Should Consensus Suppress the Individual ?

Frank Dodd (Tony) Smith, Jr. - 2017 - viXra 1705.xxx

Consider two cases, each with

Consensus = the Physics Establishment including:
- Fermilab, CDF, and D0 Collaborations (pages 8-14);
- the Cornell arXiv (pages 13; 21-22);
- CERN CDS (pages 14; 22);
- LHC, ATLAS, and CMS Collaborations (pages 15-20);
- the Princeton Institute for Advanced Study (page 20);
- and the Simons Center for Geometry and Physics (page 20)

and

Individual = I, a Georgia lawyer with a 1963 AB in math from Princeton
and some physics study at Georgia Tech with David Finkelstein as adviser,
but, having at age 50 failed the Fall 1991 Georgia Tech Comprehensive Exam
(a 3-day closed book exam), I have no physics degree

First Case (pages 4-20):

Our Universe: Is it Stable ?

Consensus = NO (only metastable)   Individual = YES

Second Case (pages 21-27):

Dark Energy and Dark Matter

Consensus = Unknown   Individual = Known Segal Conformal Structure

This paper is a brief description of interactions between Consensus and Individual in each of those two cases. Since I, the author, have been directly involved, you should read this paper bearing in mind possible bias in my point of view that might also be present in this paper. Bearing that in mind, you should decide for yourself the answer to the question posed in the title of this paper.

The following two pages descibe how I use in this paper histogram interpretation terminology:

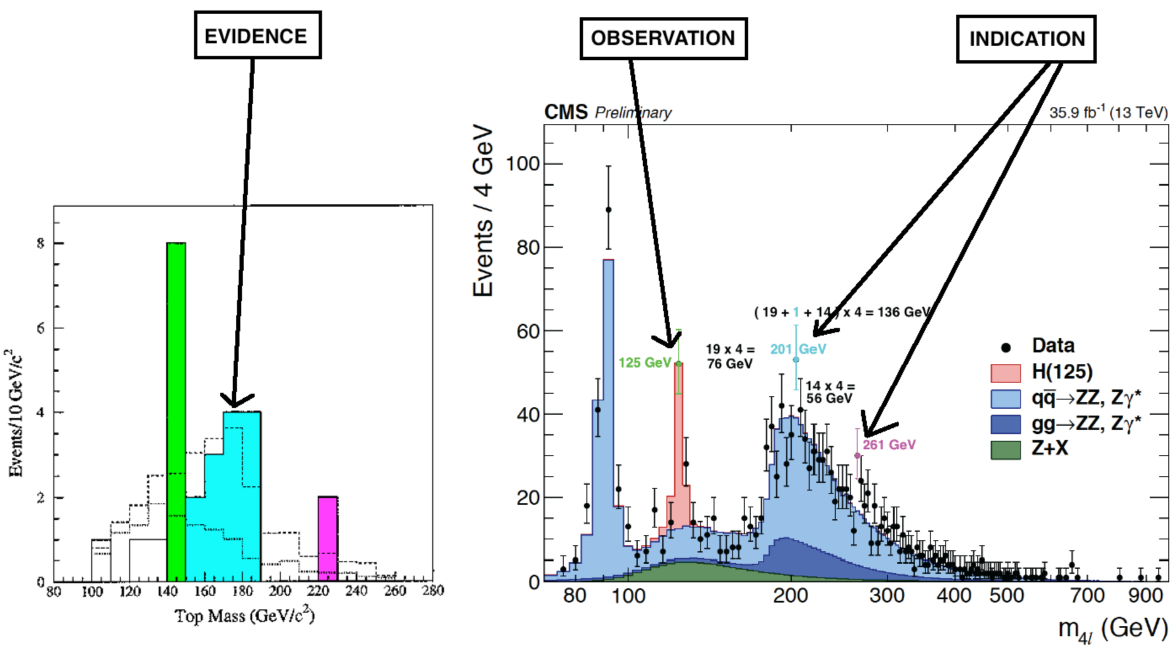
observation - evidence - indication

As I use in this paper, this is what I mean by each of these three terms:

Observation - means a state is conclusively observed
in that there is no reasonable doubt
as to the histogram bin peak corresponding to the state.
Example: 125 GeV Higgs peak in 2016 CMS Higgs -> ZZ* -> 4l channel.

Evidence - means that the histogram bins very likely correspond to the state,
in that the correspondence exists by preponderance of the evidence.
Example: 174 GeV Tquark peak in 1994 semileptonic histogram
in FERMILAB-PUB-94/097-E by CDF.

Indication - means that the histogram bins, when **subjectively** considered
as to their height and that of adjacent bins, and expected background,
seem to me to indicate a possible correspondence
between the histogram bins and the state.
Example: 201 and 261 GeV peaks in 2016 CMS Higgs -> ZZ* -> 4l channel
possibly corresponding to Higgs Mass States at 200 GeV and 260 GeV.



Note that, particularly in earlier experiments with low numbers of events
and with respect to some NJL model calculations, the Mass numbers in GeV
are more “in the area of”, meaning roughly +/- 10% or so, than “exact”.

Particularly with respect to Indication, I rely on my **subjective** seat-of-the-pants intuition more than on objective statistical criteria. Such **subjective** criteria may be harder to formulate than simpler objective statistical criteria, but when evaluating the usefulness of specific physics models (such as Nambu-Jona-Lasinio) **subjective** intuition may be the most effective technique. As to how to formulate it with respect to well-known math,

my guess is that it would be most accurately formulated in terms of Bayesian Statistics.
Wikipedia says "... The Bayesian design of experiments includes a concept called
'influence of prior beliefs'.
This approach uses sequential analysis techniques to include the outcome of earlier experiments in the design of the next experiment. ...".

With respect to this paper and experiments discussed herein:
Nambu-Jona-Lasinio model theory leads to belief in three Higgs-Tquark Mass states:
Higgs = 260 GeV and Tquark = 220 GeV
Higgs = 200 GeV and Tquark = 174 GeV
Higgs = 125 GeV and Tquark = 130 GeV

1994 CDF saw Indications of Tquark Mass states in the area of 130 GeV and 220 GeV
1997 D0 saw Indications of Tquark Mass states in the area of 130 GeV and 220 GeV
Both experiments strengthen belief in the states
Higgs = 260 GeV and Tquark = 220 GeV
Higgs = 125 GeV and Tquark = 130 GeV

2011-2012 LHC Higgs -> ZZ* -> 4l ATLAS saw
Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV
2011-2012 LHC Higgs -> ZZ* -> 4l CMS saw
Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV
Both experiments strengthened belief in all 3 Nambu-Jona-Lasinio states.

2015 LHC Higgs -> ZZ* -> 4l ATLAS saw
Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV
2015 LHC Higgs -> ZZ* -> 4l CMS saw
Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV
Both experiments strengthened belief in all 3 Nambu-Jona-Lasinio states

2016 LHC Higgs -> ZZ* -> 4l ATLAS saw, for the first 14.8 fb-1 of the total 36.1 fb-1,
Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV
2016 LHC Higgs -> ZZ* -> 4l CMS saw
Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV

Based on consistently increasing belief in 3 Nambu-Jona-Lasinio states over 20 years of Fermilab and LHC experiments, I am hopeful that if the 2017 LHC run gets the total 13 TeV data up to 60 - 80 fb-1 then the data will raise my level of confidence in the 3 states from Indication to Evidence.

