



# Improving Met Resolution @ L1

Laura Sartori

For the L1MET Team

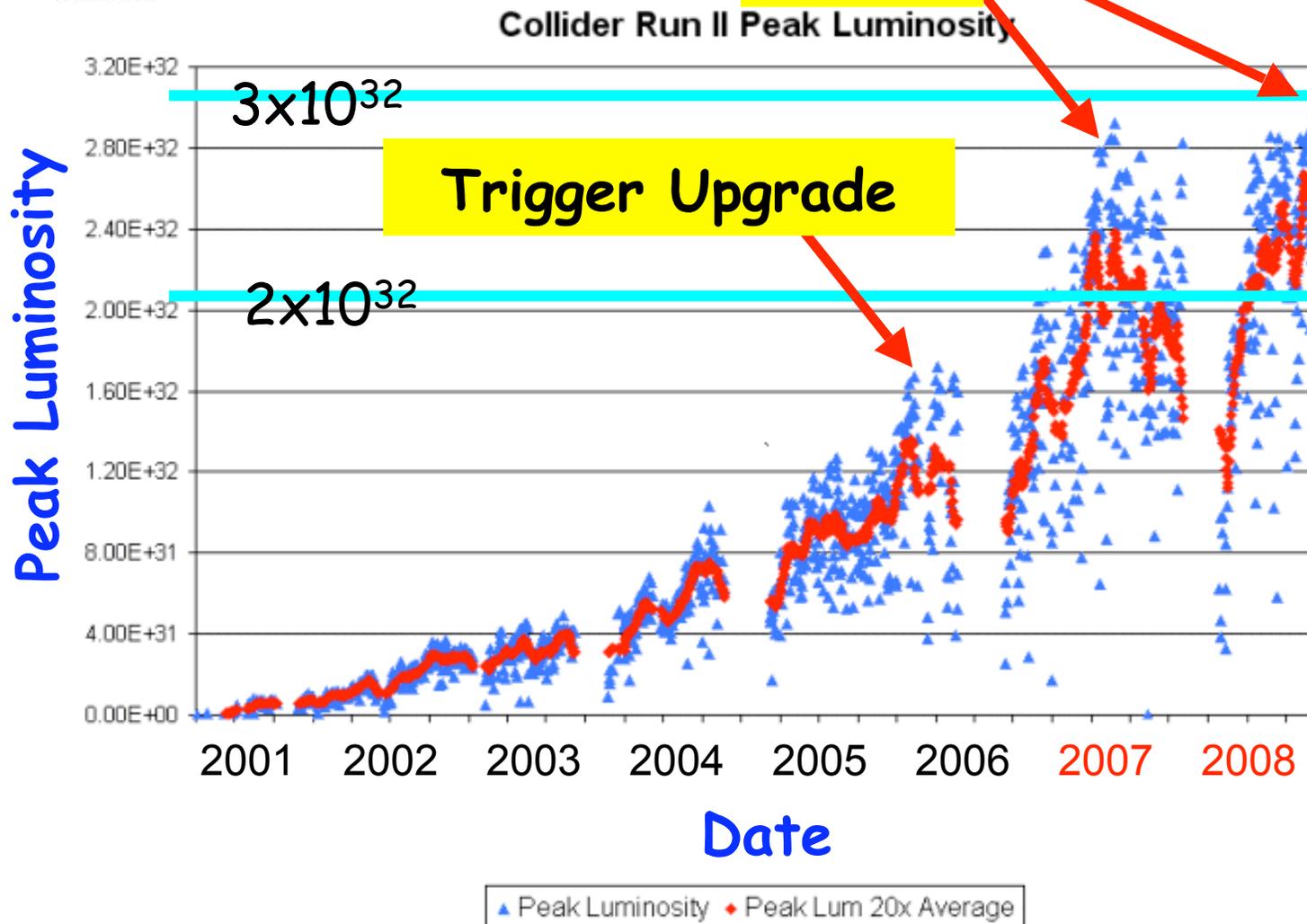
(M.Casarsa, G.Cortiana, V.Cavaliere, V.Greco,  
E.Bossini, C.Grosso, S.Leo)

