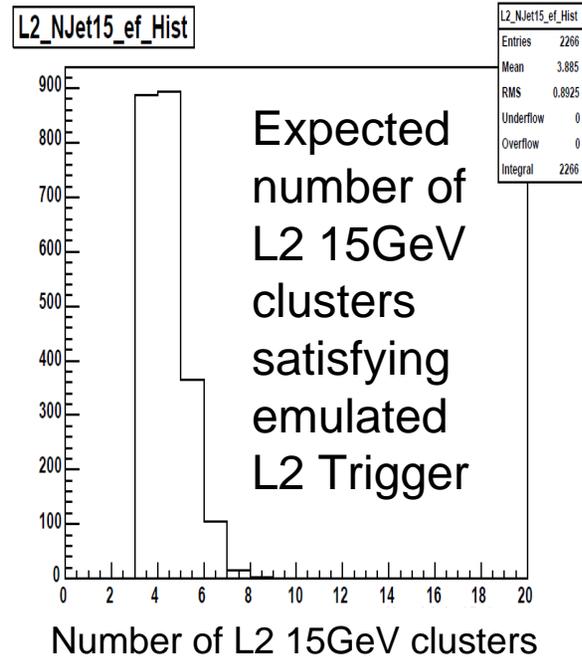
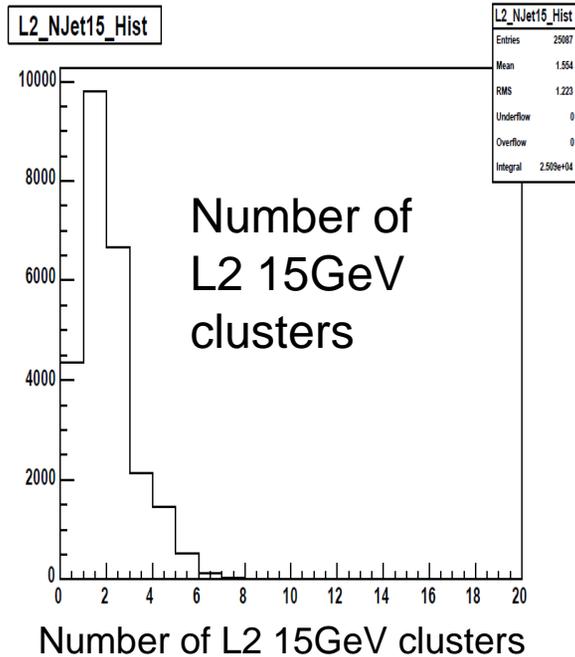


# Validation of Multi-jet trigger logic: L2

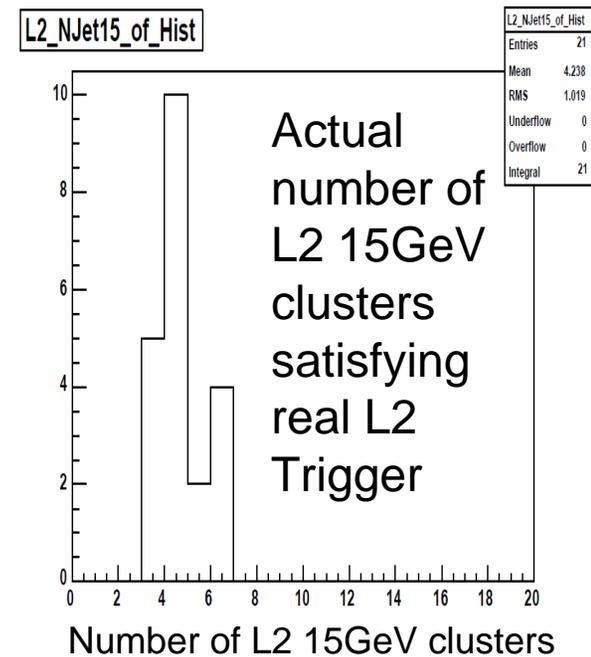
● L2 Trigger Path:

- ▶ **TWO\_CJET20\_&\_JET15\_SUMET100\_PS100\_v-1**
- ▶ **For the trigger test, a x100 PS was applied**

3 x 15GeV Clusters



(Nevents: 2266)



(Nevents: 21)