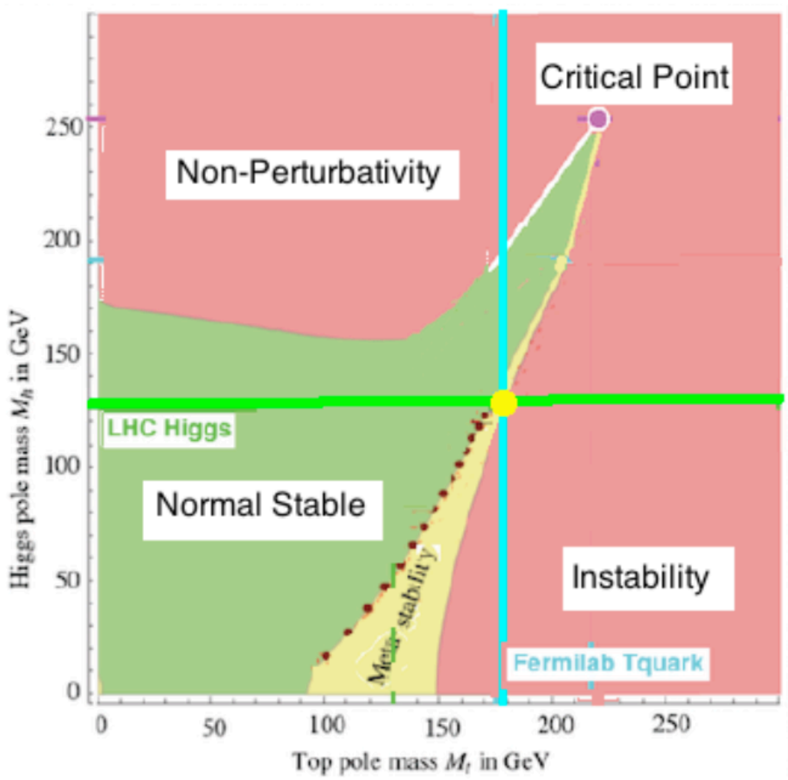
Our Universe: Is it Stable ?
Consensus = NO (only metastable)   Individual = YES

The Consensus view is simple and clear:

The Higgs and the Tquark are both Standard Model point particles,
each with only one Mass State:

Higgs = 125 GeV Observed by LHC in 2012
Tquark = 174 GeV for which Fermilab saw Evidence in 1994

If you use the Standard Model to plot their phase space
on a diagram of Higgs mass v. Tquark mass, Consensus gets

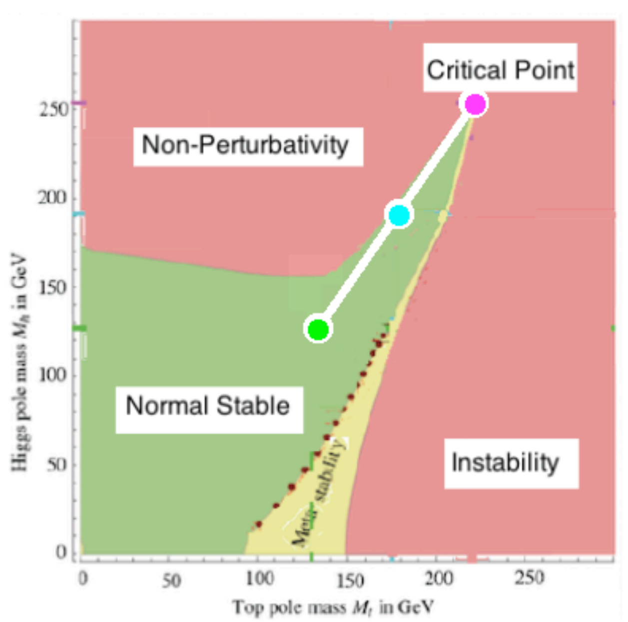


so **Consensus says that Our Universe is NOT Stable**
but is rather at the boundary of Metastability and Instability.

The Individual view is more complicated, but more Optimistic.

In it, the Higgs is a Tquark Condensate
and
the Higgs and Tquark form a 3-Mass-State System
according to Nambu-Jona-Lasinio type structures
described in the papers hep-ph/9603293 and hep-ph/0311165
by Yamawaki, Hashimoto, and Tanabashi
producing 3 Higgs-Tquark Mass States:

at the Critical Point;
at the Non-Perturbativity Bounday;
and in the Normal Stable Zone.



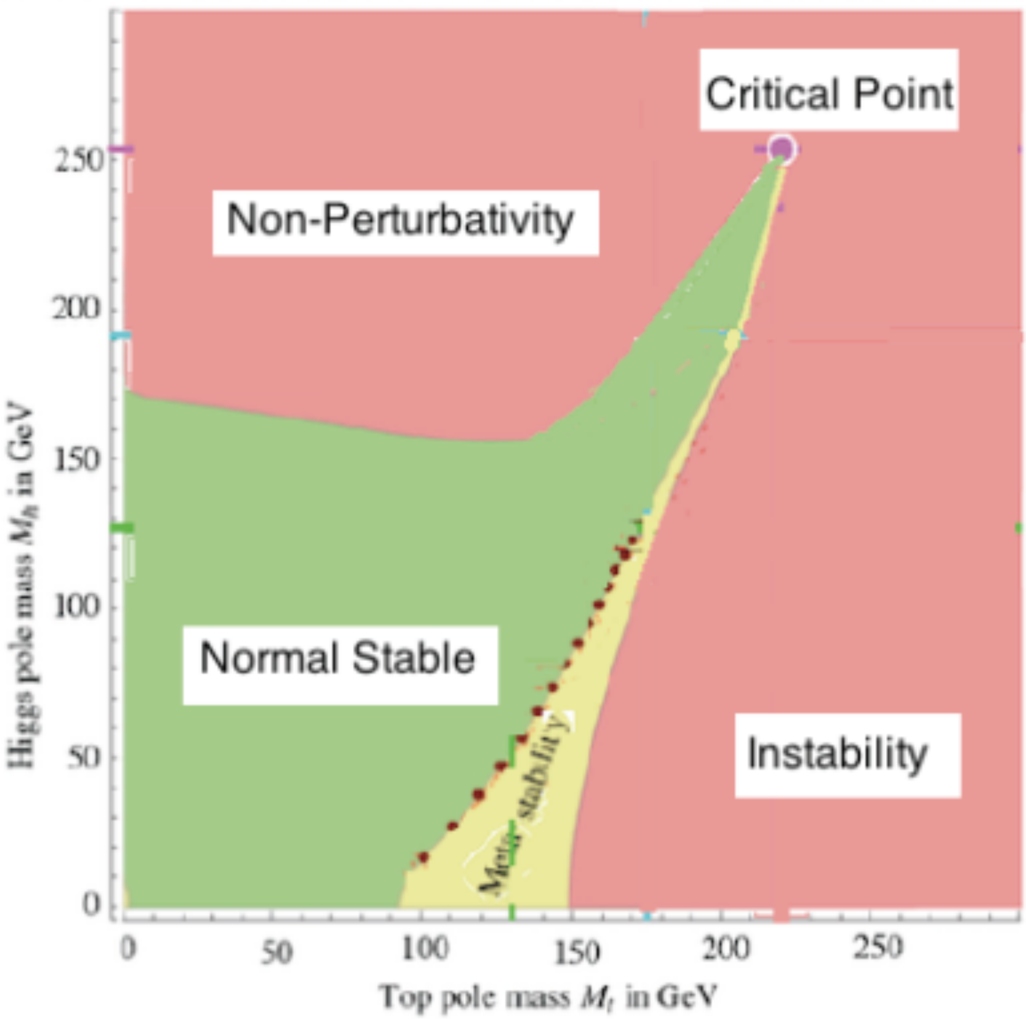
Only at the Critical Point (where the Higgs Mass is at the Higgs VEV)
is the zone of Vacuum Instability or Metastability encountered.

Therefore, **the Individual view is YES - Our Universe is Stable**.

How and Why did the Consensus reject the Optimistic View of the Individual ?

Here are some details:

