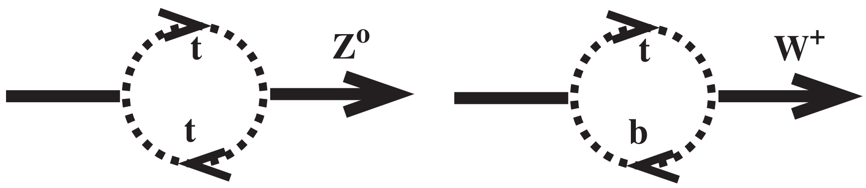
SM Predictions for Top Quarks

The asymmetry in $e^+e^- \rightarrow b\bar{b}$ scattering implies that b is part of SU(2) doublet

- top quark has standard SU(2) couplings
- CKM matrix predicts dominant decay $t \rightarrow W^+b$

Corrections to $W^\pm$ and Z° masses depend on heaviest fermion



- LEP, SLD measurements on the Z resonance require

$$M_{top} = 178 \pm 10^{+18}_{-19} \text{ GeV/c}^2$$

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What Does it Take to Discover Top?

- Observe "anomalous" production of W^+W^- events
  - Use dilepton events – both W's decay leptonically
- Observe W^+W^- events associated with a b quark
  - Use lepton + jet events
- Show events come from heavy fermion decays
- Confirm rate is consistent with $t\,\bar{t}$ production
  - Measure cross section using tagged events

Dilepton Top Quark Search

$t\bar{t}$ decaying into 2 leptons create unique signature

- Two charged leptons from $W^{\pm}$ decay
- Imbalance in total energy due to undetected neutrinos
- Two jets from bottom quarks

CDF performed a search requiring

- Two clean, high P_T lepton candidates
- Missing transverse energy $\not{E}_T > 25$ GeV
- Require two jets with $E_T >$ 10 GeV and $|\eta| < 2.0$
- Reject specific backgrounds (e.g. Z°)