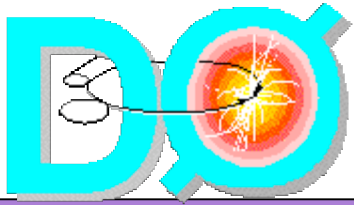


Imposing Thresholds on TTs

Jovan Mitrevski
Columbia University

DØ Run 2b L1Cal Group Meeting

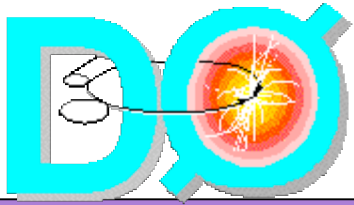
12 Dec 2002



Problem Explanation



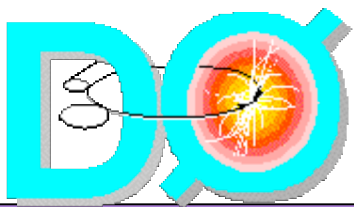
- ◆ For low-energy electrons, if noise measurements are not handled well, isolation cuts can kill electrons:
 - ◆ For 16 GeV electron, the hadronic energy, a sum of 16 TTs, must be less than 2GeV
- ◆ There is a fear that the peak-finder biases noise measurements to the positive.
- ◆ For this study, rcp is set as follows:
 - ◆ bool smearing = true
 - ◆ float Smear = 0.1
 - ◆ float SmearICR = 0.1
 - ◆ float Noise = 0.25
 - ◆ float NoiseICR = 0.25



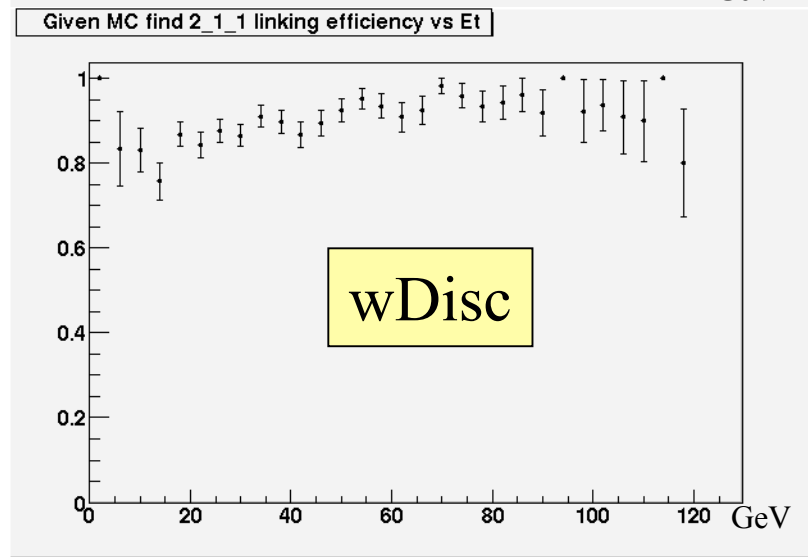
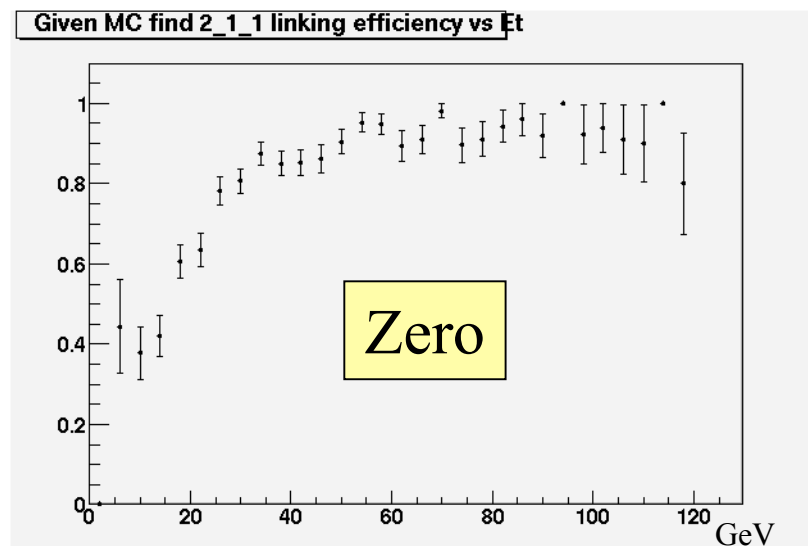
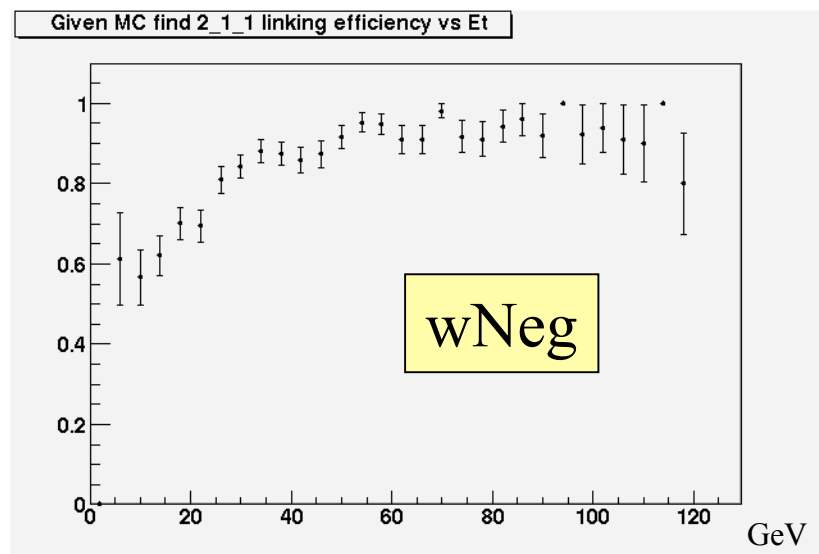
What Used