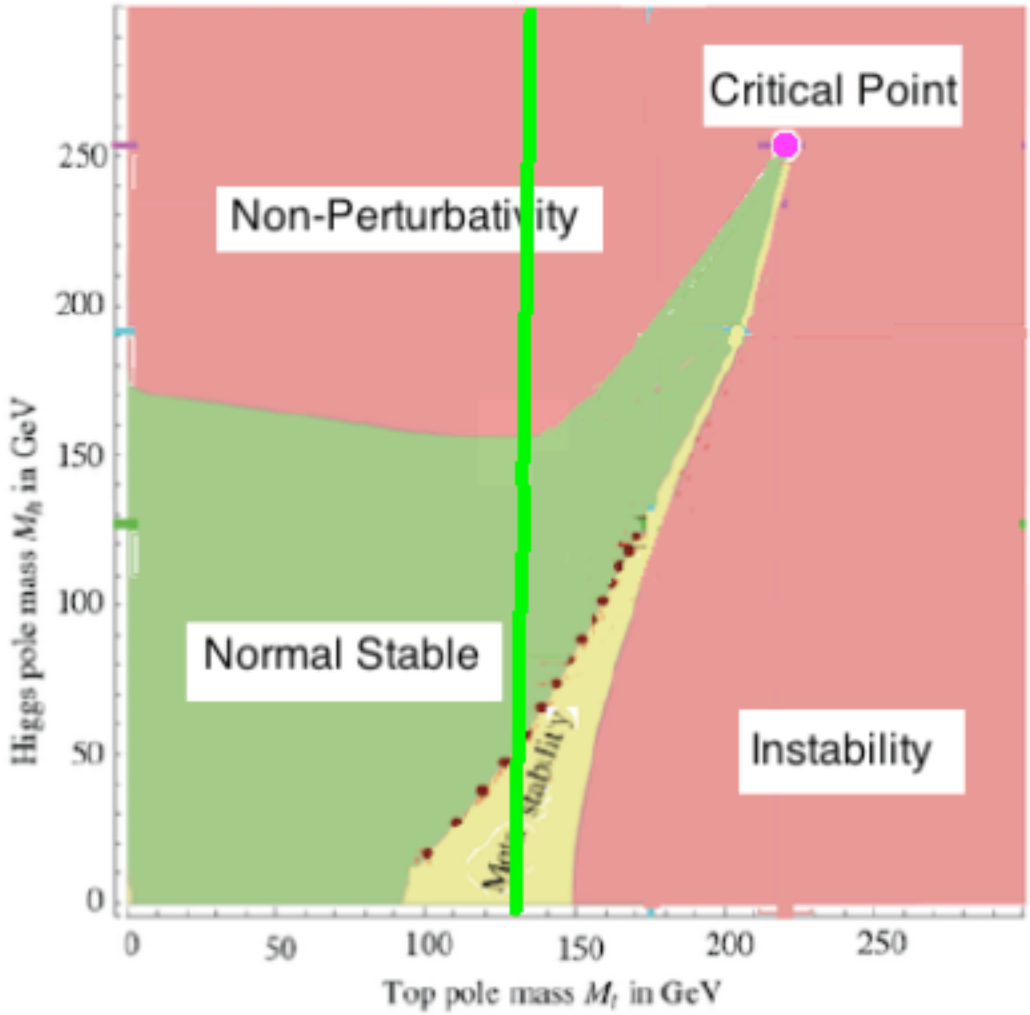
You can plot characteristics of a Nambu-Jona-Lasinio type Higgs-Tquark system on a Higgs Mass - Tquark Mass diagram like this:



From First Principles
it is clear that there should be a Higgs-Tquark Mass State at the Critical Point:

Critical Point State: Higgs Mass about 260 GeV (around the Higgs VEV) -
- Tquark Mass about 220 GeV

From its geometry, my physics model - see viXra 1602.0319 -
predicted in the 1980s a Tquark Mass State about 130 GeV,
indicated by the Green Line:



The 130 GeV calculation can be seen in terms of
Particles as Schwinger Sources, finite small regions defined by Julian Schwinger, whose geometry determines Green's Functions from Bergman Kernels of Complex Domains having symmetry of the gauge groups of Particle charges. Armand Wyler developed this technique in the context of electromagnetic force strength (fine structure constant) and particle masses (proton / electron mass ratio). Hua Luogeng calculated the relative volumes of Schwinger Source structures needed to apply Wyler's techniques to the Weak, Color, and Gravity forces.

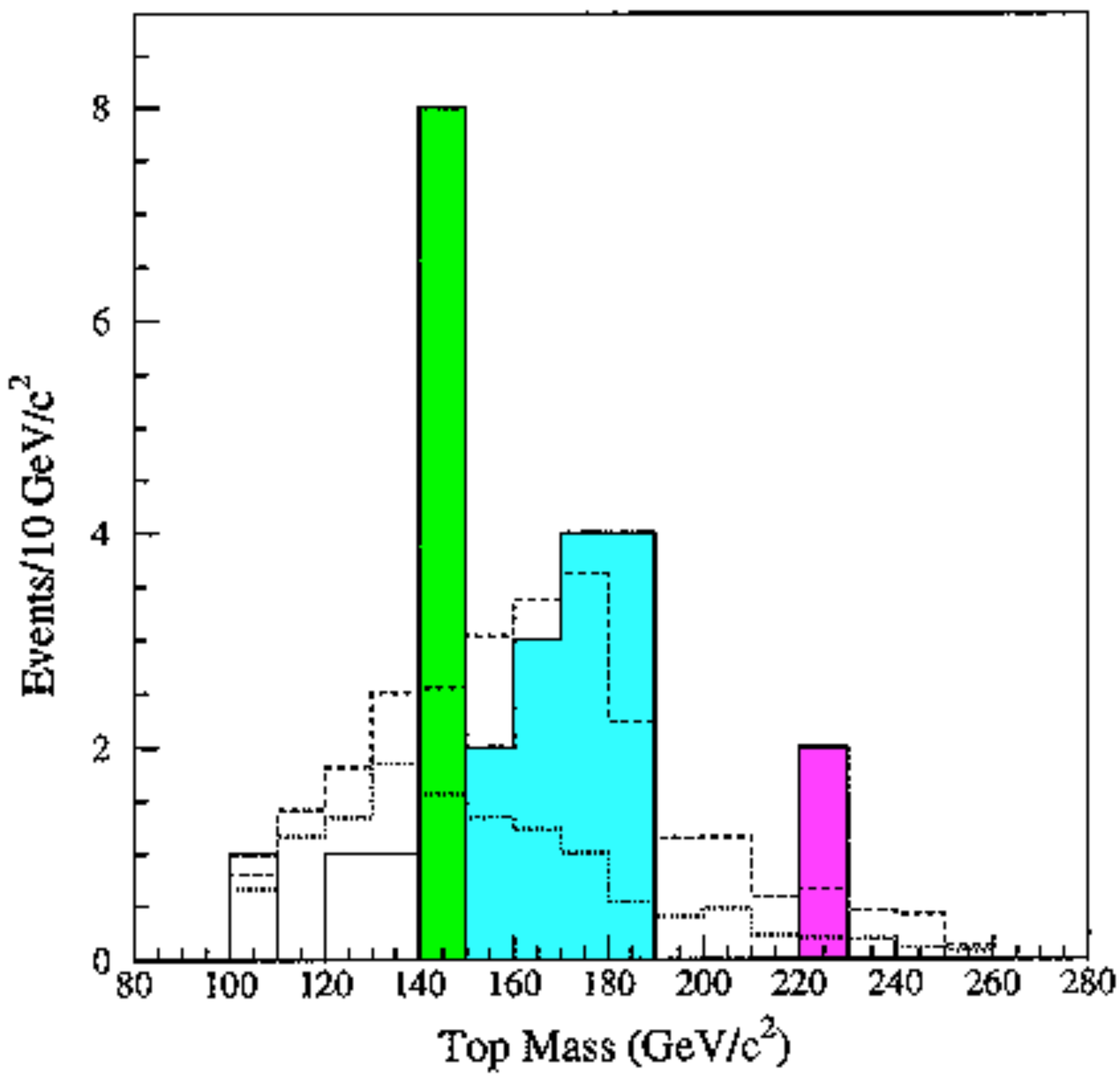
On 22 May 1992 the paper
"ANALYSIS OF TOP-ANTITOP PRODUCTION AND DILEPTON DECAY EVENTS AND THE TOP QUARK MASS”
by R. H. Dalitz and Gary R. Goldstein was received by Physics Letters B (Phys. Lett. B 287 (1992) 225-230).
It stated that: "A simple idealized procedure is proposed for the analysis of individual top-antitop quark pair production
and dilepton decay events, in terms of the top quark mass.
This procedure is illustrated by its application to the CDF candidate event.
If this event really represents top-antitop production and decay,
then the top quark mass would be 131 +22 -11 GeV.”.

When I saw that paper I was very happy
because it supported my theoretical prediction of a 130 GeV Tquark Mass State

However, for political reasons - NOT based on physics reasoning -
the Fermilab Consensus hated the Dalitz-Goldstein paper and its result
so
instead of what I had hoped for,
intelligent discussion of my model and its successful prediction,
the paper’s authors (and I who was supporting their work)
were on the receiving end of hateful vitriol from the Fermiab Consensus.

> Example of hateful vitriol - Goldstein was at Tufts, and the Fermilab Consensus told Tufts that if Goldstein continued to publicize his Tquark mass calculation work then all faculty and students at Tufts would be banned from working at Fermilab.

