5 Tau Triggers

1. Central $\mu + \tau$ track
2. $\mu$ from Central
   Muon Extension $\tau$ track
3. Electron $\tau$ track
4. $\tau + MET$

CDF Trigger system
- CDF trigger is a 3-level system
- eXtremely Fast Tracker (XFT)
  makes tracks available to Level 1
  \( \Rightarrow \) It is possible to reconstruct $\tau$ at trigger level.

Using impact parameter for $\tau$ ID
- $\tau$ lepton lifetime ($\tau \rightarrow \ell + \nu$): 87 $\mu$m
- $\sigma (d_{\tau}) = 10 \mu$m (TDR), $\sim 30 \mu$m (online)
- It is possible to assign offline probability
  $P(d_{\tau})$ for each to-be-$\tau$

Structure of Triggers
Real live example from 17 May 2003, trigger table PHYSICS 1_04 09

First Results
- $W \rightarrow \tau + \nu$ data from $\tau$ MET trigger
- $Z \rightarrow \tau + \nu$ data from $e+ track trigger$

Physics Goals
- Pencil-like jets appear in:
  - Electroweak: $W \rightarrow \tau + \nu$
  - $Z/\gamma \rightarrow \tau + \nu$
  - Top: $t \bar{t}$ with $W \rightarrow \tau + \nu$
  - Higgs: associated $HH/HH$
  - With $W/Z \rightarrow \tau + \nu$ and $H_0 \rightarrow \nu
  \nu$
  - LFV $H \rightarrow \mu
\mu$
  - SUSY extend searches at large $\tan \beta$
  - RPV mSUGRA
  - did we forgot smth?

Preliminary studies show that $d_\tau$ may be a discriminator between real and fake $\tau$.