Event 417 – top discovery or not?

totally out of context e-mail quotes from 1993

VOLUME 72, NUMBER 14 PHYSICAL REVIEW LETTERS 4 APRIL 1994

Search for the Top Quark in $p\bar{p}$ Collisions at $\sqrt{s}$ =1.8 TeV

The mu/e event is fantastic. It would be a shame to sit on it endlessly. I think that waiting for the collaboration meeting before going public would be too long a wait. If all the talent that has already thought about top cannot find a better explanation, we should then send it in to PRL as a prime candidate. Draft a letter this week, put all the good people on trying to tear it down, and if by Friday it still looks OK, fax it in.

Congratulations on your event. It has occupied many of my thoughts. Yes, I have fit the mass in a hopefully more model independent way than typically is done. With zero measurement errors the mass is above 147.5 and (with 68% confidence) less than about 162 GeV. The essential issue is reliable propagation of experimental measurement errors, which obviously will broaden these limits. I hope to make progress on this front in the next 24 hours.

We cannot ever assure ourselves of being right. However, I have always believed that, as scientists, we have the responsibility to tell what we know rather than hide behind obfuscation. We know that the emu event is in a region of phase space that is not likely to be encumbered by background …

once you have estimated the background … and you find that all sources you can come up with give .03 events background (I have heard .01 event)..... you have to publish the result. This should be done quickly, not because we are in a race with CDF BUT we have an obligation to do so as scientists after we were given the opportunity to build this detector. The conclusion of course is that within the minimal Standard Model the only source for such an event is the top quark.

I do not think it is a matter of having only one event but what the background and errors for that event are.

Assuming … there are no further surprises, because the event has been around for over a week now, I think we should publish this. By publish I mean not in the New York Times, but a seminar and a paper.

Many have urged publication of this event in some context as soon as possible. Opinion varies on how soon and with what slant. I consider three possible ways publish:

1. publish the event and note that it looks like top. (coming close to a claim)
2. publish the event as an interesting event with no spin on its physical origin.
3. publish a paper on the (negative) search for top with this event in the sample and discussed.

I believe the first two options are inappropriate. We cannot defend a single event as being top. We should not publish a paper that is a "gee whiz, isn't this one interesting" message -- its not good physics. So:
I propose we prepare a paper for publication which presents our best limit on the top quark mass. Both e-mu and e-e channels would be included in this paper…

Philosophically, not being ex bubble chamber, what one can say about 1 event is not clear to me - the omega- was unambiguous - in D0 we do not have a unambiguous complete kinematic reconstruction.

No amount of hard work by the top group will change the fact that 417 is just one event, and one event will not find the top or limit the range of M_top.

Personally I'd rather be right than (in)famous.

I have enclosed my LATEXed proposal for our Top paper. This is just a skeleton that may help us determining what needs to be done, who will do it etc. We don't have to keep the titles, and, in fact, I believe that for a PRL paper we just won't have enough room to spare on cosmetics.

it is obviously a gold plated top candidate like there has not been at FNAL before and I do not understand why we are not all scrambling over this event trying to find something wrong AND estimate the background (hard numbers).

[event 417] …is an unusual event and we might as well say so rather than play coy.

We have analyzed the surviving $e\mu$ event under the hypothesis that it is due to $t\bar{t} \to W(e\nu)W(\mu\nu)b\bar{b}$ using an extension of the likelihood method based solely on the event topology as described in Ref. [13]. Our analysis [14] shows that this event is kinematically consistent with $t\bar{t}$ production over the mass range 100 to 200 GeV/c^2. Using a likelihood function based upon the parton distribution functions, partonic cross sections, and decay lepton distributions, we find that the peak likelihood for this event is near the median found in MC top samples. The likelihood distribution is maximized for a top mass of about 145 GeV/c^2, but masses as high as 200 GeV/c^2 cannot be excluded. This result is consistent with, but independent of, our lower limit on m_t described above.

"I, for one, was immediately convinced that it was top. I did not need studies of backgrounds, or of detector response, or of other factual matters. … the event looked more convincing than, for example, Gerson Goldhaber's discovery of the Ω^- in K^+d interactions, and far more likely than the first Ω^- found by Nick Samios et al."

Congratulations!

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