# Tevatron Luminosity and Trigger Upgrades

## Calorimeter Trigger Upgrade

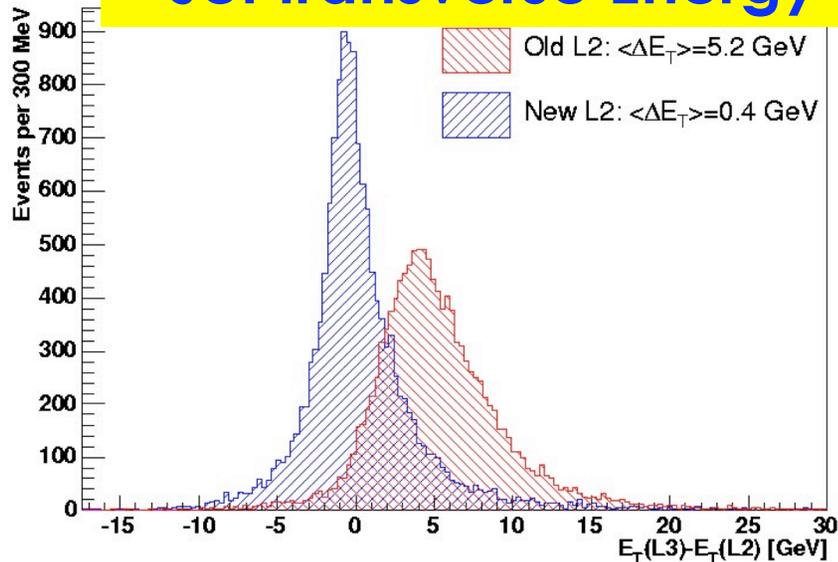
L2CAL

L1MET



# L2 Cal Upgrade

## Jet transverse Energy



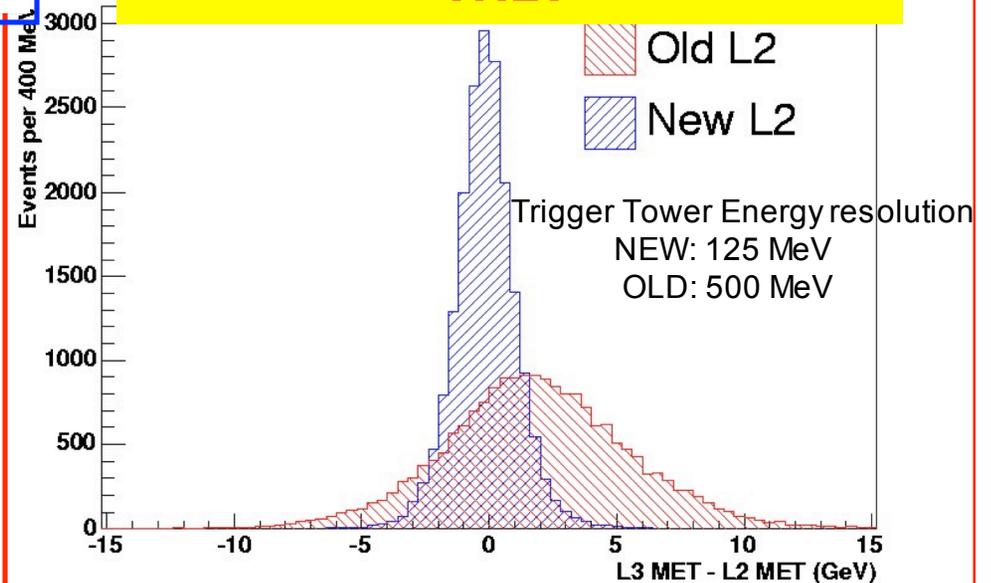
System Commissioned in 6 months.  
Official system since August 2007.

Difference between L2 and  
L3 jet transverse energy  
and MET for the old and  
the upgraded L2Cal  
system.