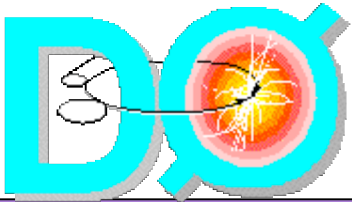
- ◆ For this study, I simulated three configurations:
 - ◆ Offset zero to allow negative values down to -1.0 GeV (wNeg)
 - ◆ Don't offset zero (Zero)
 - ◆ Don't offset zero, but also force values smaller than 0.75 GeV to be reported as zero (wDisc)
- ◆ The data I used for electrons is the standard r2b mb7.5 WH $\rightarrow$ e $\rightarrow$ bb project.
- ◆ The data I used for jets is the standard r2b mb7.5 ZH $\rightarrow$ $\rightarrow$ bb project.
- ◆ I used $|\eta| < 3.5$, but I excluded the ICR.
- ◆ The results are a work in progress and haven't been thoroughly checked.



Hint of Problem



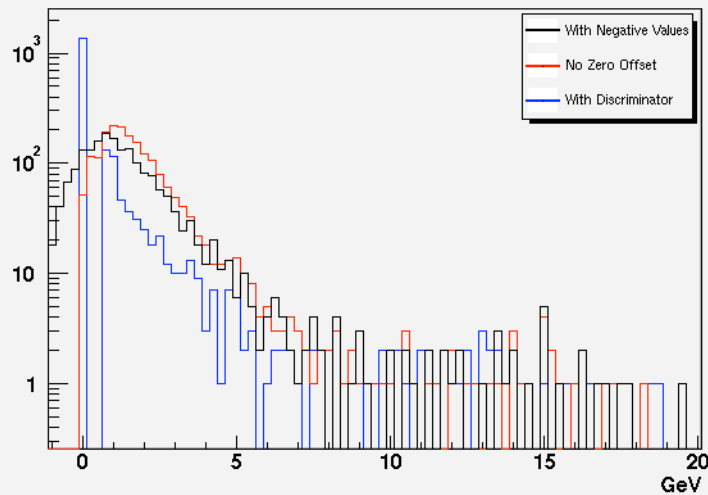
- ◆ Looking at MC to Trigger Cluster electron linking efficiency vs ET, as at the Saclay Workshop, we see that the efficiency drops down at low ET, especially for the “Zero” case.
- ◆ “wDisc” shows promise