On 26 April 1994 Fermilab released FERMILAB-PUB-94/097-E
by The CDF Collaboration
"Evidence for Top Quark Production inpp Collisions at 4s = 1.8 TeV”
with this semileptonic histogram (colors added by me)

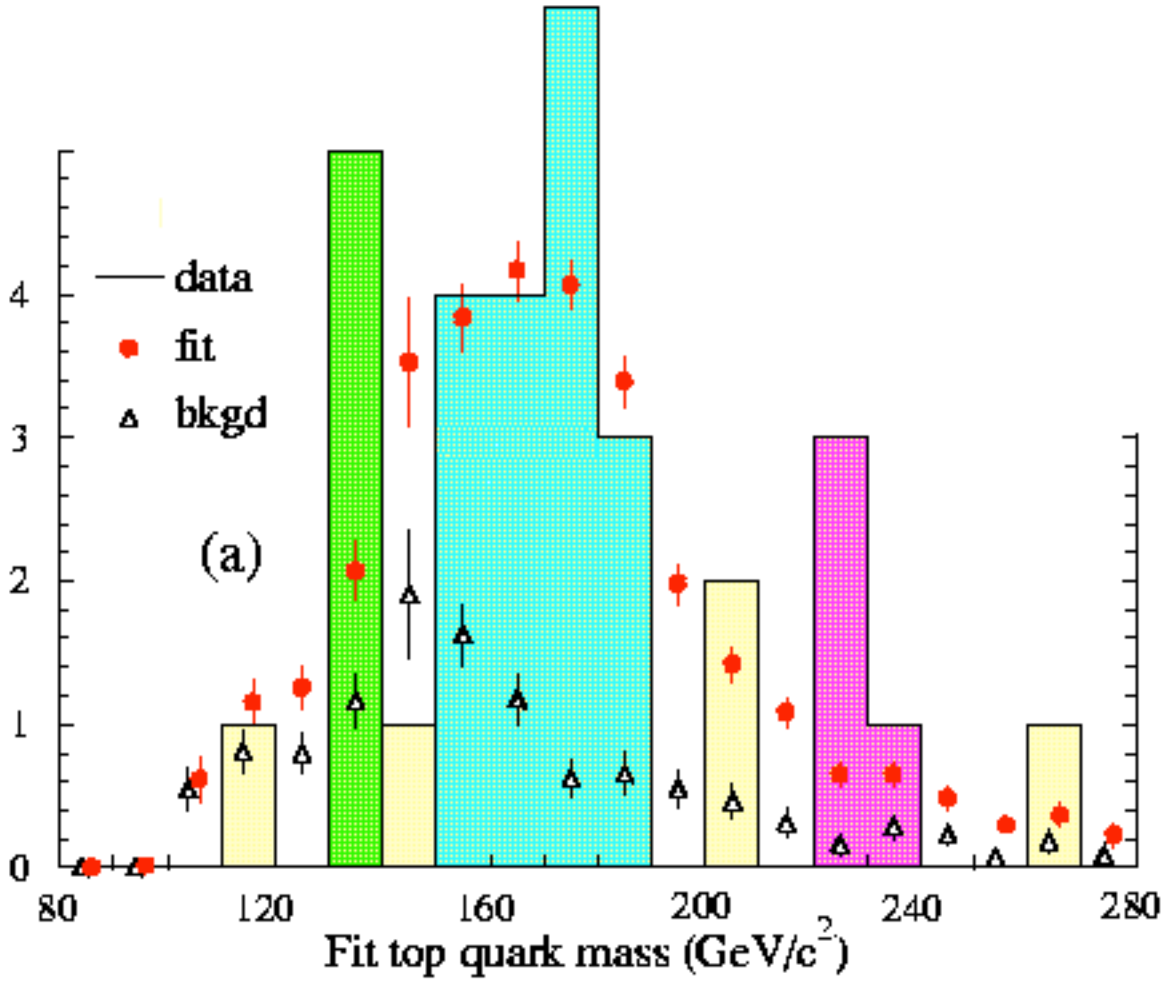


Fermilab ignored the magenta small peak corresponding to the Critical Point State, without comment,
and also ignored the green large peak corresponding to my prediction
and the Dalitz-Goldstein paper, saying
"... We assume the mass combinations in the 140 to 150 GeV/c^2 bin represent a statistical fluctuation since their width is narrower than expected for a top signal. …”.

I think that the Fermilab Consensus ignored the large green peak because it is roughly coincident with 130 GeV of Dalitz, Goldstein, and me that the Consensus hates.

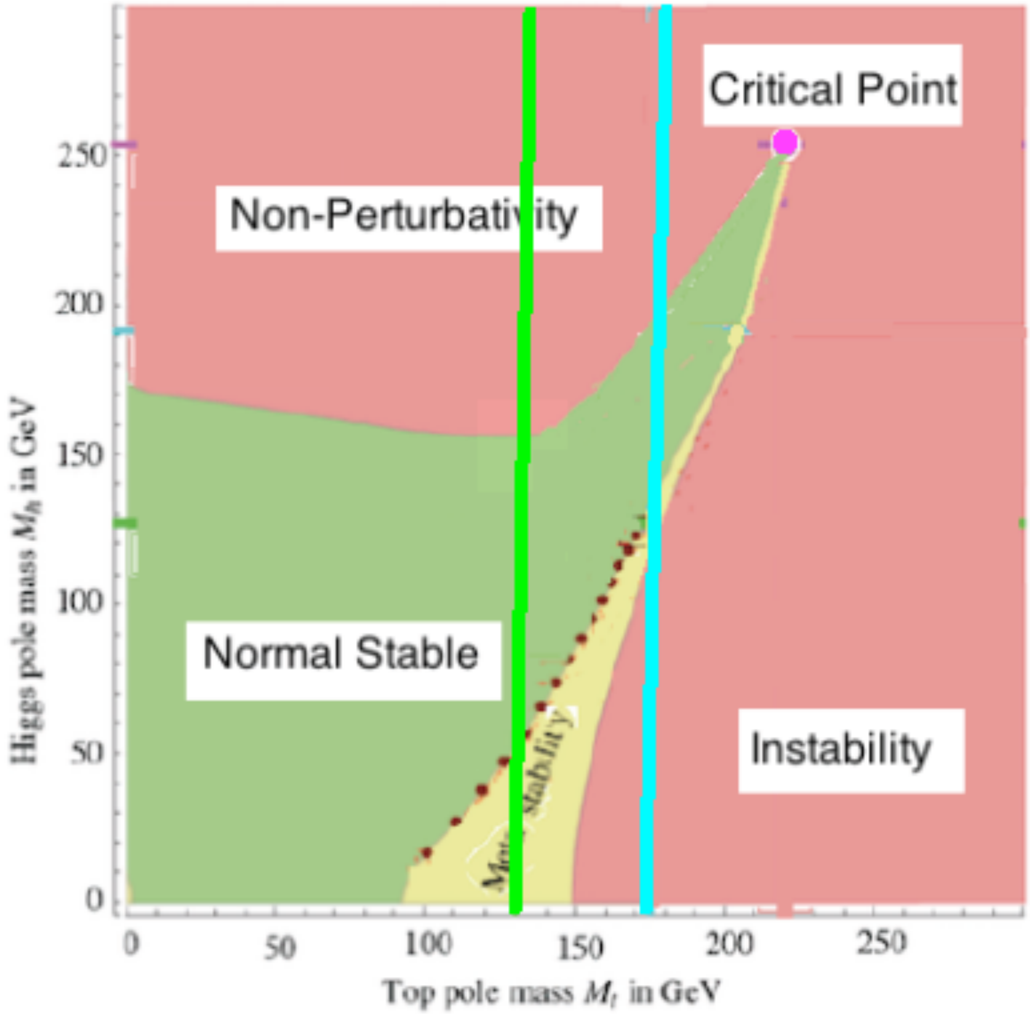
Fermilab, from that time on, insisted that the one and only Tquark Mass State
was the broad cyan peak around 174 GeV

and continued to do so even when Fermilab's other detector, D0,
in 1997 (hep-ex/9703008) also saw semileptonic histogram peaks around
the Critical Point Mass State (magenta)
and the predicted Dalitz-Goldstein Mass State (green)