~ 50% of the L2 CDF Triggers  
benefit from this Upgrade :

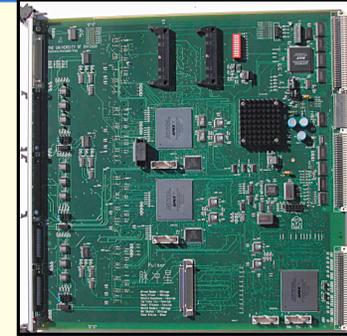
- JET, TAU
- MET, SUMET
- Photon, Electron
- **NEW: HIGGS-DEDICATED**

## MET

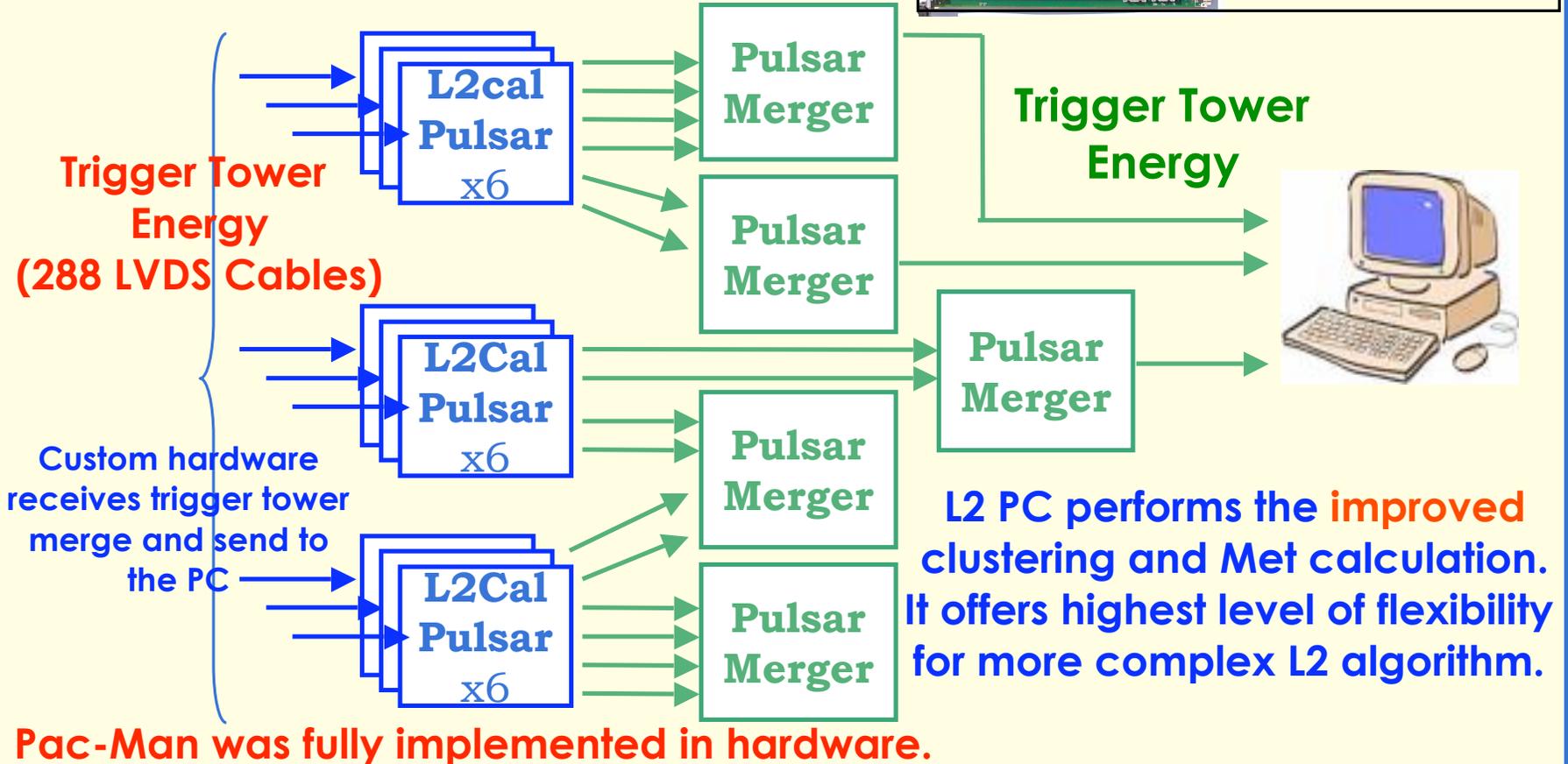


# L2 Cal Hardware Architecture

Mix of custom hardware and commercial PC.



