requiring a charged track in the CTC that matches a muon track stub. Electron candidates are defined by an electromagnetic shower in the calorimeter with less than 10% additional energy in the hadronic calorimeter towers directly behind the shower, a well-reconstructed track in the CTC that matches the position of the shower, and shower profiles consistent with those created by an electron. The overall efficiency for finding at least one SLT tag in a $t\bar{t}$ event is 0.22 ± 0.02, and is not a strong function of the top quark mass.

The rate at which this algorithm misidentifies light quark or gluon jets as having a soft lepton is determined empirically by studying events collected by requiring the presence of at least one jet cluster. The mistag rate for muon tags varies between 0.005 and 0.01 per charged track, and rises slowly with the energy of the jet. The mistag rate for electrons also depends on the track momentum and how well isolated it is from other charged tracks; it typically is of order 0.005 per track. Fake SLT tags where there is no heavy flavour semileptonic decay is expected to be the dominant source of background tags in the $t\bar{t}$ sample, due to the larger SLT fake rates as compared to the SVX mistag rates.

7.2.3 Tagging Results in the CDF Lepton+Jets Sample

The SVX and SLT tagging techniques have been applied to the W+jet sample as a function of the number of jets in the event, and the expected number of mistags has been calculated for each sample. This provides a very strong consistency check, as the number of observed tags in the $W+1$ jet and $W+2$ jet samples should be dominated by background tags; the fraction in these two event classes expected from $t\bar{t}$ production is less than 10% of the total number of candidate events.

The number of candidate events and tags is shown in Table 5. There is good agreement between the expected number of background tags and the number of observed tags for the $W+1$ jet and $W+2$ jet samples. However, there is a clear excess of tags observed in the $W+\geq 3$ jet sample, where we observe 27 and 23 SVX and SLT events, respectively, and expect only 6.7 ± 2.1 and 15.4 ± 2.3 SVX and SLT background tags. The excess of SVX tags is particularly significant, with the probability of at least this number of tags arising from background sources being 2×10^{-5}. The excess of SLT tags is less significant because of the larger expected background. The probability that at least 23 observed SLT tags would arise from background only is 6×10^{-2} and confirms the SVX observation.

It is interesting to note that if we attribute the excess number of SVX tags in the $W+\geq 3$ jet sample to $t\bar{t}$ production, we would expect approximately 10 $W+2$ jet tagged events resulting from $t\bar{t}$ production. This is in good agreement with the excess of observed tags (13 ± 7) in this sample, and corroborates the hypothesis that the excess in the $W+\geq 3$ jet sample is due to the $t\bar{t}$ process.

A striking feature of the tagged sample is the number of events with two or more tagged jets. The 27 SVX tags are found in 21 events, so that there are 6 SVX double tags. There are also six SVX tagged events that have SLT tags. We would expect