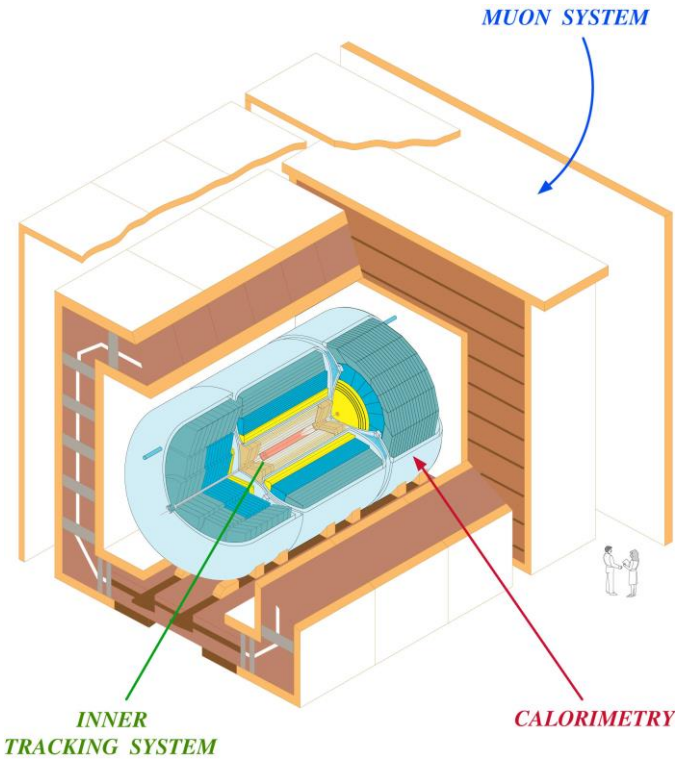
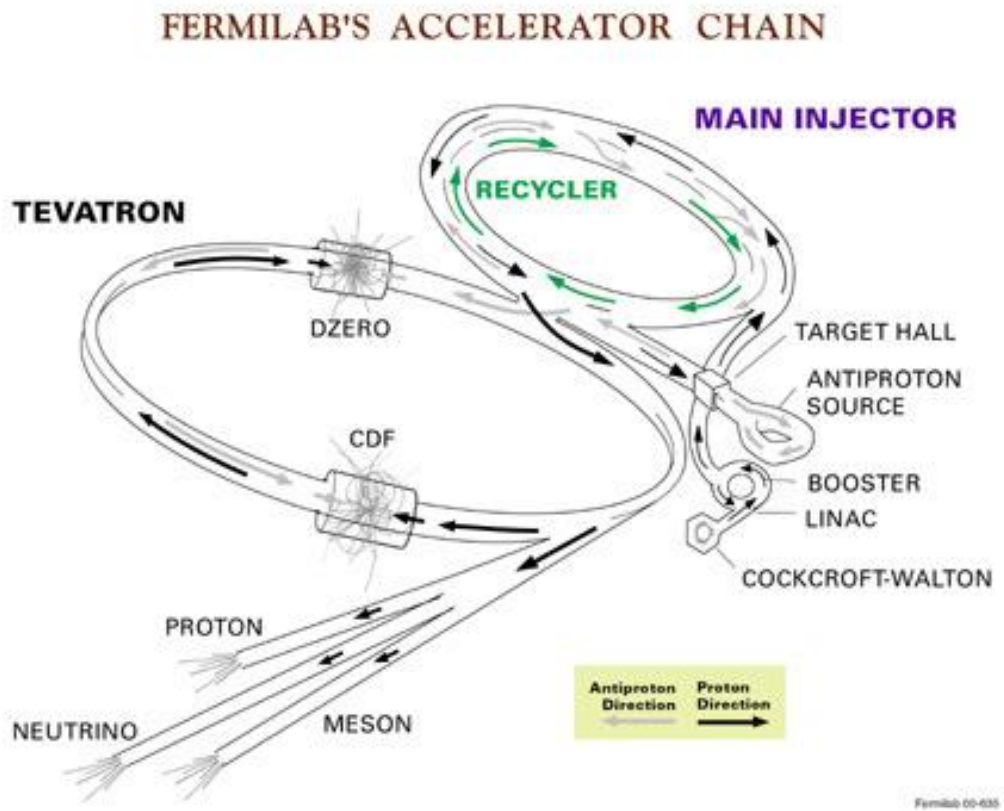
VOLUME 74, NUMBER 14 PHYSICAL REVIEW LETTERS 3 APRIL 1995

