



Reaching For The Top Take II

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Single Top Workshop
5 December, 2005

The (Long) Road to Discovery

1984 Approval

1992 Collisions

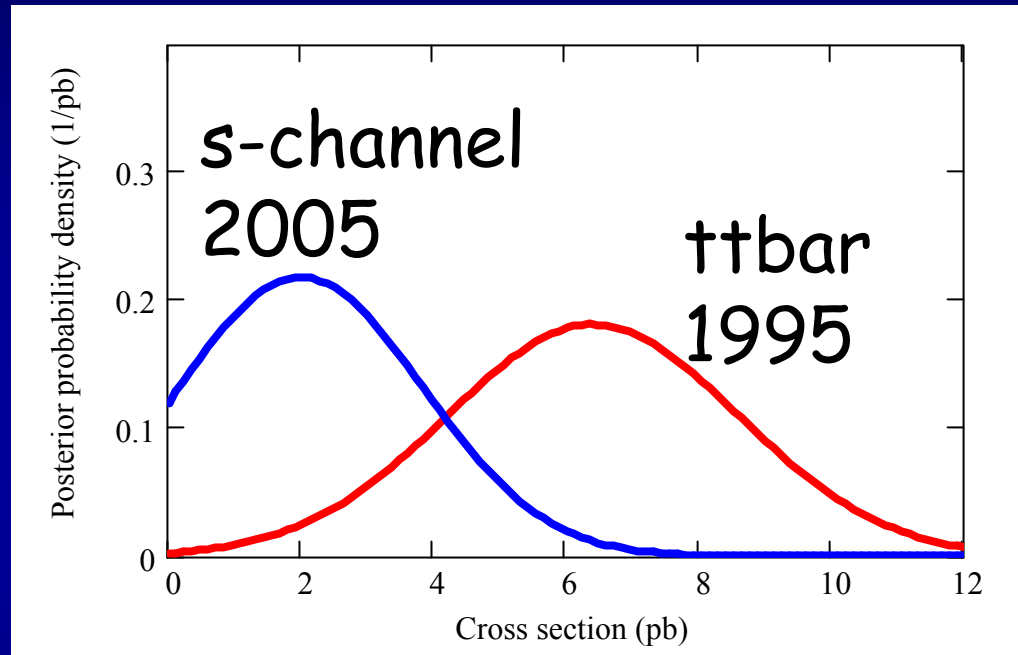
1995 Discovery

2001 Collisions

200X Discovery (?)

From Measuring Zero to Discovery

$$\Delta\sigma/\sigma = 1.1$$



$$\Delta\sigma/\sigma = 2.9$$

$$0.0 < \sigma_s < 5.0 \text{ pb}$$

$$2.1 < \sigma_{t\bar{t}} < 10.7 \text{ pb}$$

@ 95 % CL

It Must be Convincing

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PHYSICAL REVIEW LETTERS

3 APRIL 1995

Observation of the Top Quark

Observation of the Top Quark at DØ

(Draft Version 0.5, February 15, 1995)

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convincing results.
Publish!

Comments on the draft:
The word "at" is incorrect from the title.
It is an objective piece of work!

First, I feel we are on firm ground and we should proceed with this letter.
Second I will let Tom worry about the grammar.