**PULSAR:**  
general purpose board developed at CDF.



# L1MET Project

-HTTF MEETING- October 2007

[http://www-cdf.fnal.gov/internal/WebTalks/Archive/0710/071003\\_HTF](http://www-cdf.fnal.gov/internal/WebTalks/Archive/0710/071003_HTF)

V. Rusu: "Status of MET triggers after L2CAL"

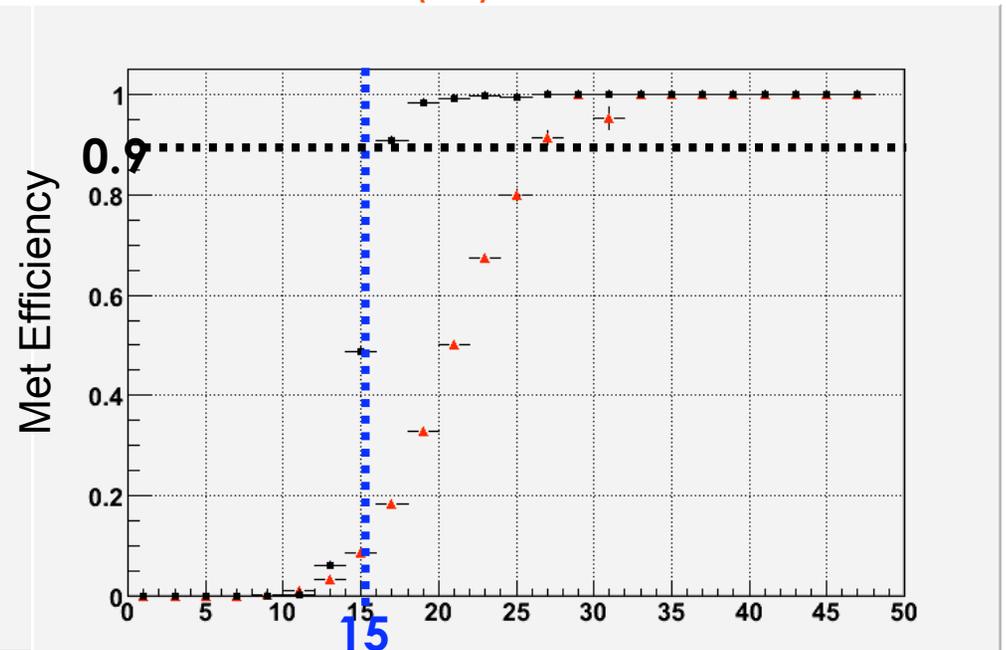
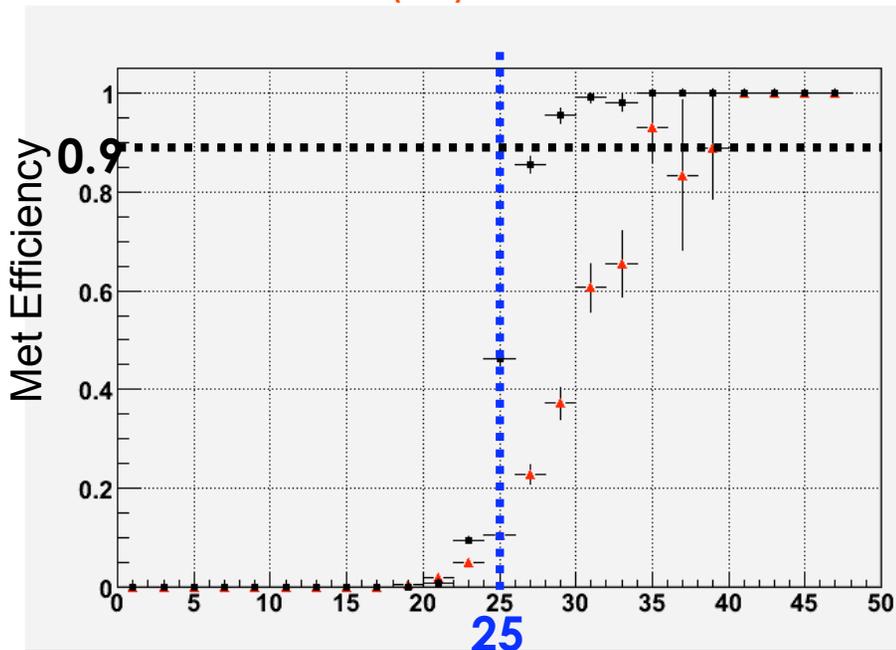
L. Sartori: "Possibilities for improved MET resolution at L1"