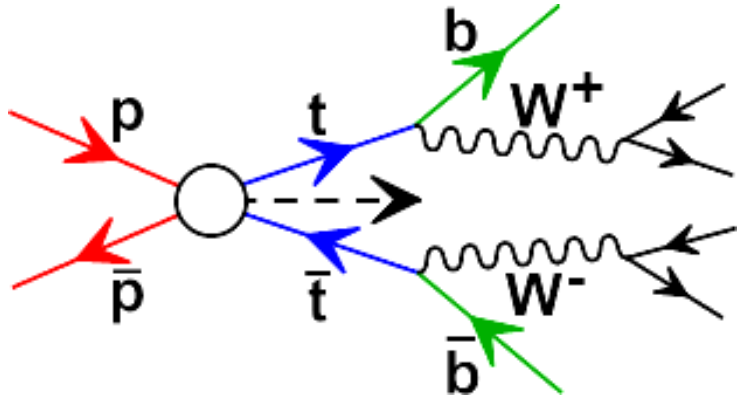
# Observation of the Top Quark

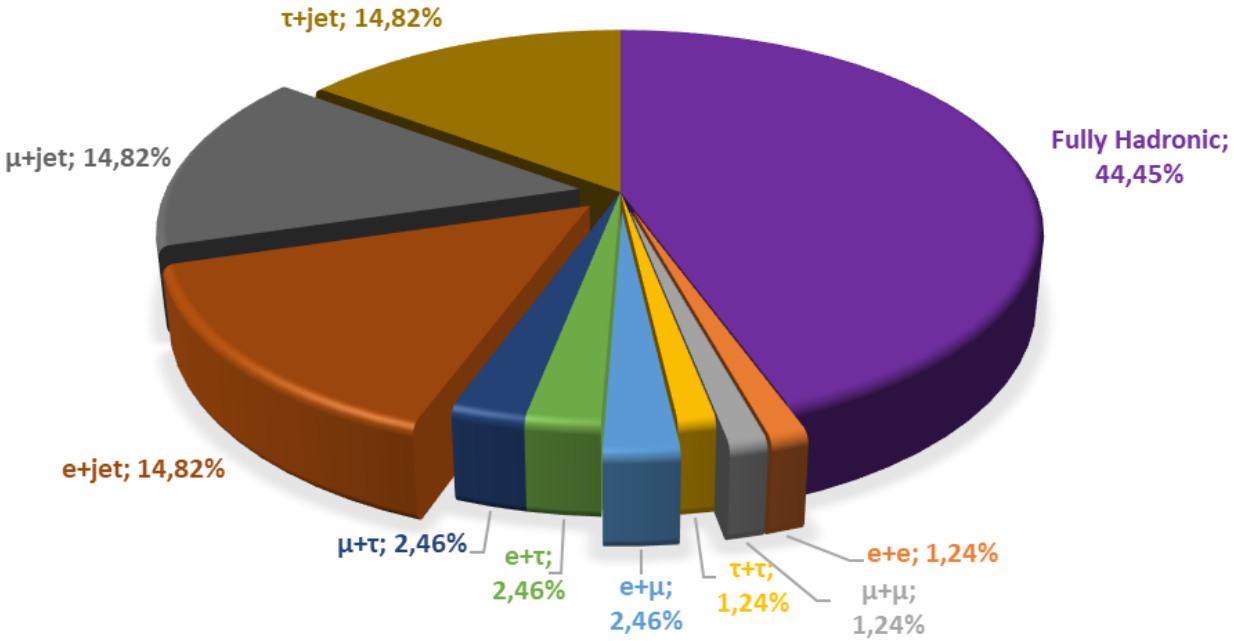


# $t$ production, decay, and observation

- mainly produced in $t\bar{t}$ pairs ($q\bar{q}$ annihilation, or $gg$ fusion)
- [Almost] always decays into a b quark and a W boson.
- W boson can decay either leptonically or hadronically.