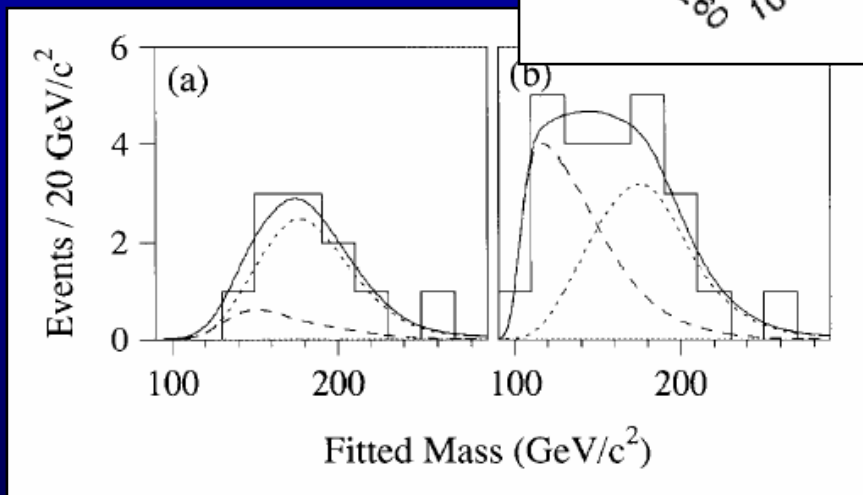
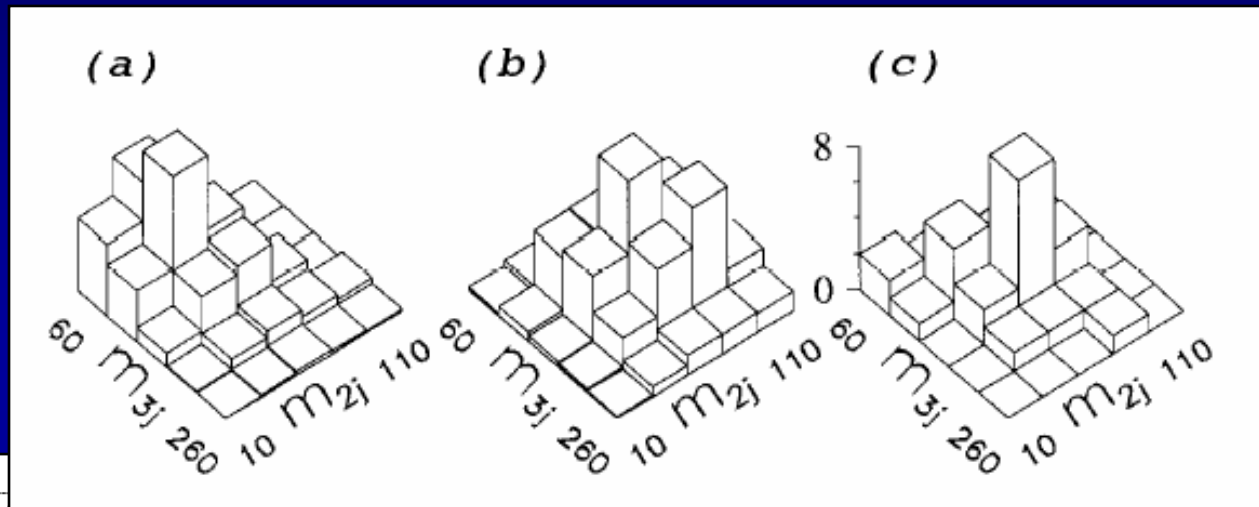
It Must be Convincing

We observed **17 events** with an expected background of **3.8 ± 0.6 events**.

The kinematic properties of the excess are consistent with top quark decay.

The Excess Must be Evident...