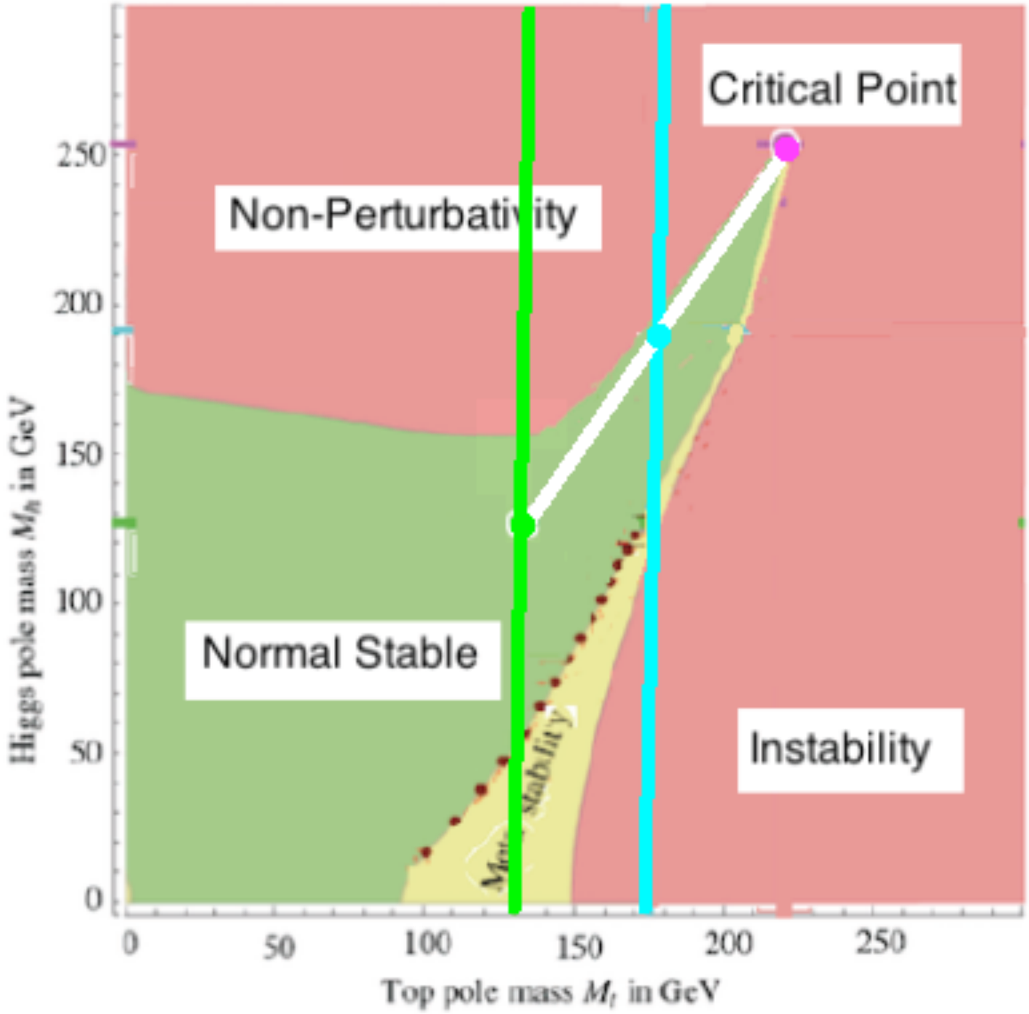


Fermilab continued to insist that the one and only Tquark Mass State
was the broad cyan peak around 174 GeV
despite the fact that their published data could be analyzed to be consistent
with all three Nambu-Jona-Lasinio Mass States (if you would like to see a lot of details
about such alternative analyses, see my web pages -
www.valdostamuseum.com/hamsmith/ and www.tony5m17h.net).

However, it is clear that Fermilab was observing a third Nambu-Jona-Lasinio Tquark Mass Peak (the cyan broad middle peak) so as of the mid-1990s our diagram should be



Now, start at the Critical Point and run down (white line) the Boundary of Normal Stable - Non-Perturbativity until you hit the cyan Fermilab Middle Mass Statee and then continue down a straight line (white line) to the green Tquark Ground State

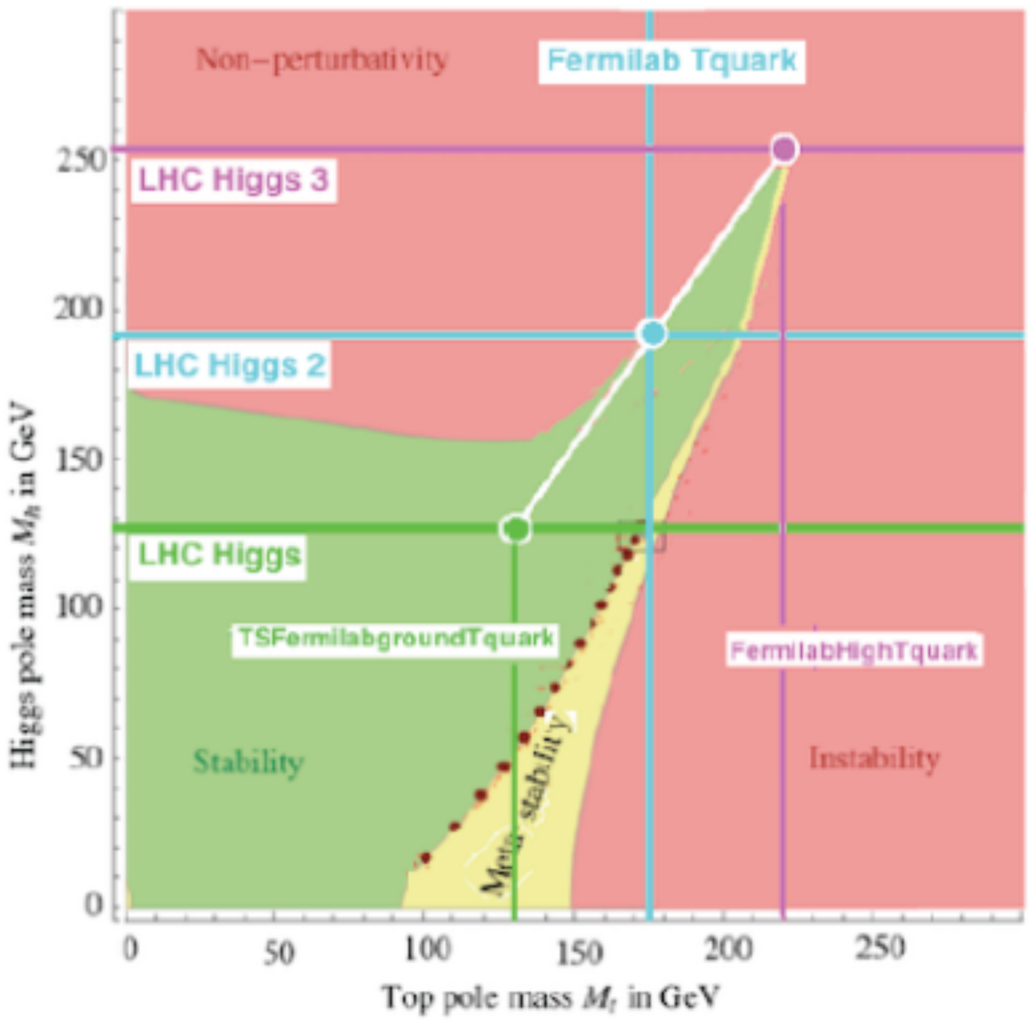


At this point, mid-1990s, assuming a Nambu-Jona-Lasinio-type Higgs-Tquark System, Fermilab had seen the Tquark Masses of the three Higgs-Tquark Mass States but the Higgs Masses were only NJL predictions not yet seen by LHC.

Critical Point High Mass States: Higgs about 260 GeV and Tquark about 220 GeV Experiments in this region should tell us about the Critical Intersection of Normal Stability, Non-Perturbativity of Compositeness and 8-dim Kaluza-Klein M4 x CP2 Structure, and Vacuum Instability.

Non-Perturbativity Boundary Middle Mass States: Higgs about 200 GeV and Tquark about 174 GeV Experiments in this region should tell us a lot about Non-Perturbativity of Compositeness and 8-dim Kaluza-Klein M4 x CP2 Structure.

Normal Stable Low Mass Ground States: Higgs about 125 GeV and Tquark about 130 GeV.



It was only in the time from mid-1990s to early 2000s that I began
to understand the Nambu-Jona-Lasinio-type 3-Mass-State Higgs-Tquark System,
based on reading the papers hep-ph/9603293 and hep-ph/0311165
by Yamawaki, Hashimoto, and Tanabashi,
but
just when I was beginning to really understand the NJL-type Higgs-Tquark System
I was blacklisted by the Cornell arXiv (2002)

I had tried to fight the blacklisting by suing Cornell (Case No.:4:02-CV-280
fin my home Northern District of Georgia)
which suit was dismissed 24 March 2003 only on Jurisdictional grounds
(not a dismissal of the merits of my case) the Court saying
that I should sue Cornell in its home state of New York.
My efforts to hire a good New York law firm were unsuccessful because,
as I was told, no matter whether I paid a good fee, I would be only an Individual
one-time client, and Cornell was a multi-billion dollar enterprise involving
a large number of people (some of my cousins are alumnae) with whom a good
relationship was of continuing usefulness for New York lawyers.
Therefore I gave up the law suit approach.

