Early Top at CDF

Prehistory from 10 B.T. to 3 B.T.

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1. Life in the Dark Ages (circa 1987)

2. Search for top in Run 0

3. Getting the First Results Out

4. Lead up to Run 1

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Life in the Dark Ages

Real discussion about top started in 1987

- UA1's claims about top were largely discredited
- No evidence of anything unusual in Run -1
- CDF just starting to be aware of the work involved

First Top Group meeting organized in November 1987

- Mel Shochet and Brig Williams chosen as convenors
- Organized beginning of analysis efforts
- Technology pretty crude....

Took a while to figure out how to use MC's

- Lots of issues with $\sigma_{t\bar{t}}$
- B backgrounds to inclusive leptons?
- $W+$ jet production?

Beginning of a very large effort

- Impossible to identify all the people involved
- So apologies if your name doesn't come up....

Run 0 Analysis Launched mid-1988

With detector commissioning underway, efforts to understand triggers and data selection were priorities

- $e\mu$ channel considered "golden"
- Lepton+jets looked challenging
  - Didn't understand purity of lepton samples
  - Did we know how to reconstruct jets?
  - No real attempt at modelling b quark bkgds
  - W production not understood
- Multijets looked hopeless....
- But UA2 was taking data (so was UA1 .....)

Had greatest confidence in dileptons

- By February 1989, had 2 pb^{-1} of data and no candidates
- CDF presented preliminary results at Santa Monica Symposium
- Blew the doors off UA2...

But lepton+jets analyses were controversial

- Disagreed on ability of detector to measure M_T
- Took several more months to come to closure

Lepton + Jets Dragged On....

Problem was W+jets background

- Background subtractions, cuts on M_T, etc.
- Finally decided to do simultaneous fit of M_T distribution
- Gave the most sensitivity in $W+\geq 2$ jets channel

Next task was to write the papers

- First paper drafts from Run 0...
- Dilepton paper was fairly straight-forward
  - One candidate event
  - $M_{top} > 72$ GeV/c^2 at 95% CL
- Lepton+Jets seemed very challenging
  - First draft in July 1989
  - Finally got it approved in October
  - $M_{top} > 77$ GeV/c^2 at 95% CL
- Turned out both were in same issue of PRL (Jan 1990)
  - Along with W/Z production ratio

Next Step? Combine Channels and B-tag

Wanted to use semileptonic B decays as tag of b quark

- Did not increase sensitivity significantly
  - But demonstrated that it could be done!
  - Used it in combined analysis
- Put together
  - Dileptons
  - Lepton+Jets with B-tag
  - Extended mass limit to 91 GeV/c^2
  - Published PRL in Jan 1992!

Final Run 0 top measurement was charged Higgs search

- Extended reach of earlier searches somewhat
- Was published month after we announced "evidence..."

Final Comments on Early Days

By late 1992, had to break Heavy Flavour group up

- Bottom group was born 1 January 1993!
- Top group reconstituted as separate group

Top represented enormous effort within CDF

- List of contributors daunting....
- Different techniques were supported to the benefit of the final result
- One of the best illustrations of "Big Science" working well