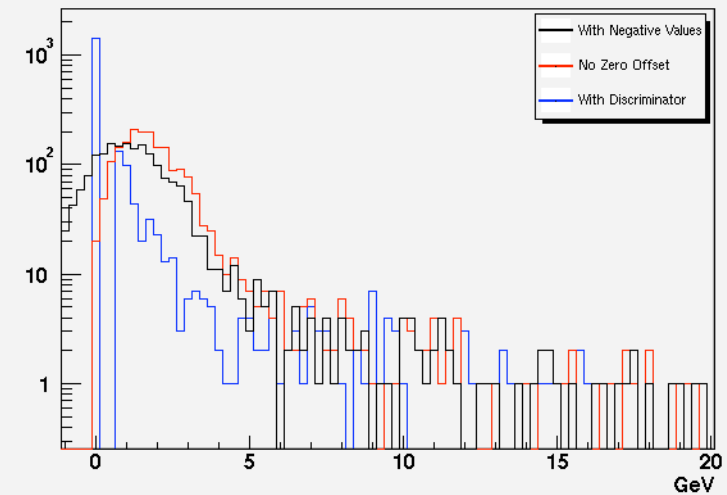
The Details



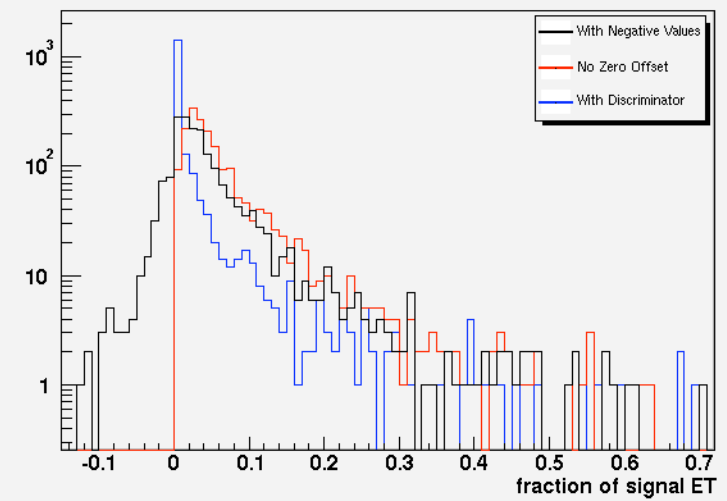
The EM Isolation Spectrum



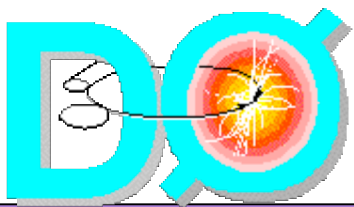
The HAD Isolation Spectrum



The scaled HAD Isolation Spectrum



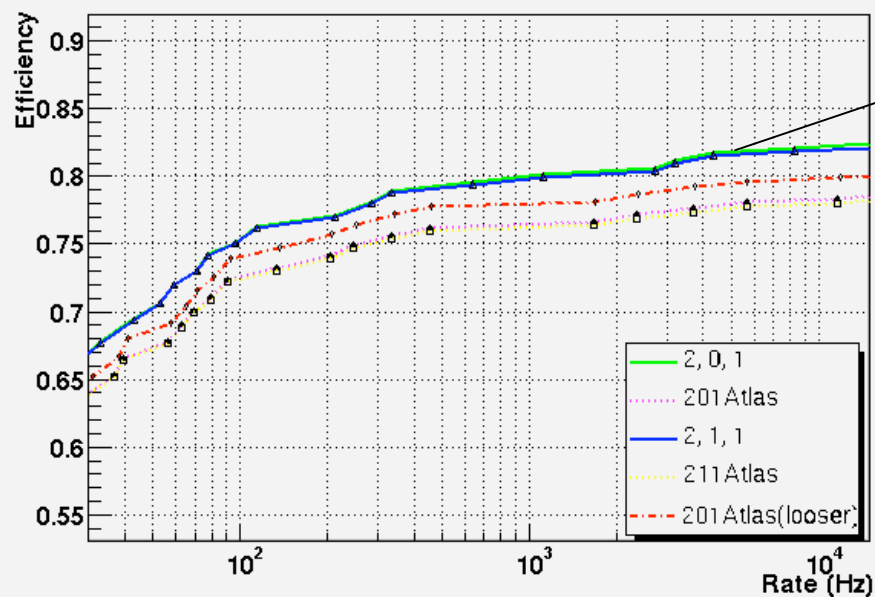
- ◆ The Isolation Region Plots explain the previous results.
- ◆ “Scaled” plot shows the hadronic E_T as a fraction of the electron E_T .