Further,
the CERN CDS EXT service which had allowed me to put up papers
terminated outside access (and therefore terminated my access) pursuant to
an 8 October 2004 meeting of the CERN Scientific Information Policy Board (SIPB)
so
my ability to communicate my ideas to the physics community
was severely curtailed, being restricted to my personal web sites,
and the alternative archive viXra,
and making talks at meetings,
including contributing a talk at the 2005 APS April Meeting in Tampa.

The chairman of the session at which I presented my
Nambu-Jona-Lasinio-type 3-Mass-State Higgs-Tquark System
was Joseph Lykken of Fermilab. At the meeting he seemed interested,
and said he would discuss it with the people at Fermilab and let me know
if I could maybe go there and make a talk etc.

I did not hear from him immediately,
so I sent him an email and he replied (20 April 2005) saying:
"... Thanks, I will let you know if I get any postive response from
the CDF and D0 experiments. Regards, -Joe ...".

There was no further contact with him after that,
which
showed me that even if a smart individual like Joe Lykken at a place like Fermilab
were to be interested in my ideas, the Consensus Powers would
make certain that I and my ideas would not be allowed.

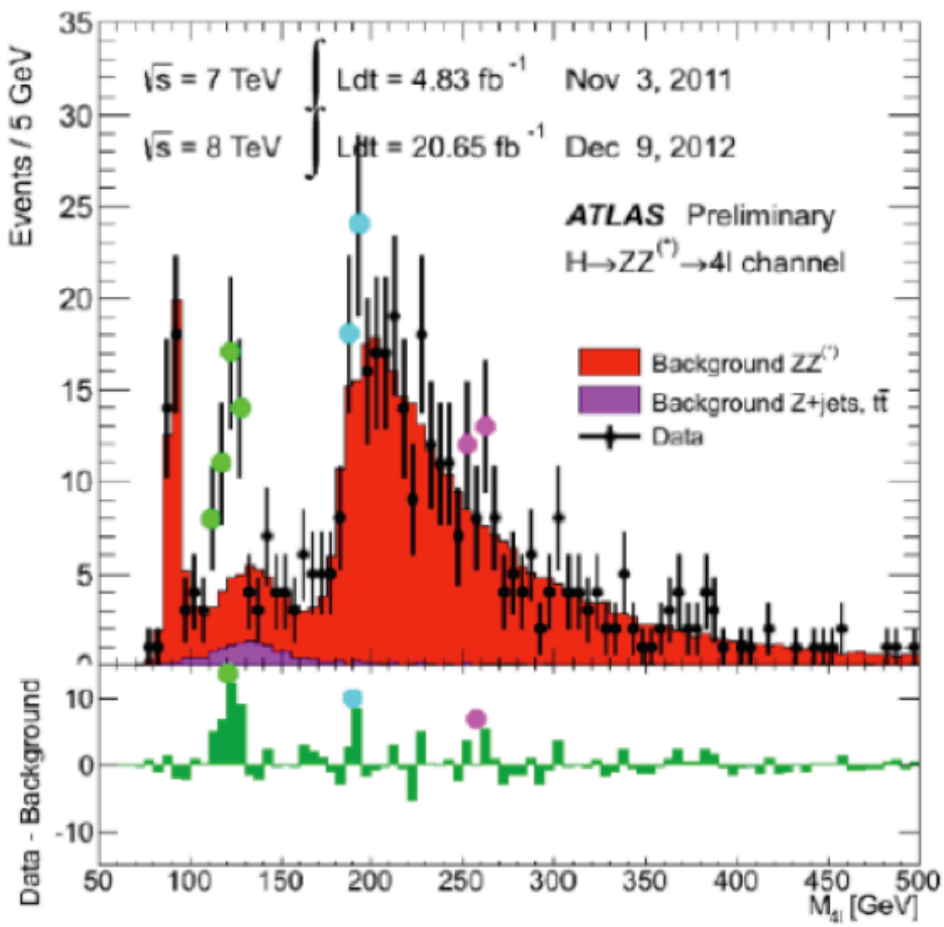
Therefore about all I could do was to wait for the LHC to start taking data
that might indicate Higgs Mass States predicted by my NJL model.

The cleanest and most reliable channel in the LHC experiment is Higgs -> ZZ* -> 4l
which would show a Higgs Mass State as a clean peak
but it has fewer events than other channels
so
the most likely early discovery of a Higgs State would be in the digamma channel
which would show a Higgs Mass State as a shallow bump on a broad background curve
that might be hard to distinguish from a statistical fluctuation.

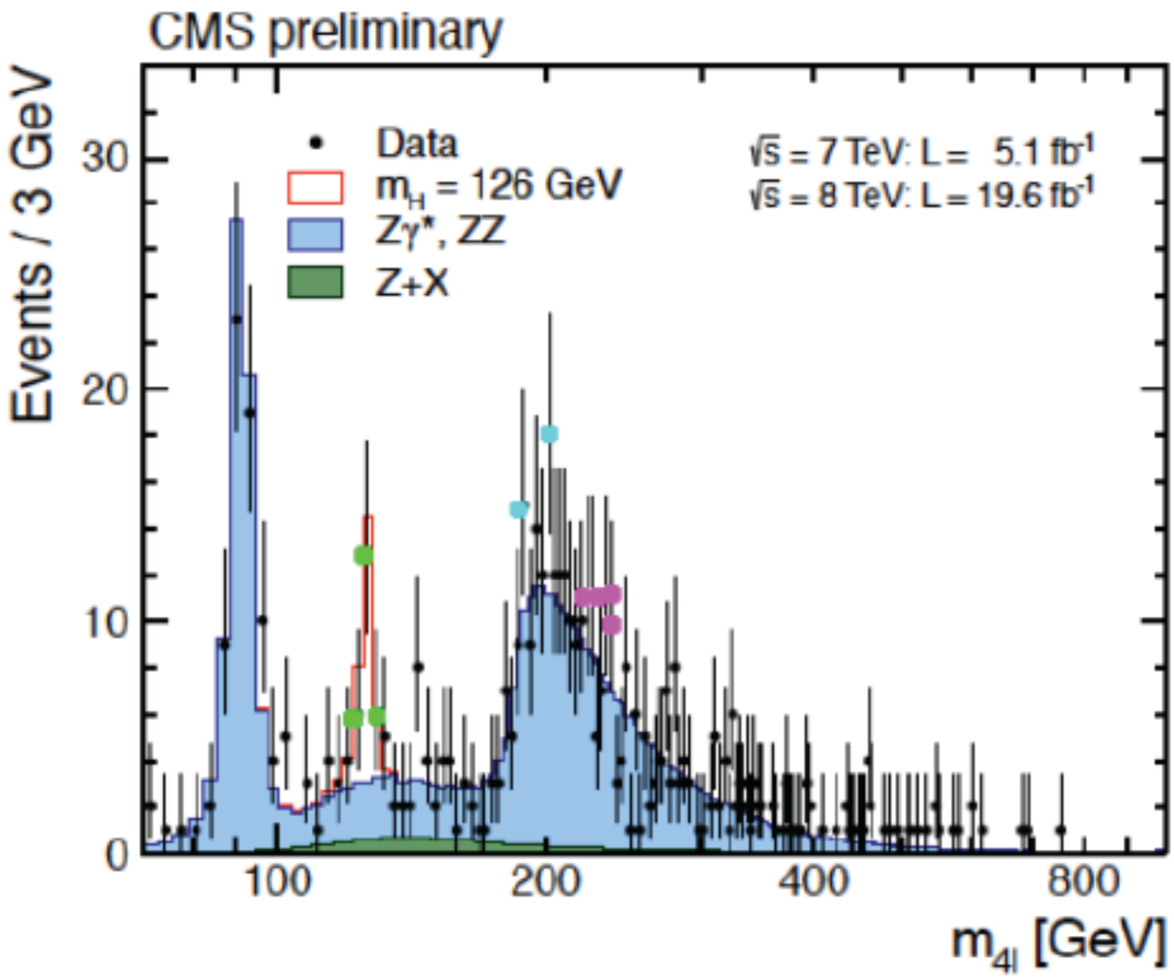
In 2008 the LHC started up to run at 14 TeV,
but defective electrical connections caused an explosion that terminated operation.

In 2010-2011, after repairs and rethinking, the LHC began to run at 7 TeV
with ATLAS and CMS indicating possible Higgs Mass State around 115-130 GeV.