⇒ **Approval of the L1MET project.**

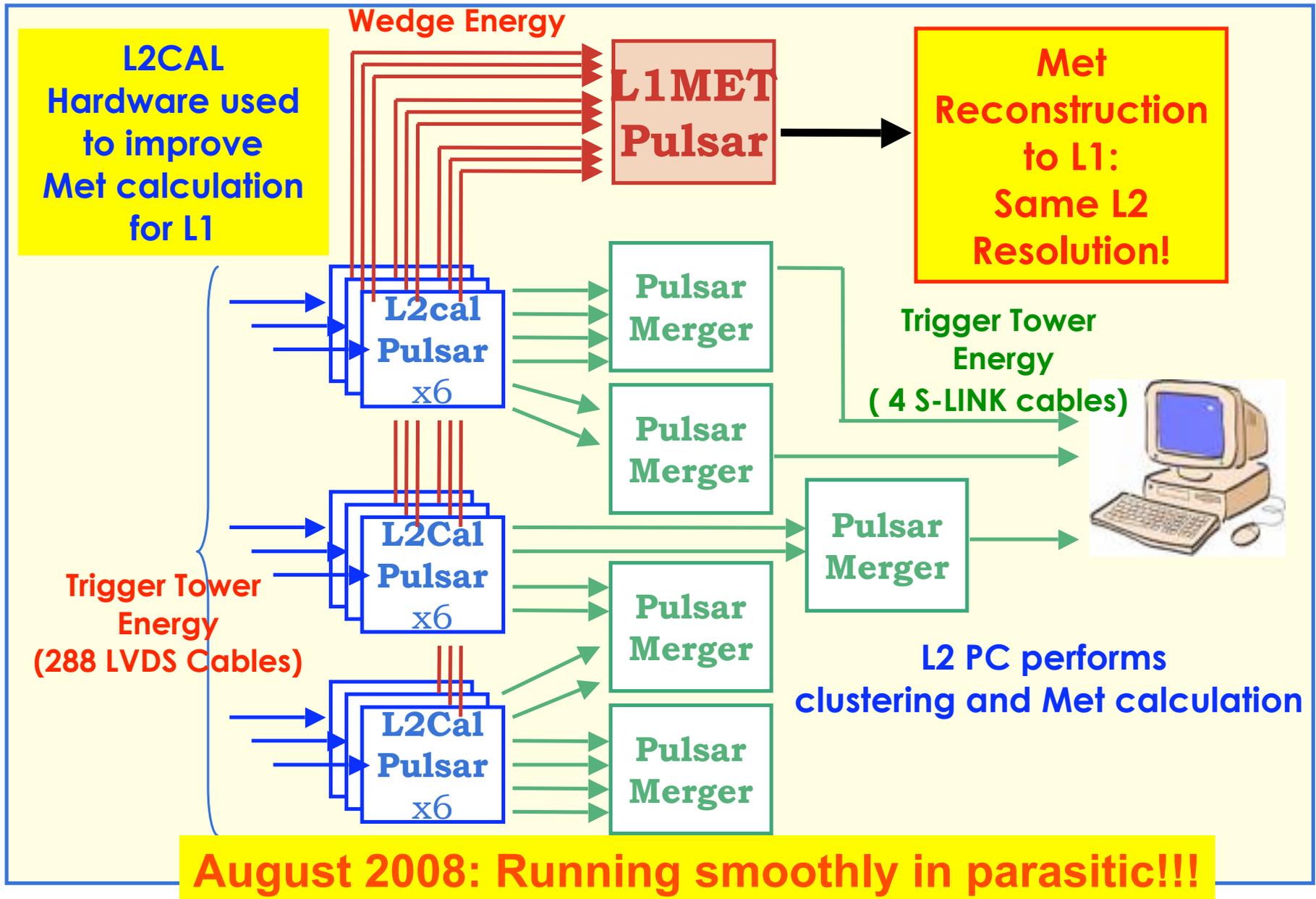
⇒ GOAL: Improving L1 Met resolution. Same as L2 (after the Upgrade)