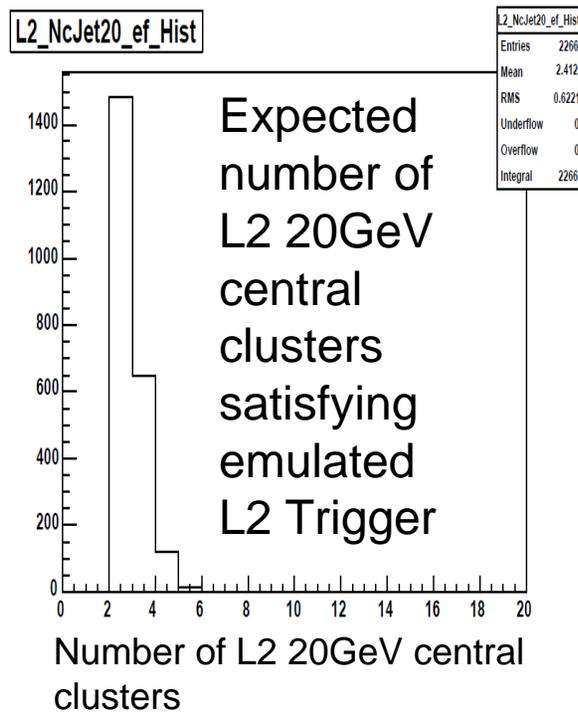
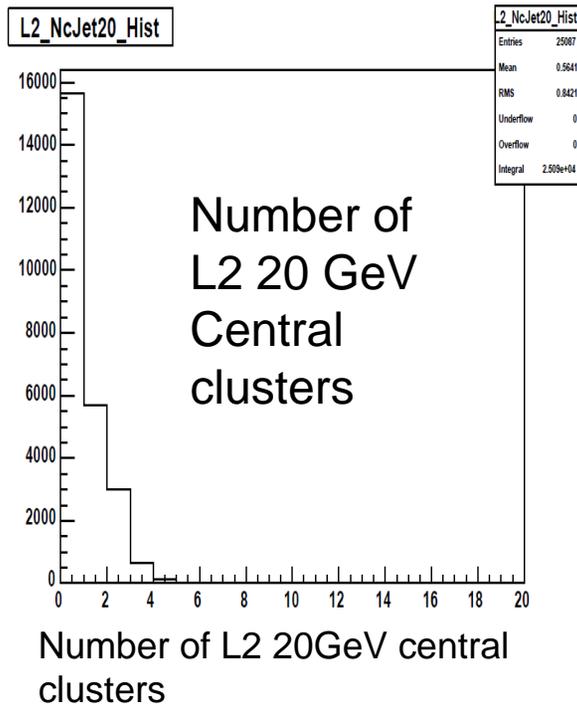
The difference in the number of events is due to the x100 prescale

# Validation of Multi-jet trigger logic: L2

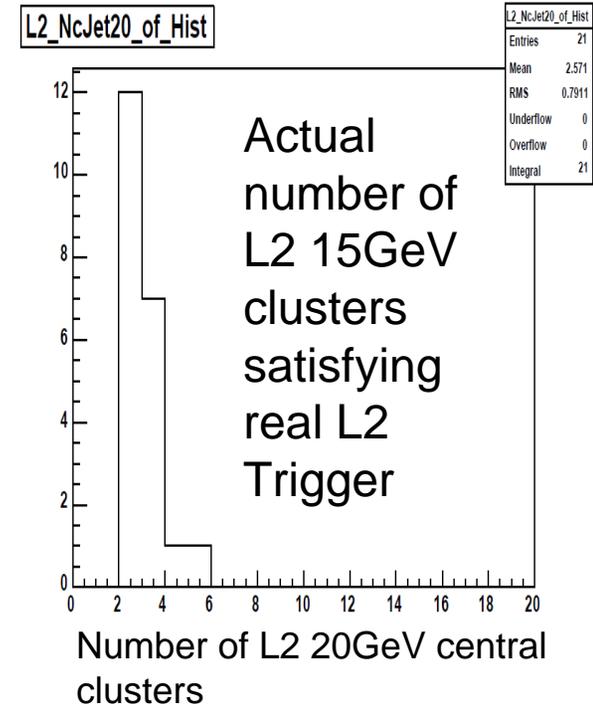
● L2 Trigger Path:

▶ TWO\_CJET20\_&\_JET15\_SUMET100\_PS100\_v-1

## 2 Central JET 20



(Nevents: 2266)



(Nevents: 21)