...in simple



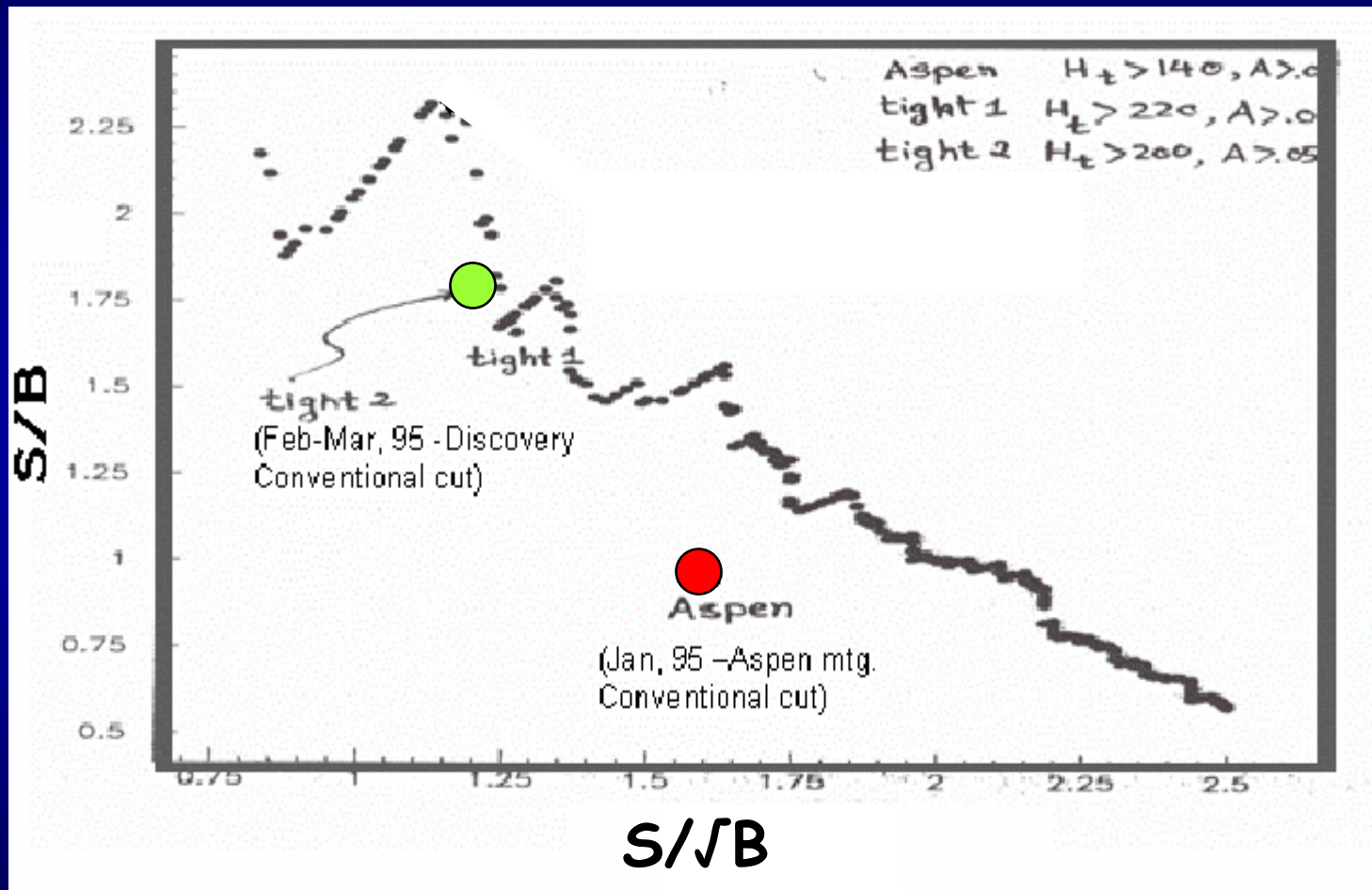
...variables

“Keep it simple, but **no simpler**”

Al Einstein

$$G = 8\pi T$$

Climbing the Aspen Peaks



The EB will be under enormous pressure to accept a claim of discovery, perhaps on a very short timescale.

An analysis with multiple braided threads will present a *conscientious* EB with a formidable challenge.

The Road Ahead

Continue to use the best methods

Boosted Decision Trees

Naive Bayes

Networks

Bayesian Networks

But try to keep the braid simple

Can we reduce the number of variables ?

Can we consolidate backgrounds ?

Can we consolidate signals ?

The Road Ahead

Methods - enough already!

We have excellent methods - need to
agonize less over training details

Where the work is

Greater scrutiny of background models.

Convincing ourselves, and our colleagues,
that the background is modeled well in
the "signal" region.

