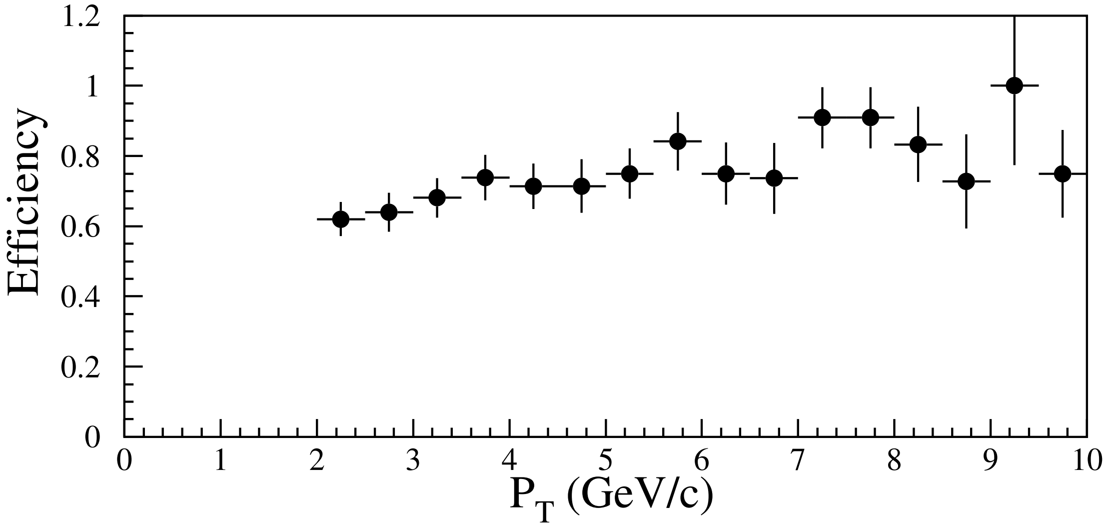

Figure 34: Efficiency for the isolation-independent electron selection requirements as a function of P_T.

To calculate the acceptance for top events, we use the ISAJET Monte Carlo generator, modified to use the CLEO Monte Carlo program for the decay of B mesons, and a simulation of the CDF detector. The efficiency for detecting an additional electron or muon of $P_T > 2$ GeV/c in top events is $\epsilon_{tag} = (16 \pm 2)\%$, resulting in the number of expected tagged $t\bar{t}$ events given in Table 22. Of these events, 37% will contain an electron tag, and 63% will contain a muon tag, independent of top mass. For the $t\bar{t}$ Monte Carlo sample with a top mass of 140 GeV/c^2, 53% of these leptons come directly from b decay, 35% come from the c quarks from b decay, and the remaining 13% come from the W in the reaction $t \rightarrow Wb$. These fractions are very weakly dependent on the assumed top mass. The Monte Carlo simulation also predicts that a small fraction of tagged top events (approximately 7%) should contain more than one reconstructed soft lepton. Note that ϵ_{tag} defined above does not include the small (approximately 4%) probability of misidentifying a hadron as a lepton in top events. Systematic uncertainties in the lepton tagging rate arise from uncertainties in the muon and electron detection efficiencies (6%), uncertainties in the b and c quark semileptonic branching ratios (10%), uncertainty in the fragmentation of b quarks into hadrons (5%), and the finite statistics of our Monte Carlo samples (7%).

As a further check of the efficiency of the SLT tagging procedure, we search for SLT tags in the inclusive electron sample described in Section 5.2. We estimate that the fraction of electrons in this sample that are from semileptonic b decays in $b\bar{b}$ events is $F_b = (37 \pm 8)\%$. The sample of jets recoiling against these electrons is therefore enriched in b quarks. We find 767 SLT tags in the 55061 jets with $P_T >$ 10 GeV/c and $|\eta| < 2$ in this sample. The background from fake leptons in this sample (see Section 5.3.2), is estimated to be 310 ± 62, so that the excess of SLT tags over background is 457 ± 68. Theoretical calculations [44] suggest that the fraction of recoil jets in $b\bar{b}$ events that actually contain a b or $\bar{b}$ quark is $F_{rec} = (49 \pm 15)\%$.