- Met > 25 (L2 and future L1)
- Met > 25 (L1)

- Met > 15 (L2 and future L1)
- Met > 15 (L1)



# The L1MET Upgrade



# L1MET Team

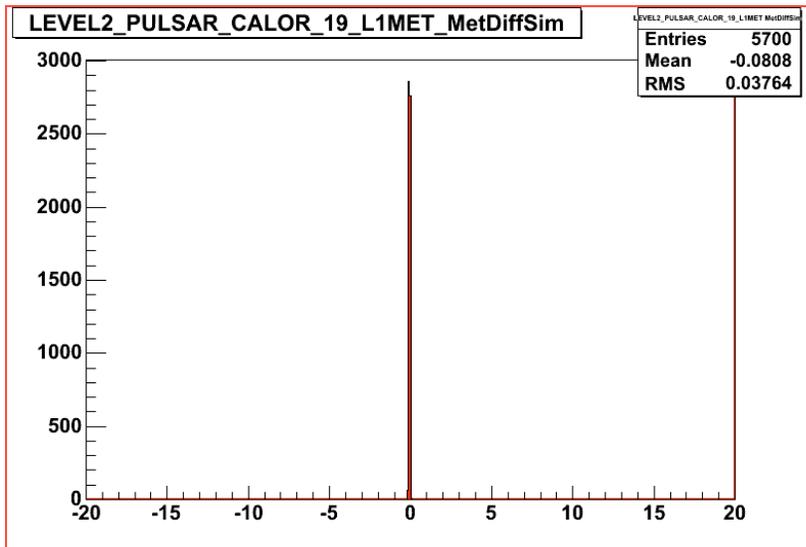
- Preliminary studies: E. Bossini (Siena), L. Sartori (Pisa), V.Rusu (Fermilab).
  - Firmware/Hardware: V.Greco (Pisa), L.Sartori.
- Hardware Tests: V.Cavaliere(Siena), M.Casarsa(Fermilab).
  - Monitoring: G.Cortiana(Padova), C.Grosso (Chicago).
    - L1 Interface: C.Grosso.
    - Cable production: e-shop Chicago.
- Commissioning/System validation: L.Sartori, C.Grosso, S.Leo(Pisa).

## Talk/Publications:

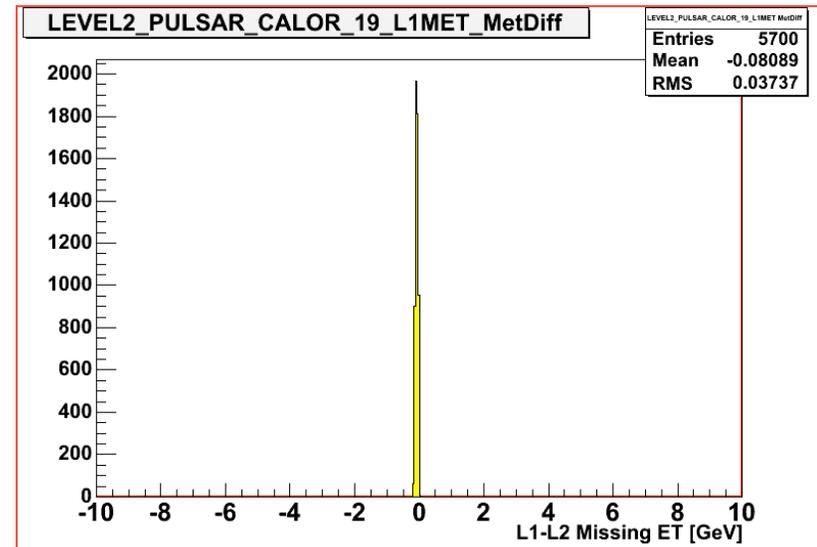
- ICHEP-08 (L.Sartori)
- TWEPP-08(V.Greco) $\leq$ L1Met results.
  - IEEE 08

