Inclusive Signatures and Distributions for the Blackbox Model

1 Signatures

We present inclusive signatures and distributions for $2fb^{-1}$ of data at the LHC for the "blackbox" model. These correspond to the 'raw' data posted by Stephen Mrenna on the Blackbox webpage : http://cepa.fnal.gov/psm/blackbox/index.html.

	2 jets	3 jets	$\geq$ 4 jets
0 leptons	10075	6537	4555
1 lepton	2032	1075	579
Opp. Sign dileptons	50	14	9
Same Sign dileptons	45	17	14
$\geq$3 leptons	0	0	0

Table 1: Number of events for $2fb^{-1}$ of data for each of the above signatures. The total number of events simulated is 73356.

2 Cuts

The above inclusive signatures are obtained by the following cuts:

- Jets are defined by a conesize of $R = 0.7$ centered on the highest cell E_T, with $|\eta| < 3$. After jet formation, jets whose cores are closer than $R = 0.7$ are merged into one jet. The E_T of each jet is required to be greater or equal to 100 GeV.

- Leptons are defined as electrons or muons. The P_T for each lepton is required to be greater or equal to 20 GeV. There are no fiducial efficiency factors for electrons, photons or muons. Muon and electron acceptances are not identical. The muon coverage is extended to $|\eta| < 2$ while the electron coverage to $|\eta| < 5$. The electrons and muons are required to be isolated from jets as follows: the total E_T within a cone of $R = 0.4$ about the muon direction is less than 5 GeV while the total E_T within a cone of $R = 0.3$ about the electron direction is less than 5 GeV. For the muon, the ratio of the transverse calorimeter energy to the muon track transverse momentum is less than 10%. Also, muon objects that fail the isolation cuts are either added to a nearby jet (with $\Delta R < 0.7$), or are relabelled as jets.

- The missing transverse energy ($\not{E}_T$) for each event is required to be greater or equal to 100 GeV. Also, the transverse plane angle between $\not{E}_T$ and the closest jet is required to be between 15^0 and 180^0.

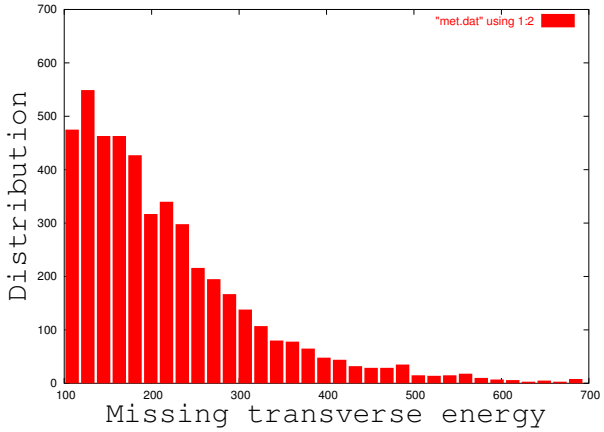
The detector simulation used is "pgs". For more information about pgs, please refer to the blackbox webpage and links therein.

3 Distributions

The following three distributions are plotted below :-

a) Distribution of $\not{E}_T$ for '0 leptons + $\geq$ 4 jets' signature — $\not{E}_T$ is defined as follows :

$$\not{E}_T = \sqrt{(\sum_1^{n_{jets}} P_x^{jet})^2 + (\sum_1^{n_{jets}} P_y^{jet})^2} \tag{1}$$

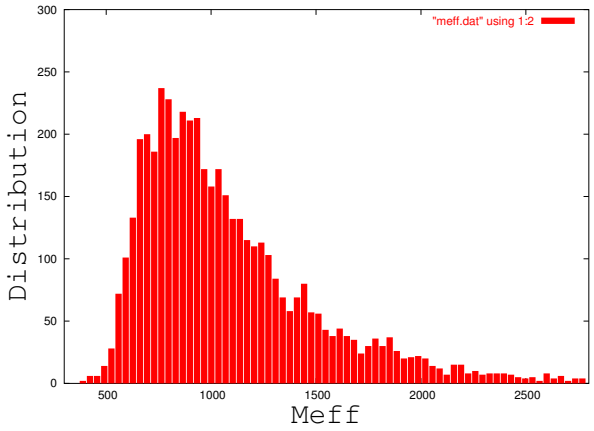


b) Distribution of M_{eff} for '0 leptons + $\geq$ 4 jets' signature — M_{eff} is defined as follows :

$$M_{\text{eff}} = (\sum_1^{n_{jets}} P_T^{jets}) + \not{E}_T \tag{2}$$

$$P_T^{jet} = \sqrt{(P_x^{jet})^2 + (P_y^{jet})^2} \tag{3}$$

c) Distribution of M_{ll} for 'Opposite Sign dileptons + $\geq$ 2 jets' signature — M_{ll} is defined as follows :



$$M_{ll} = \sqrt{(P_{l_1} + P_{l_2})^{\mu}(P_{l_1} + P_{l_2})_{\mu}} \tag{4}$$

The distribution (N) for M_{ll} is defined as :

$$N = N_{e^+e^-} + N_{\mu^+\mu^-} - N_{e^+\mu^-} - N_{e^-\mu^+} \tag{5}$$