Eff. vs. Rate



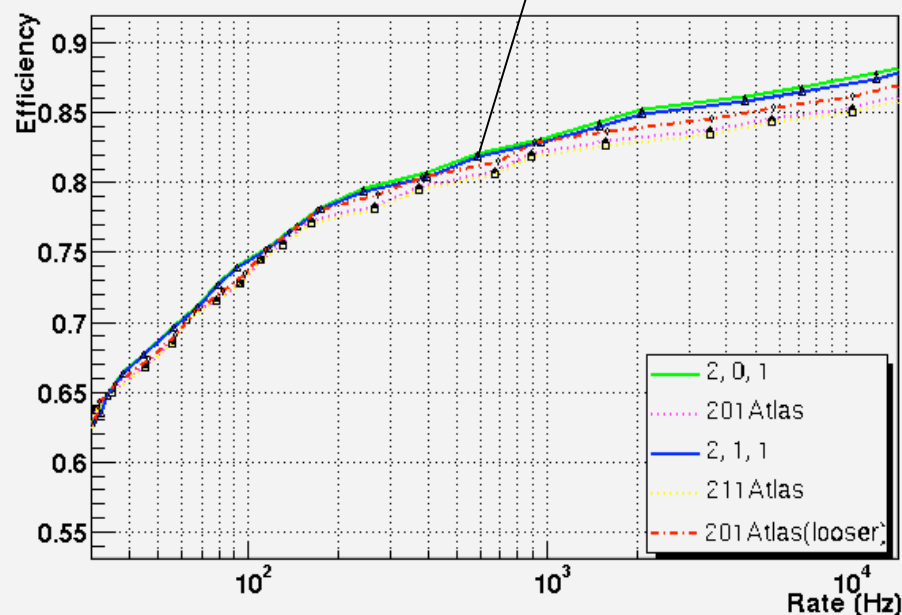
Electron efficiency as a function of rate



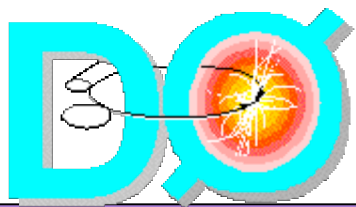
wNeg

wDisc

Electron efficiency as a function of rate



- ◆ The efficiency vs. rate plots show better performance of the “wDisc” at higher rates, but slightly worse at lower rates.

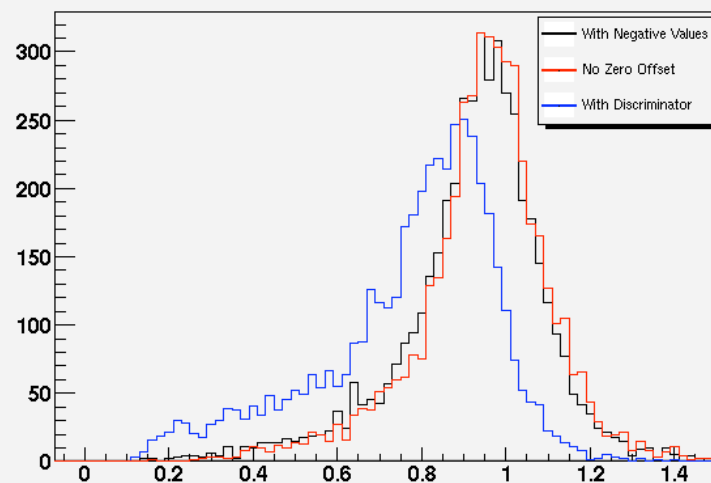


What about the Jet Algorithm?