In 2012, running at 8 TeV, ATLAS and CMS Observed in the digamma channel
the 125 GeV Low Mass HIggs Ground State. As to the other two Higgs Mass States,
ATLAS saw Indications of Higgs Mass States around 200 and 260 GeV,
as well as at 125 GeV, in the Higgs -> ZZ* -> 4l channel



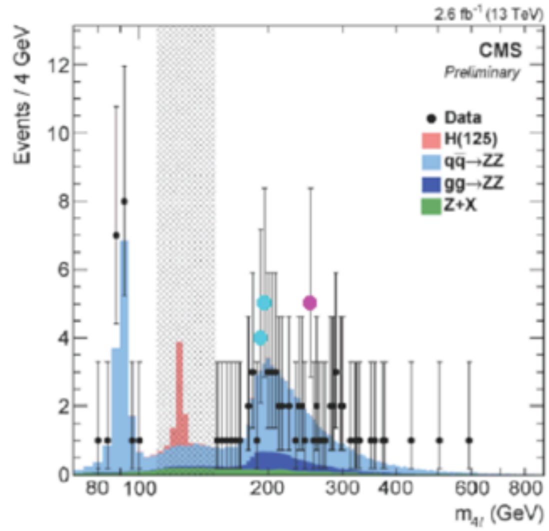
CMS also saw indications of the same two Higgs Mass States
with cross sections around 25% of Standard Model expectations:



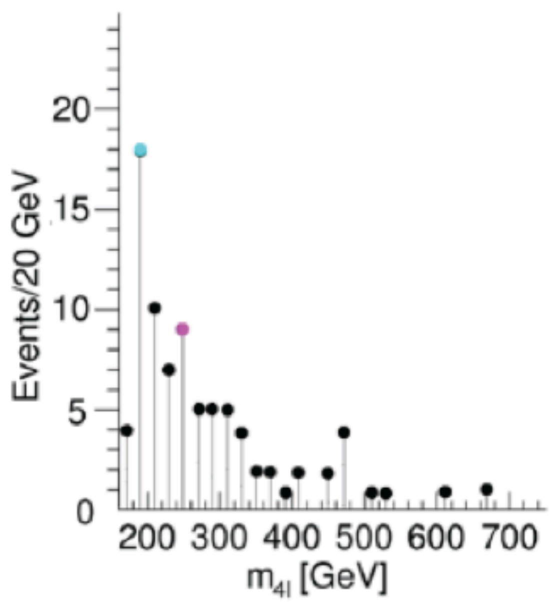
The LHC shut down in 2013-2014 for repair and reconstruction needed
for operation at 13 TeV.

In 2015 the LHC had a 13 TeV run producing 2.6 fb-1 for CMS and 3.2 fb-1 for ATLAS both of which saw iindications of Higgs Mass States around 200 and 260 GeV

CMS saw

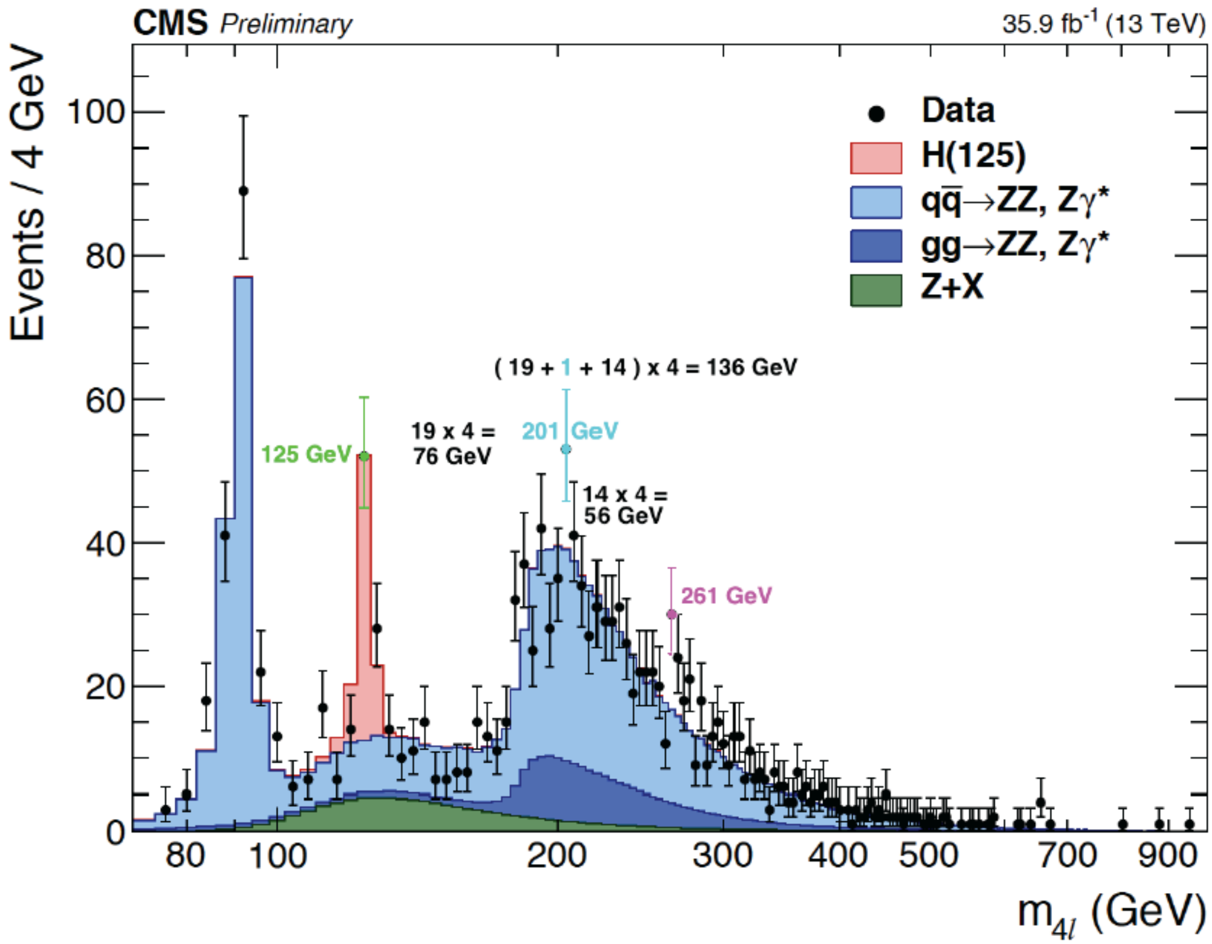


ATLAS saw

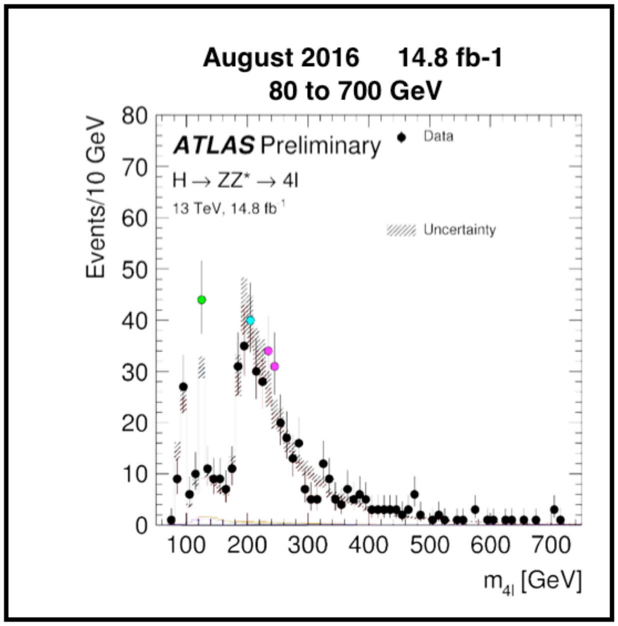


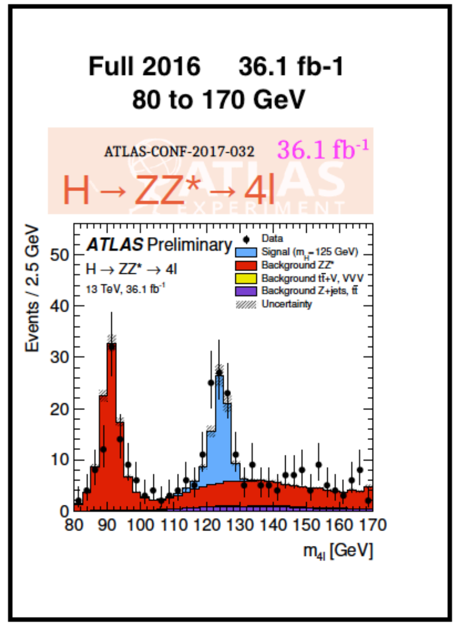
In 2016 the LHC had a 13 TeV run producing 35.9 fb-1 for CMS and 36.1 fb-1 for ATLAS

CMS saw for the Higgs -> ZZ* -> 4l channel:



ATLAS saw for the Higgs -> ZZ* -> 4l channel:





In August 2016,
based on the first 14.8 fb-1 of 2016 data in the Higgs -> ZZ* -> 4l channel,
ATLAS saw Indications of Higgs Mass states in the area of 200 GeV and 260 GeV
and Observation of Higgs Mass state at 125 GeV.