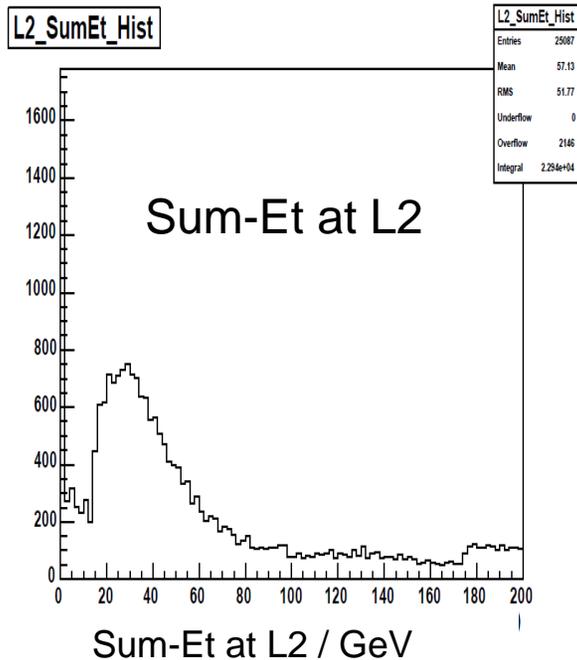
The difference in the number of events is due to the x100 prescale

# Validation of Multi-jet trigger logic: L2

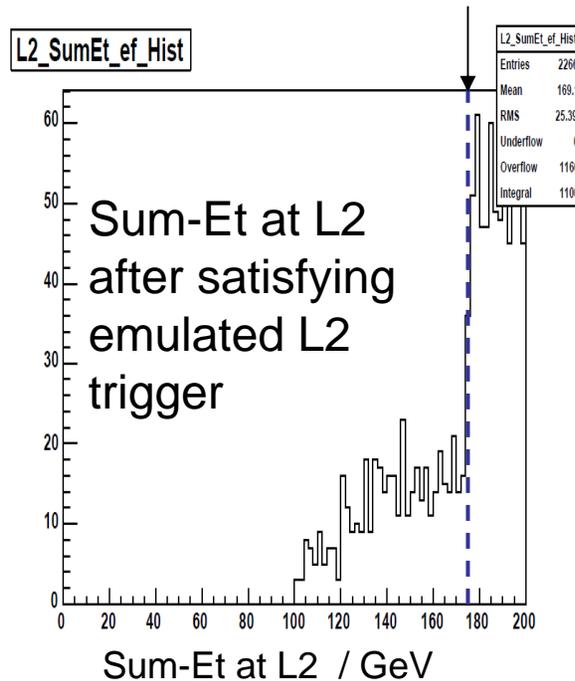
● L2 Trigger Path:

▶ TWO\_CJET20\_&\_JET15\_SUMET100\_PS100\_v-1

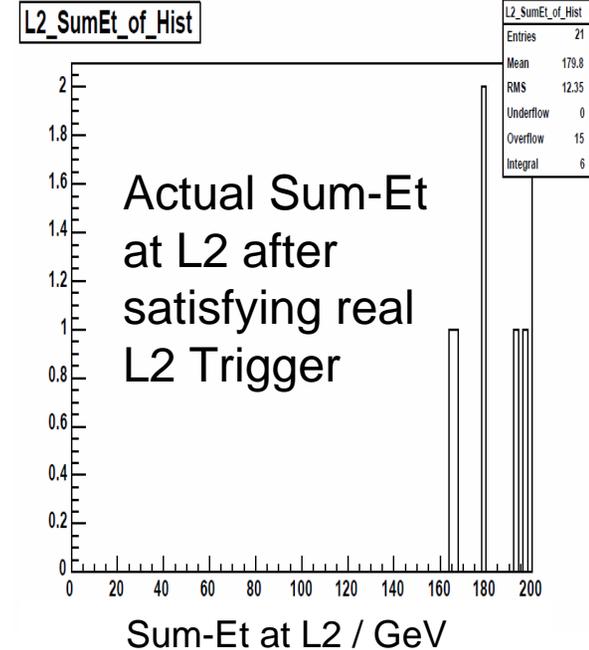
## Sum-Et 100



Influence of  
TOP\_MULTI\_JET trigger



(Nevents: 2266)