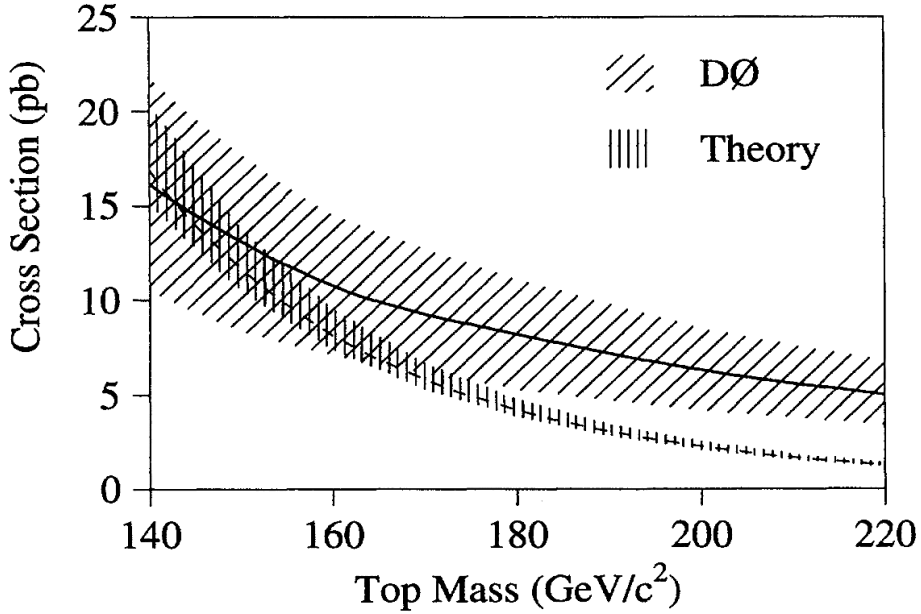

$t\bar{t}$ *Pair decay channels*

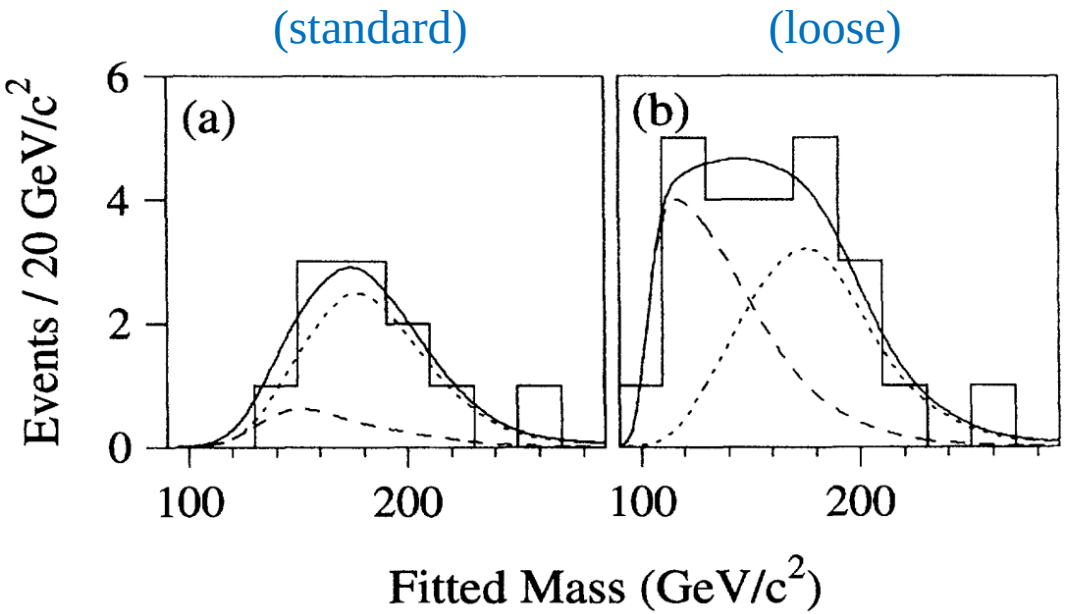
- Channels of interest are those where either one or both W bosons decay to a muon or/and an electron.
- $\frac{signal}{background}$ ratio is improved by imposing some kinematic criteria (topological selection), on MET, aplanarity of jets, and $H_T$.
- In single lepton channels, b quarks are tagged using soft-muon b-tagging, otherwise they are considered untagged.

⇒7 channels

# Results

- Using an integrated luminosity of $50pb^{-1}$, 17 $t\bar{t}$ events were observed with an expected background of $3.8\pm0.6$ events.
- The excess of events and their distribution among the 7 channels is consistent with top quark pair production.




- The significance is calculated to be $4.6\sigma$ ($p = 2 \times 10^{-6}$)
- The measured mass of the top quark is $199^{+19}_{-21}$(stat) $\pm$22(syst) GeV.
- For that mass, the cross section is measured to be $6.4 \pm 2.2$ pb.

# Merci!

**Hatice TEKIS**
KUT

**Rafik ER-RABIT**
FS-UIT

**Stacyann NELSON**
FAMU