HLT Activities and Work with (and in) the ORCA team

JET/MET group

Charge

The HLT groups were established in April, 1999 with the charge:

> For Nov, 1999, show that we can get a factor of 10 rejection of the L1 triggers using only Calorimeter information, while maintaining good efficiency for our signals, using ORCA code.

Four Groups:

- e/gamma
- muon
- jet/met
- b/tau

The US has substantial participation in muon and in jet/met.

What that meant for Jet/Met

At that time,

1) basic calorimetry code existed for the ECAL
2) basic jet finding routines existed

What needed to be done..

1) adapt current ECAL calorimetry code for HCAL
2) add code to model the front end electronics (digization) and to handle multiple interactions both from the same crossing and from earlier crossings
3) create large data samples to use for developing our algorithms
4) create working environments in US
5) use it to verify L1 rates
6) use it to develop new L2 algorithms.

How well did we accomplish...

1) adapt current ECAL calorimetry code for HCAL

   ECAL guys did most of the work for us. However, it still uses the ECAL pulse shapes, constants, etc… We need manpower on this front!

2) add code to model the front end electronics (digization) and to handle multiple interactions both from the same crossing and from earlier crossings

   ditto

3) create large data samples

   Fortran part done very efficiently at Caltech (though some problem with distribution due to tape isues). ORCA/Objectivity part was done at CERN. Fortran samples are available at FNAL. Objectivity: not yet.

4) setup up working environment in US

   ORCA_3 is now available at FNAL. It has a nice web page, and is well-maintained. However, VCAL part of code does not work on Sun systems, only on Linux. (FNAL has a Sun).

How well did we accomplish...

5) use it to verify l1 rates

Sasha Nikitenko (a European) successfully did this using ORCA

6) use it to develop new L2 algorithms.

Algorithms were developed in FORTRAN. Sasha Nikitenko successfully implemented the tau algorithm in PAW using output from ORCA.

Who did Work

ORCA code
- Frank Behner
- ★ David Stickland
- ★ Chris Tully
- Hans-Peter Wellisch
- Sasha Nikitenko
- Teresa Monteiro
- ★ Shuichi Kunori

ORCA testing
- ★ Sarah Eno
- Sasha Nikitenko

L1 requirements
- ★ Sridhara Dasu
- Sasha Nikitekno
- ★ Ed McCliment

HLT algorithms
- Sasha Nikitenko
- ★ Dan Green
- ★ Shuichi Kunori

Jet/Met resolutions
- ★ Dan Green
- ★ Weimin Wu
- ★ Shuichi Kunori

Data Sample Production
- ★ Rick Wilkenson
- ★ Vivian O'Dell
- Werner Jank
- Jelica Draskic-Ostojic
- Salvadat Abdoulline
- Sasha Nikitenko

Physics Input
- Daniel Denegri
- Ritva Kinnunen
- Volker Drollinger
- Sasha Nikitenko
- ★ Ed McCliment
- ★ Dan Green

People who did "substantial" work are marked in green.

People from US institutions ★

People who were "active" in the JET/MET group are underlined. (Sasha Nikitenko was the heart of the group with respect to using ORCA code)

Who did the Work

Clearly, interface with ORCA team needs manpower. However, we are off to a good start

things to note:

1) there are a relatively small number of people involved Most of the people running and writing ORCA code are European.
2) only Sasha (a European) was fluent in ORCA. Sarah Eno (US-based) also managed to do some work in ORCA. Kunori also contributed to the ORCA code in the early part of the summer.

What was Accomplished

We were able to verify the L1 rates using FORTRAN (Kunori) and ORCA (Nikitenko)