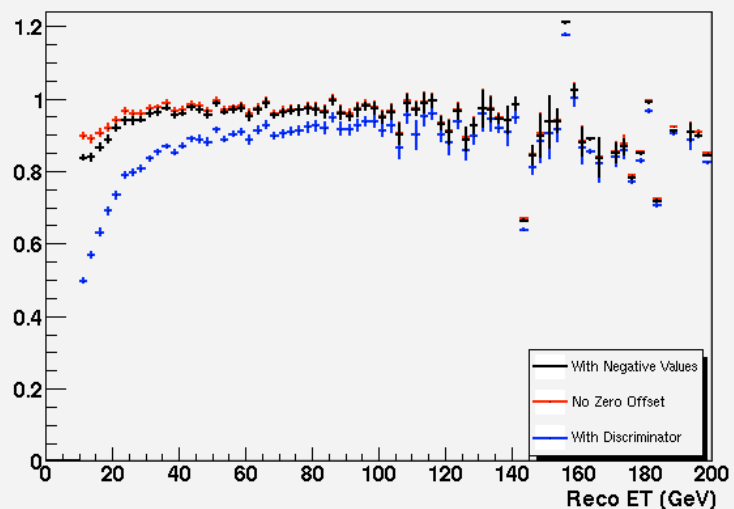


- ◆ Zeroing the TTs at the edges of a jet suggest that the $E_{Tclus}/E_{T reco}$ ratio would be worse with the discriminator.