# L1MET: Status

- All the hardware in place and running with no errors during the last week (check on MET and trigger bits).
- Monitoring online to check both hardware and performances (L1MET  $\approx$  L2MET \*) is ready.
- Running with a test trigger table to study the new rate (Met=15, Met=25).
- Data checks are ongoing offline (trigger efficiency).



**L1MET-L2MET (simulation )**

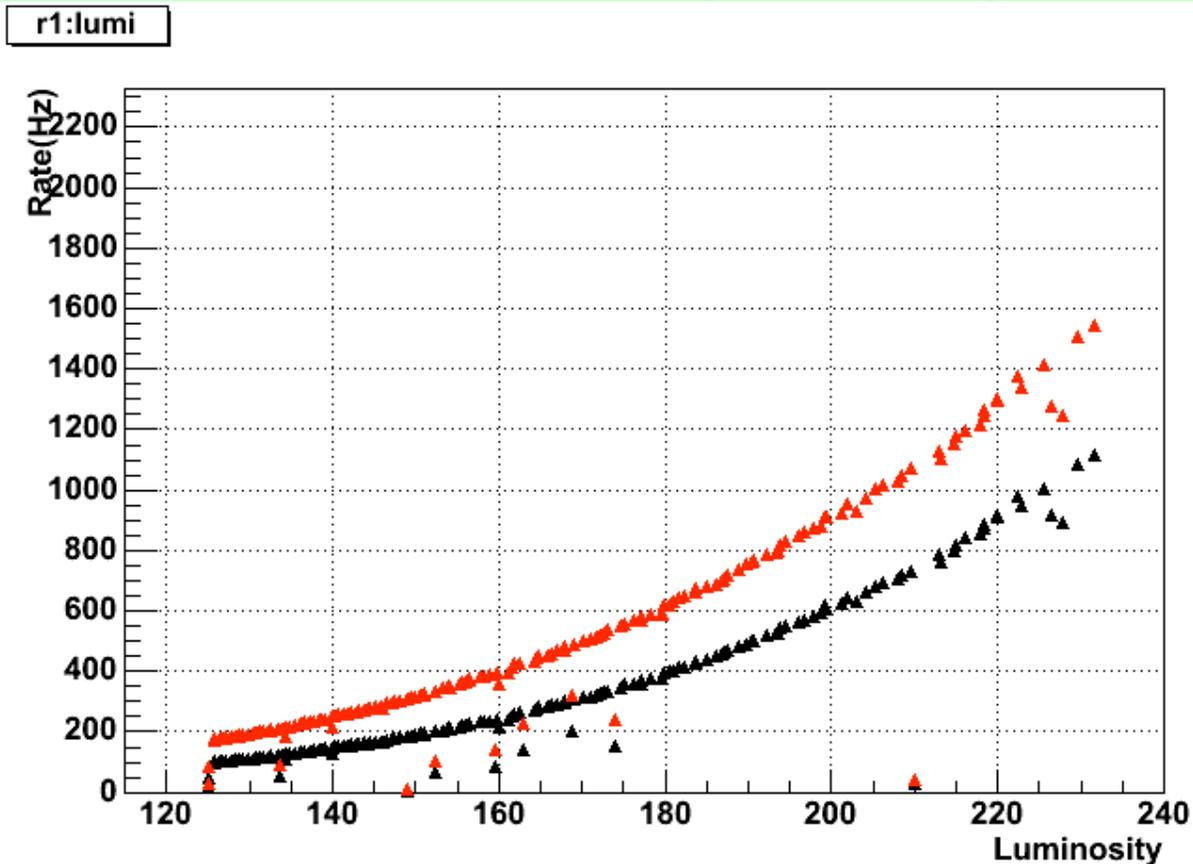


**L1MET-L2MET(on data)**

\* Diff  $\ll$  125 MeV (trigger tower resolution)

