Background	Fraction of Sample (%)
WW, WZ production	5.0 ± 2.3
$Z^\circ \to e^+e^-/\mu^+\mu^-$	5.2 ± 1.3
$Z^\circ \to \tau^+\tau^-$	3.3 ± 1.0
Fake leptons, conversions, $b\bar{b}$	10.0 ± 5.0
Total	23.5 ± 5.7

Table 4: The estimated fractions of events in the $W+ \geq 3$ jet sample arising from the different background sources to $t\bar{t}$ production. Only the requirement of ≥ 3 jets has been imposed.

7.2.1 Secondary Vertex Tagging

The CDF detector has the unique capability of detecting b quarks by reconstructing the location of the b quark's decay vertex using the SVX detector. A schematic of the decay topology for a bottom hadron is shown in Fig. 9. The charged particle trajectories are reconstructed in the CTC and then extrapolated into the SVX detector to identify the track's hits in the silicon strip detector.

The quality of the reconstructed SVX track is determined by the number of SVX coordinates found for the track and the quality of each coordinate. The algorithm to reconstruct secondary vertices considers all tracks above a transverse momentum of 1.5 GeV/c that have an impact parameter relative to the primary vertex $> 2\sigma$. The algorithm first looks for vertices formed by three tracks, making relatively loose quality cuts on each of the tracks. A vertex is accepted if a χ^2 fit requiring the three tracks to come from a common point is acceptable. Any remaining high-quality tracks with large impact parameter are then paired up to look for two-track vertices. A jet containing a secondary vertex found in this way that has a positive decay length is considered SVX tagged (the sign of the decay length is taken from the dot product of the displacement vector between the primary and secondary vertices and the vector sum of the momenta of the daughter tracks).

The efficiency of this SVX tagging algorithm has been measured using a large sample of inclusive electron and $J/\psi \to \mu^+\mu^-$ candidates, where the heavy quark contents in these samples have been independently estimated. This efficiency agrees with that obtained using a full detector simulation; the ratio of two estimates is 0.96 ± 0.07.

The b quark SVX tags not arising from $t\bar{t}$ production arise from track combinations that for some reason result in a fake secondary vertex (mistags), and from real sources of b and c quarks in $W+$ jet events. One way of estimating the mistag rate is to note that the rate of these fakes must be equal for those that fall in front of or behind the collision point (positive and negative tags, respectively). The rate of real b and c quarks not arising from $t\bar{t}$ production can be estimated using theoretical calculations