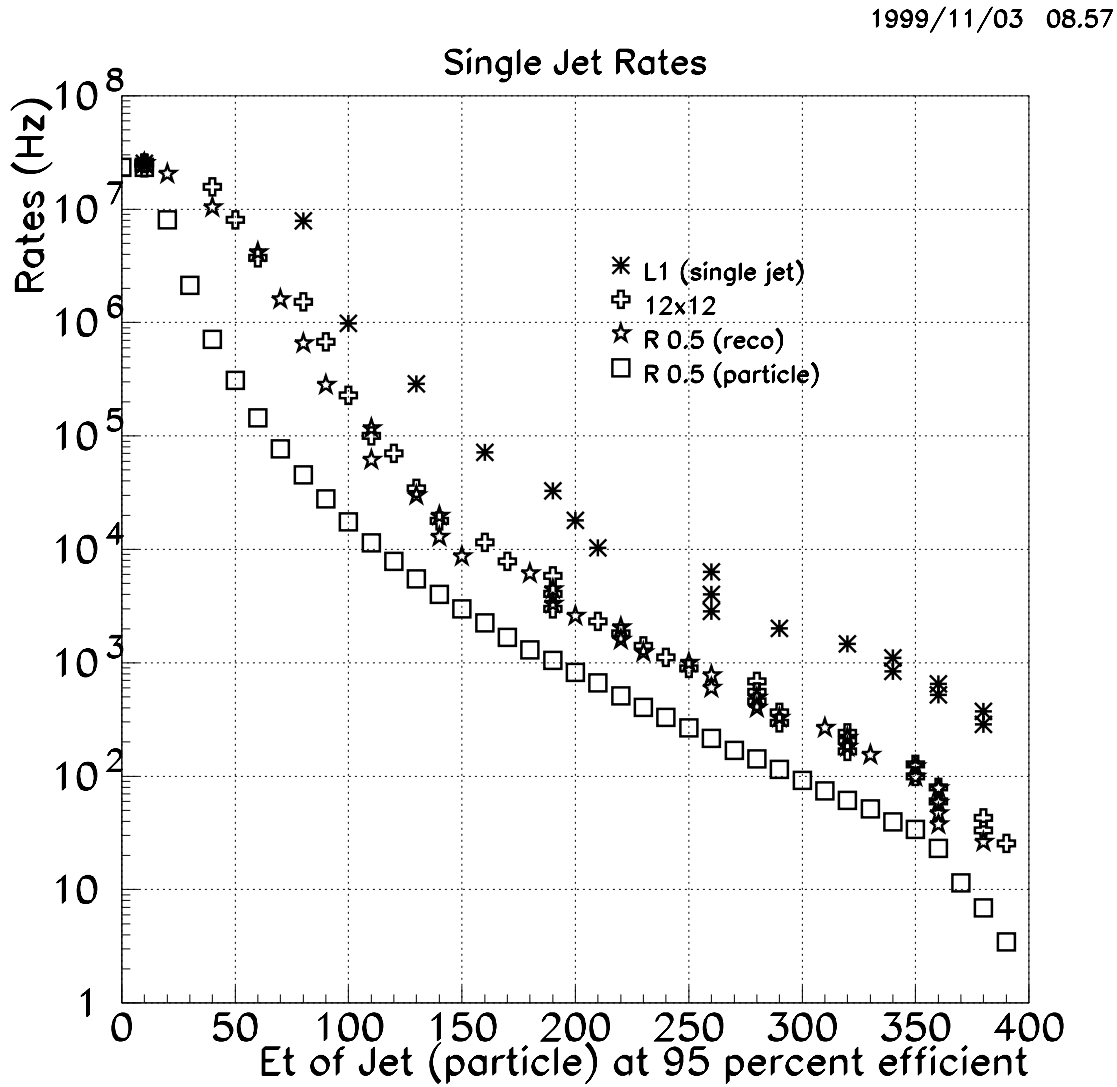
L1 Rates Verification with ORCA at $L=10^{34}cm^{-2}s^{-1}$

Triggers	ORCA, Individual rates, (cum. rates) kHz	CMS TN 1998/027 cmsim111, Ind.rates
1 J , Et thr > 100 GeV	1.7 (1.7)	1.5
2 J, Et thr > 60 GeV	1.8 (2.7)	1.2
3 J, Et thr > 30 GeV	2.8 (4.4)	2.3
4 J, Et thr > 20 GeV	2.9 (5.5)	2.6
miss Et > 80 GeV	1.1 (6.2)	1.2
scalar Et > 400 GeV	2.2 (7.1)	0.3

