



Figure 4: The H_T distributions for $e\mu + \text{jet}$ events (a) and lepton + jet events (b). The solid histograms are the distributions expected from $t\bar{t}$ events for a top quark mass of $200 \text{ GeV}/c^2$. The dashed histograms are the expected distributions for the dominant backgrounds to $t\bar{t}$ production in both channels.

in both their dilepton and lepton+jets analysis, and its effectiveness in improving the signal-to-noise in the dilepton and lepton + jets channels is illustrated in Fig. 4. The CDF collaboration has recently reported the results of a top analysis using a similar variable [19].

An additional kinematic variable known as aplanarity (\mathcal{A}) [20] has been employed by the $D\bar{0}$ collaboration. This, as its name suggests, is a measure of how spherical a candidate event is: $t\bar{t}$ events are expected to have larger values of \mathcal{A} than the corresponding physical backgrounds.

The final tool used in the reconstruction of $t\bar{t}$ events is the identification or “tagging” of jets that arise from the b quarks. There are two techniques employed by the collaborations. The first takes advantage of the fact that bottom hadrons decay semi-leptonically into electrons or muons about 20% of the time. $D\bar{0}$ and CDF therefore search the interior of each jet cone for a muon candidate. CDF also searches for low-energy electron candidates that can be associated with a jet cluster. Because there are two b quarks in each $t\bar{t}$ decay, the efficiency of this soft lepton (SLT) tagging scheme ranges from 10-15%. The second technique is used exclusively by CDF and takes advantage of the long-lived nature of bottom hadrons and the SVX (or SVX') detector. A search is performed for several charged tracks detected in the SVX that form a secondary vertex a significant distance from the primary interaction. The efficiency of this tagging scheme depends crucially on the performance of the SVX/SVX'. It is estimated that over 40% of all $t\bar{t}$ decays will have the presence of at least one SVX tag.