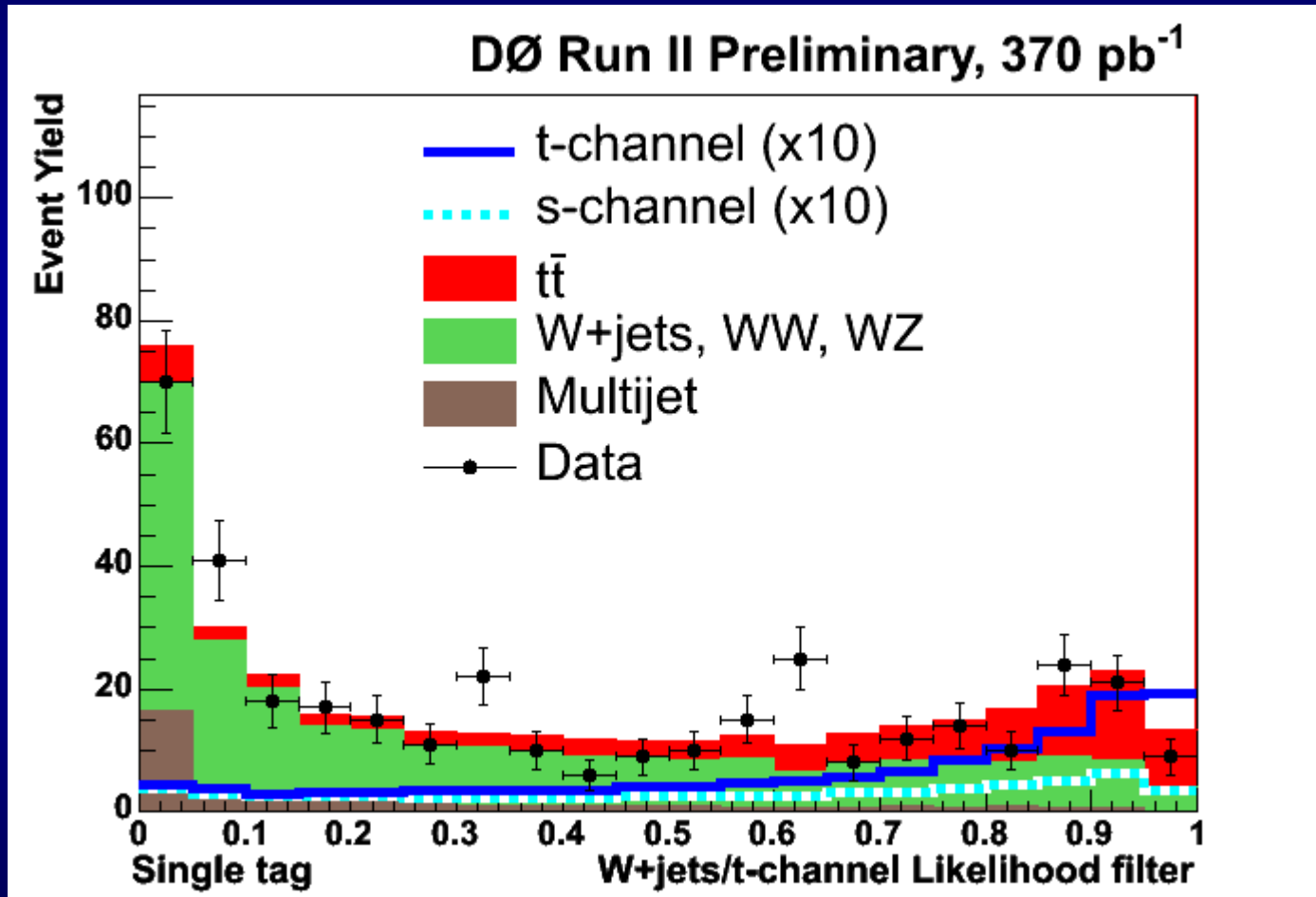
The Road Ahead

Be prepared !

"A discovery" must be managed. But be sensitive to the psychological need for everyone to feel they have "gained ownership" of it.

Principled skeptics - don't shun them

Principled Skeptics



The Road Ahead

Be prepared !

A possible announcement from the blue:

"We intend to submit a discovery paper, July 4, 2007, with or without you!"

Be prepared to be "sur place"

Be prepared to cast sleep aside !

And Finally

Be prepared !

To be party to a discovery is a privilege

One that will have cost the citizens of the world ~ \$1 Billion, give or take.

When asked by a talk radio host "why is the discovery exciting?" be sure to have an answer worthy of the public's largesse.