measured the expected background rate for their tagging scheme using a large sample of events coming from their inclusive jet triggers. Since the jets in these events are expected to arise predominantly from light quarks and gluons, they form a good sample to estimate the probability of tagging a light quark or gluon jet as coming from a b quark. This leads to an over-estimate of the background from light quark jets, as some of the jets in this inclusive jet sample will have c and b quarks in them, albeit at a low rate. These studies show that the tag rate is between 0.005 and 0.010 per jet, and rises slowly with the E_T of the jet. Detailed Monte Carlo calculations using a full detector simulation verify this result. Based on this study, DØ expects that $\sim 2\%$ of the $W + 3$ or 4 jet background events will be tagged, with provides an order of magnitude improvement in signal-to-noise in this sample.

The DØ collaboration use a less stringent $W+$ jets selection when also requiring a b quark tag in order to optimise the signal-to-noise of this analysis. The events are required to have $H_T > 140$ GeV, and the jet multiplicity requirement is relaxed to demand ≥ 3 jets with $E_T > 20$ GeV. In addition, the aplanarity cut is dropped altogether, and in the case of the electron + jets channel, the $\not\!\!E_T$ cut is relaxed to require $\not\!\!E_T > 20$ GeV. There are 3 events in the e+jet and μ+jet channels that survive these requirements, whereas only 0.85 ± 0.14 and 0.36 ± 0.08 events are expected from background sources. As in the dilepton and lepton + jets channels, a excess of candidate events over background is observed.

7.2 The CDF Counting Experiment

The CDF collaboration has performed an analysis of their lepton + jets data similar to that reported for the Run 1A dataset [9]. The analysis avoids making stringent kinematical cuts that could result in large systematic uncertainties, and takes advantage of the presence of two b quarks in the signal events to control the expected backgrounds.

Starting from the inclusive W sample, the CDF analysis requires at least three jets with $E_T > 15$ GeV and $|\eta| < 2.0$. This results in 203 events, with 164 and 39 events in the $W + 3$ and $W+ \geq 4$ jet samples. The backgrounds estimated to make the largest contribution to this sample come from real $W^{\pm}$ boson production, from standard model sources of other isolated high E_T leptons (such as Z° production), from b and c quark semileptonic decays and from events where the lepton candidate has been misidentified. Most of the non-$W^{\pm}$ backgrounds have lower $\not\!\!E_T$, and are characterised by lepton candidates that are not well isolated from other particles in the event. The correlation between this additional energy flow and $\not\!\!E_T$ in the event allows one to directly measure this background fraction. This results in an estimate for the background from sources of non-isolated lepton candidates of $10 \pm 5\%$. The background rates from sources that produce isolated lepton candidates have been estimated using data and Monte Carlo calculations. These background estimates are summarised in Table 4.