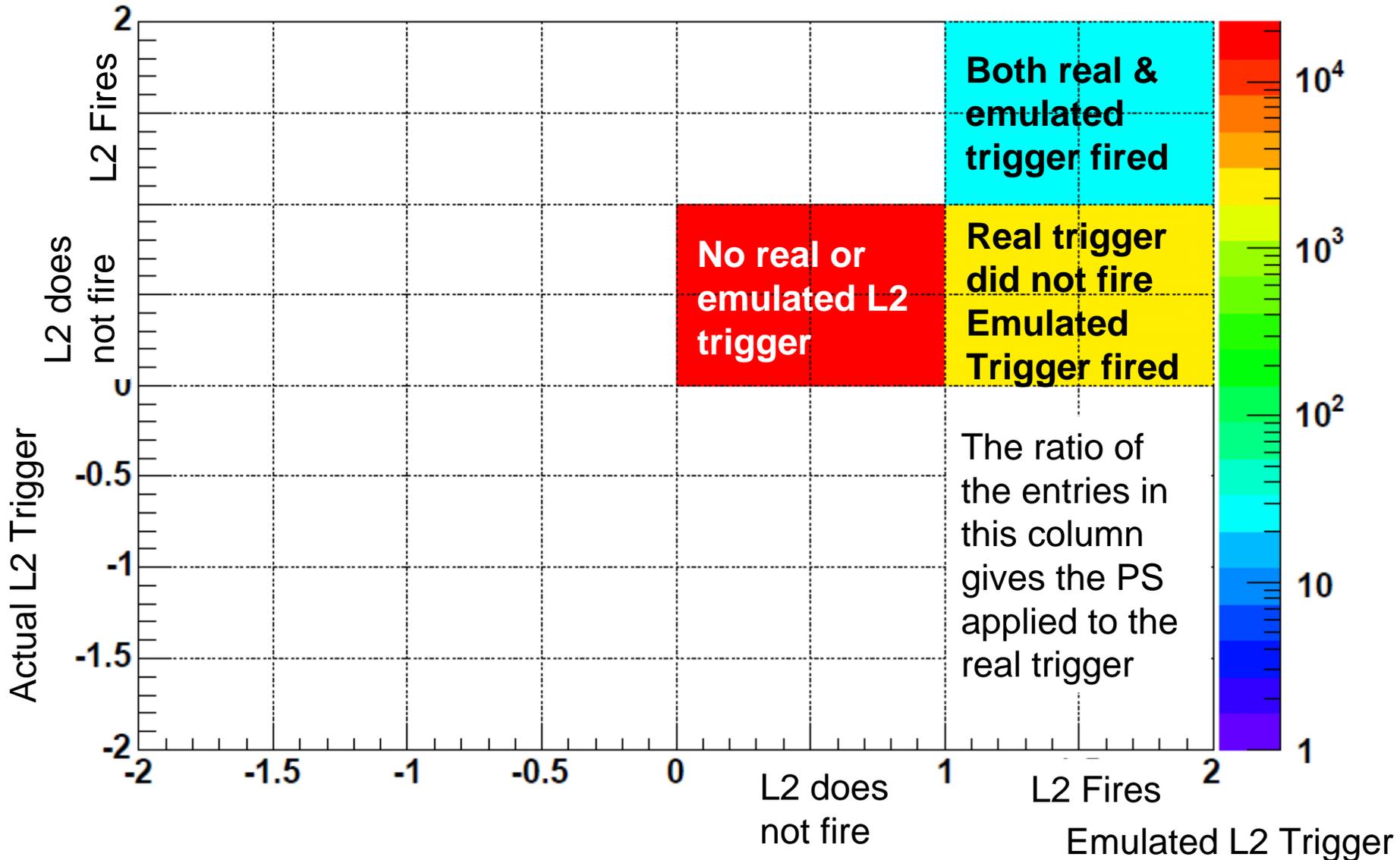


(Nevents: 21)

(The difference in the number of events is due to the x100 prescale)

# Cross-check of actual and expected trigger logic

L2\_MJ\_of\_vs\_ef\_Hist



# Bandwidth of the multi-jet trigger

- **Stream E data for Run 230990 analysed**
- **There are 227 events in this trigger path.**
- **33 events overlap with other physics paths.**
- **73 events (32%) also satisfy other L2 trigger requirement.**
- **Thus the multi-jet trigger occupies 68% of the bandwidth.**

# Summary

- **The rate of the multi-jet trigger was re-evaluated**
  - ▶ The measured and estimated rate match better
  - ▶ However there are features in the estimation which need to be understood
- **The trigger logic was validated and performs as expected**
- **The bandwidth the multi-jet trigger was estimated**
  - ▶ It occupies 68%.....is this acceptable ?
- **Next steps:**
  - ▶ Need to understand the bumps in the rate estimation
  - ▶ Include the multi-jet trigger in the current physics table ?