Table from Sasha Nikitenko

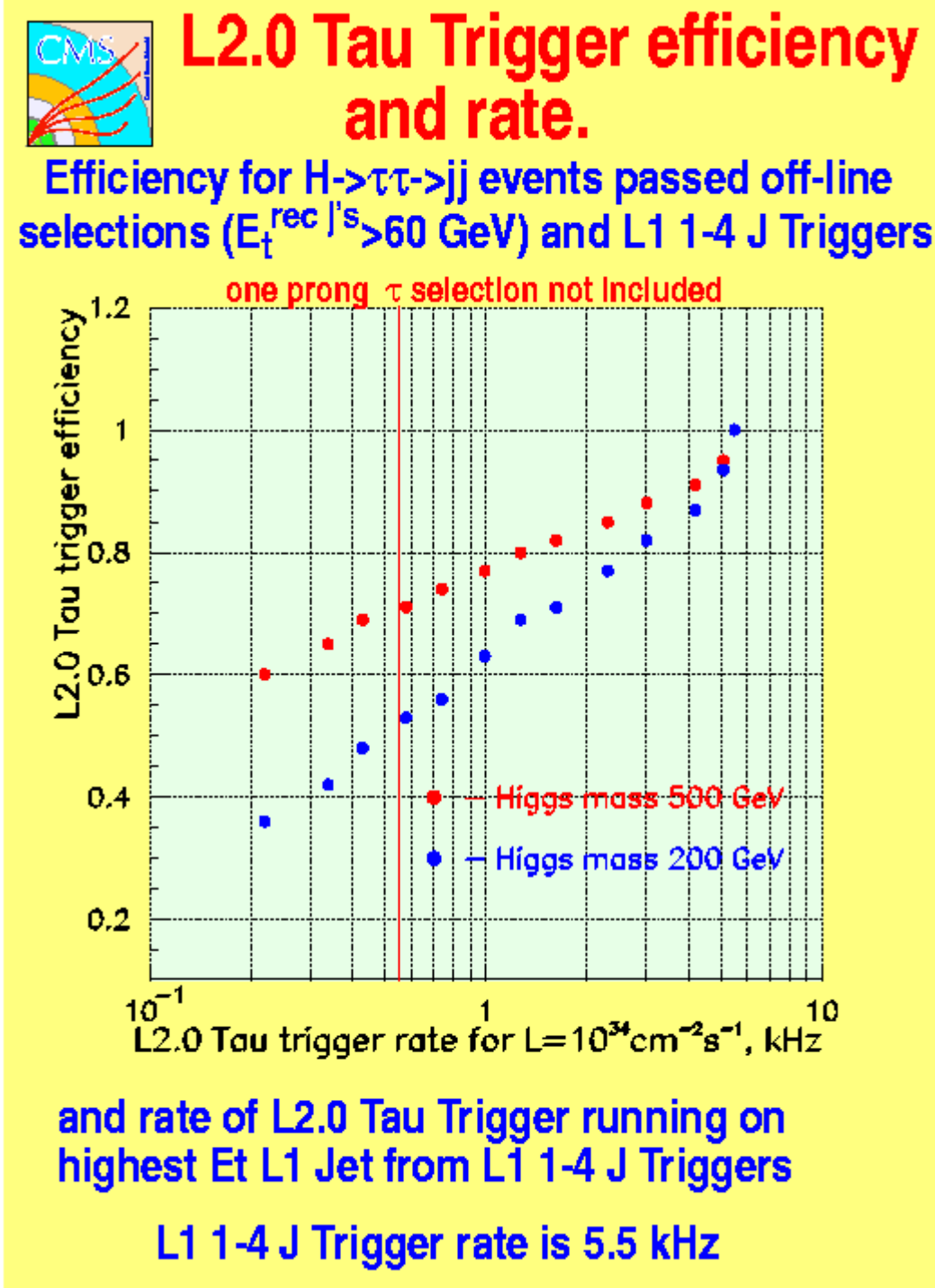
Accomplishments

Kunori showed that we could get a factor of 5 rejection at L2.0 by throwing out jets in the "turn-on" curve portion of the L1 trigger (using FORTRAN).



Accomplishments

Sasha Nikitenko showed that we can get a factor of 10 for tau triggers at L2.0 by cutting on the ratio of the E_Ts in 0.13 to 0.3 cones using the output of ORCA code. (the 200 GeV point still needs work. Efficiency at L2.0 is low, at L1 is even lower)



Summary for Jet/MET

1) We basically met our milestone
2) However, we need to improve our contact with the ORCA group, especially regarding HCAL software.
3) We have a good start, and due to the tremendous effort from the ORCA team towards the milestone, things should be easier from now on.