employed to flag these candidates immediately. The cross section for this trigger is only a few nb.

At a luminosity of 2×10^{31} cm^{-2}s^{-1}, a trigger cross section of 300 nb corresponds to an event rate of 6 Hz, which can be comfortably recorded and analyzed. Note, however, that even with a cross section of 10 nb, the total data sample for an integrated luminosity of 50 pb^{-1} will consist of 500 000 events, with each event comprised of order 200 kbytes of information.

5.4 The Run IA and IB Datasets

The Tevatron Collider started up after a three year shut-down in fall 1992, and continued running through the summer of 1993. As this was the DØ detector's first collider run, it was remarkable that the collaboration was able to successfully use 40-50% of the collisions for their physics studies. The CDF collaboration gathered 19.6 ± 0.7 pb^{-1} of data during this period.

From the start of Run 1B in 1994 to February 1995, the Tevatron Collider had delivered over 100 pb^{-1} of collisions to each detector. The DØ and CDF collaborations had recorded and analysed ~ 45 pb^{-1} of this data by this date, giving the the two collaborations total Run 1 datasets of 50 and 67 pb^{-1}, respectively.

In between Run 1A and 1B, both collaborations made incremental improvements to their detectors. The DØ detector's muon trigger was improved and various detector subsystems were modified with the goal of improving overall robustness and efficiency. The CDF collaboration replaced the original 4-layer SVX detector with a mechanically identical device that used newer, radiation-hard silicon strip wafers, and employed an AC-coupled readout design. The new detector, known as the SVX', has much better signal-to-noise and is fundamentally better understood.

5.5 Event Reconstruction

Given the large number of partons that arise from the decay of the $t\bar{t}$ system, each detector is required to reconstruct with good efficiency high energy electrons and muons, the jets resulting from the fragmentation of high energy quarks, and the presence of one or more neutrinos by the imbalance of total transverse energy in the collision.

High energy electrons and muons are identified in both detectors by the charged track left in the central tracking systems, and by the behaviour of the leptons in the calorimeters and muon identification systems outside the calorimeters. Electrons will generate an electromagnetic shower in the calorimeter, with a lateral and longitudinal shower profile quite distinct from the shower intitiated by a charged hadron. Muons are readily identified as they generally pass unimpeded through the calorimeter and are detected outside the calorimeters as charged particles that point back to the particle trajectory in the central tracker. The CDF electron and muon reconstruction algorithms have efficiencies of $84 \pm 2\%$ and $90.6 \pm 1.4\%$ for leptons from W boson decays. The DØ electron reconstruction has an efficiency of $72 \pm 3\%$. These efficiencies