# L1MET: first measured performances

- Rate for **MET25** vs luminosity: **NEW SYSTEM & CURRENT SYSTEM**
  - **RUN 266805 (09.04.2008)**



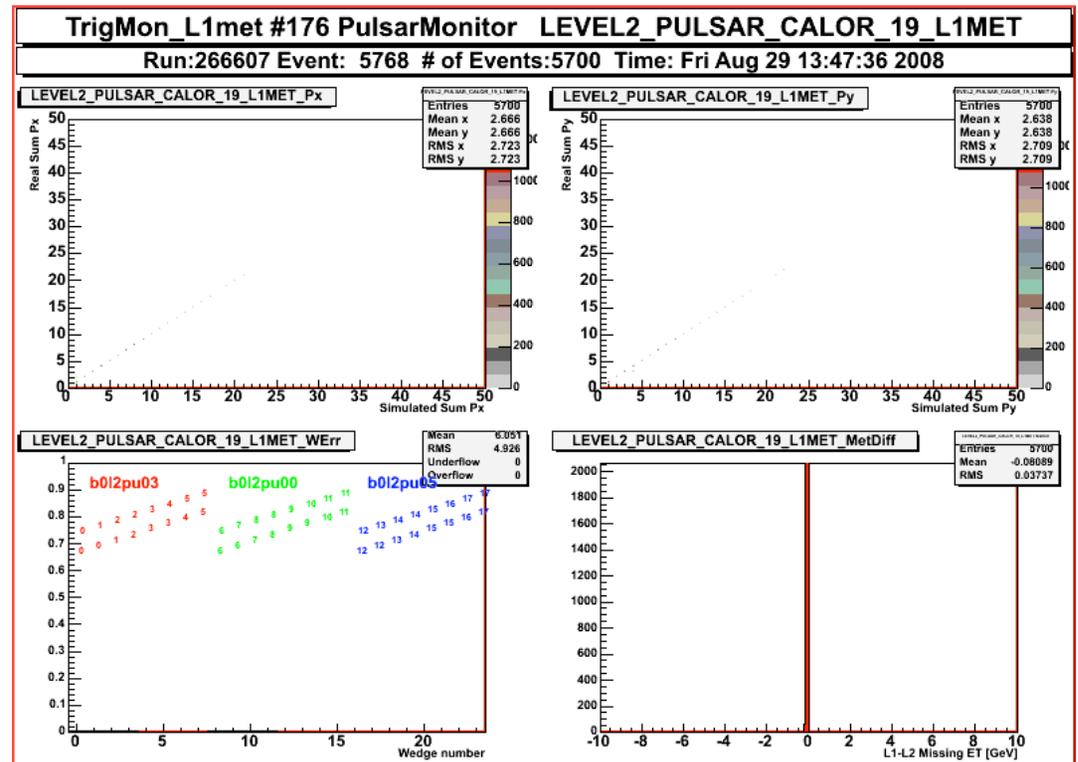
- The rate increases a little bit since we are increasing the trigger efficiency.
- Additional checks and studies are ongoing.

# Preparing for the sign-off

- Accumulating statistic for the hardware validation ( $\approx 10^6$  events).
- Measuring/checking trigger performances on the data offline.
- Studying the rates.
- Additional checks on data offline.
- Preparing documentations (CDF note, documentation for the shift crew)
- Making the system maintainable for people in future.

Reference Plot for CO in trigger room:

1. Px and Py check.
2. L1MET-L2MET.
3. SumEt for each wedge.



# Conclusions

- L1MET SYSTEM is running smoothly in parasitic and we are working to be ready for the sign-off.
- A trigger meeting to decide sign-off details will take place today.
- Improved L1Met resolution offers different trigger strategies:
  - Perform at L1 rate the cuts now done at L2: this would make a large L1 bandwidth available without losing in efficiency.
  - Put a lower MET cut threshold at L2 increasing the Higgs efficiency
  - A combination of the previous two strategies.
  - New strategies.
- **A new tool for the collaboration and new work for the trigger group.**