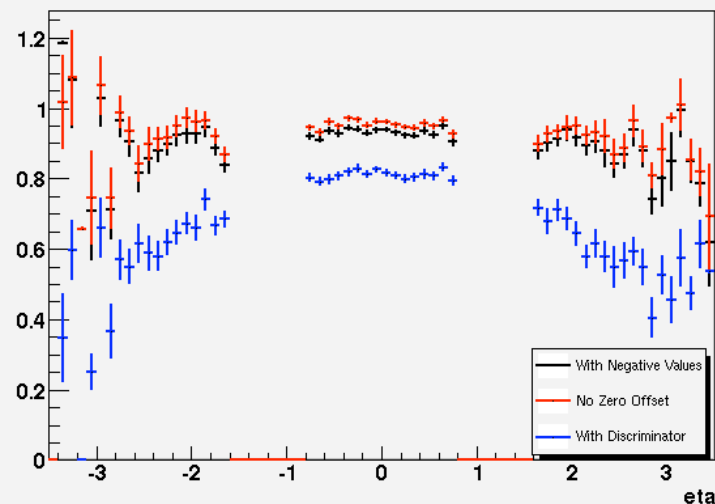
The jet energy fraction

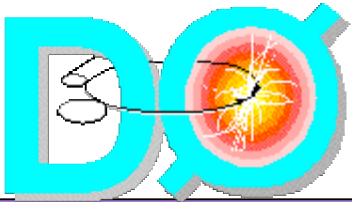


The jet energy fraction as a function of E_T



The jet energy fraction as a function of η

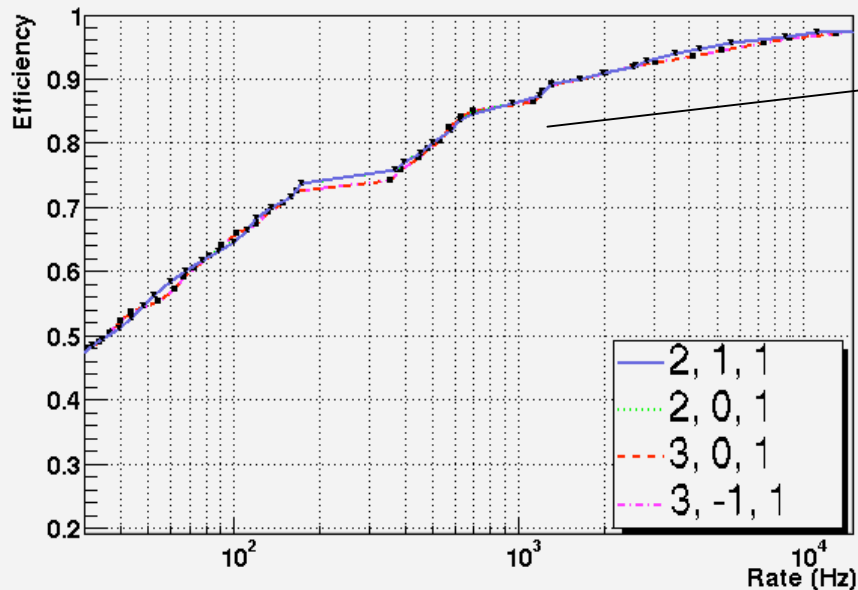




Jet Eff. vs. Rate



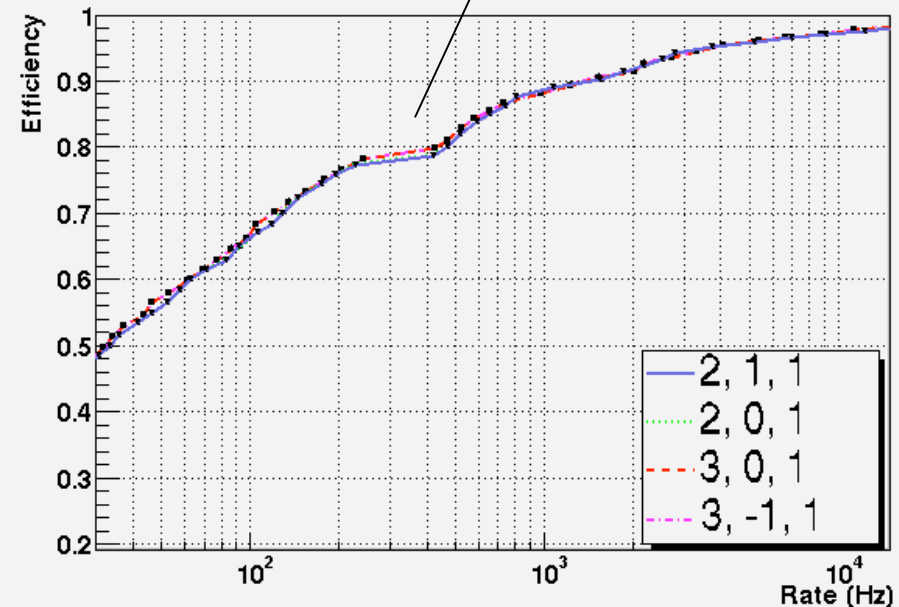
Jet efficiency as a function of rate



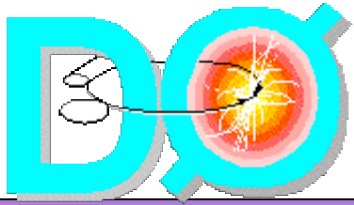
wNeg

wDisc

Jet efficiency as a function of rate



- ◆ However, the eff. vs. rate plot for jets is not as bad as the energy fraction plots would suggest.
- ◆ The plots are very close.



Conclusion



- ◆ A major question is how well does the noise simulation in the Monte Carlo files reflect the actual noise in the calorimeter.
 - ◆ Is the size of the noise correct?
 - ◆ Is it sufficient to treat bunch crossings as being independent of previous and subsequent ones?
- ◆ Understanding and properly handling the noise is very important in making the electron isolation cuts.
- ◆ Understanding the noise will be very important in making the missing energy and total energy values accurate.
- ◆ This is just beginning; much more work is needed.