For the Full 2016 36.1 fb-1 of data in the Higgs -> ZZ* -> 4l channel,
ATLAS did not report results at Moriond 2017,
and at Shanghai LHCP2017 only reported results for the 80 to 170 GeV range,
thus ignoring the possible Higgs Mass states in the area of 200 GeV and 260 GeV
while emphasing Observation of the Higgs Mass state at 125 GeV.

If in future data analysis and reporting,
the LHC follows the trend of ATLAS, ignoring any Higgs at 200 and 260 GeV,
and **concentrating only on the Observed 125 GeV Higgs Mass state**
that is favored by the Consensus,

then the Individual's Nambu-Jona-Lasinio 3-State HIggs-Tquark System
will have been Effectively Suppressed

and the Simple Consensus View of a single Higgs state at 125 GeV
will have prevailed,

just as the Fermilab Consensus, by ignoring any Tquark data at 130 and 220 GeV,
has seen its Simple Consensus View of a single Tquark state at 174 GeV
become Accepted Dogma.

In 2016-2017 I wanted to present my Nambu-Jona-Lasinio 3-Mass-State ideas
for a Higgs-Tquark system in the context of watching LHC results
as the amount of data increased, being 30-40 fb-1 for 2016
and expected to be a similar amount for 2017
because
I hope that the Higgs -> ZZ* -> 4l channel results with 60-80 fb-1
may be enough to show clearly evidence or observation of
the 200 GeV Higgs Mass State on the Non-Perturbativity Boundary
and
the 260 GeV Higgs Mass State at the Critical Point (Higgs VEV)

so I applied to visit
the 2017 Rencontres de Moriond (results of the LHC 2016 run)
and
the Princeton Institute for Advanced Study
and
the Simons Center for Geometry and Physics.

The Moriond organizer was very courteous,
but declined my offer to talk about my ideas.

The Princeton IAS rejected my application,
stating that I was unqualified because I have no Ph.D.,
despite the facts that:
Freeman Dyson was a Professor at IAS (1953-1994, then becoming emeritus)
Freeman Dyson has no Ph.D.,
but has a 1945 Trinity College Cambridge B.A. in mathematics.
I have a 1963 Princeton A.B. in mathematics.

The Simons Center rejected my application, not stating any particular reason.

> A personal reason that I would have liked to visit the Simons Center
> is that it is near the Setauket Presbyterian Church, of which
> my 8-Great Grandfather Nathaniel Brewster was the First Minister (1665-1690).
> Nathaniel Brewster (AB Harvard 1642) was one of the nine graduates of Harvard's first class.
> His father, my 9-Great Grandfather Francis Brewster II (MA Pembroke Cambridge 1624),
> died at sea in 1647 aboard the New Haven Phantom Ship.

If the Influential Physics Establishment Institutions
such as CERN-LHC-Moriond, Princeton IAS, and Simons Geometry and Physics
continue to exclude Individuals with ideas such as Nambu-Jona-Lasinio Systems
then

Physics will enter a Dark Age with only incremental advancements
and
No Major Advancement in Fundamental Understanding.

Dark Energy and Dark Matter

Consensus = Unknown   Individual = Known Segal Conformal Structure

Again, t**he Consensus view is simple** and clear:

Nobody understands Dark Energy and Dark Matter.

Also again, **the Individual view is more complicated**, but more Optimistic.

In 2003 the Wilkinson Microwave Anisotropy Probe (WMAP) released
its first results (astro-ph/0302207) showing
a Dark Energy : Dark Matter : Ordinary Matter ratio

DE : DM : OM = 0.73 : 0.22 : 0.044

Irving Ezra Segal based his ideas about Gravity and the Cosmological Constant
on the Conformal group Spin(2,4) = SU(2,2) whose 15 generators act as gauge bosons
which combine to produce Einstein-Hilbert Gravity plus Cosmological Constant -
- see section 14.6 of Rabindra Mohapatra's book "Unification and Supersymmetry".

The 15 Conformal Generators are:

6 Lorentz plus 4 Special Conformal = 10 for the Expanding Universe of Dark Energy
4 Translations for 4-dim spacetime of Primordial Black Holes and Dark Matter
1 Dilatation for the Higgs scalar giving Mass to Ordinary Matter

At first glance, that gives the ratio

DE : DM : OM = 10/15 : 4/15 : 1/15 = 0.67 : 0.27 : 0.06

but DE, DM, and OM vary differently with the time-varying radius of Our Universe.
When you take into account the differing variations with age of Our Universe,
you get for the ratio at our present time:

DE : DM : OM = 0.753 : 0.202 : 0.045

in very good agreement with the WMAP results.

I then wrote a paper that,
even though I had been blacklisted by the Cornell arXiv in 2002,
I hoped would be good enough and important enough that Cornell would lift its blacklist.

However, when I submitted my WMAP ratio calculation paper to the Cornell arXiv,
I found that my blacklisting would not be lifted,
and it was rejected by Cornell in February 2004.

I then submitted the paper to the CERN CDS document server
which allowed me to post it as EXT-2004-013.

My success was short-lived, because pursuant to an 8 October 2004 meeting
of the CERN Scientific Information Policy Board (SIPB)
the CERN CDS External Service was terminated.
My personal opinion is that my name was involved in the October 2004
discussions leading to the killing of the CERN CDS preprint server.
My only sources are rumors, because nobody officially involved will talk to me directly.
The rumor sources are people connected with CERN who would talk to me
or to friends of mine but were (and probably still are) afraid of their jobs
if they were to be identified.

If the Consensus continues to Suppress the distribution of Individual ideas
such as Conformal Gravity, Dark Energy, and Dark Matter
then
it is very unlikely that Understanding of Gravity, Dark Energy, and Dark Matter
will advance beyond the Consensus View, which is that
Dark Energy and Dark Matter are Mysteries that Nobody Understands.

The following 5 pages are my WMAP ratio calculation paper EXT-2004-013
that was put on CERN CDS before termination of External service in October 2004.

CERN CDS preprint EXT-2004-013

Cosmology, Gravity, and the WMAP ratio 0.73 : 0.23 : 0.04

Frank D. (Tony) Smith, Jr., Cartersville, Georgia USA

[Note - shortly after arXiv removed this paper, in response to some comments mde by others, I added the material set off by [ ] .]

Abstract

WMAP results indicate that our universe is now made up of 73% dark energy (DE), 23% dark matter (DM), and 4% ordinary matter (OM), the DE possibly being in the form of a cosmological constant (itself a misnomer, as a "cosmological constant" can be variable). A model of gravity based on the conformal group Spin(2,4) = SU(2,2), motivated by work of I. E. Segal, can be used to estimate the present-day DE : DM : OM ratio. If DM obeys the ordinary matter equation of state, then the model gives the ratio 0.753 : 0.202 : 0.045, which is quite close to the WMAP observation of 0.73 : 0.23 : 0.04.

WMAP results indicate that our universe is now made up of 73% dark energy (DE), 23% dark matter (DM), and 4% ordinary matter (OM), the DE possibly being in the form of a cosmological constant (itself a misnomer, as a "cosmological constant" can be variable).

In the D4-D5-E6-E7-E8 VoDou Physics model, Gravity and the Cosmological Constant come from the MacDowell-Mansouri Mechanism and the 15-dimensional Spin(2,4) = SU(2,2) Conformal Group, which is the group used by Irving Ezra Segal in his work on gravity and cosmology.

The 15 generators of the Conformal Group SU(2,2) = Spin(2,4) correspond to:

- 3 Rotations;
- 3 Boosts;
- 4 Translations;
- 4 Special Conformal transformations; and
- 1 Dilatation.

The main purpose of this paper is to use the structure of the Conformal group to estimate the present-day ratio

DE : DM : OM

which, according to WMAP results, is

.73 : .23 : .04

The basis of the estimation is the following correspondence:

- DE (dark energy, cosmological constant) - the 10 Rotations, Boosts, and Special Conformal generators
- DM (dark matter) - the 4 Translations
- OM (ordinary matter) - the 1 Dilatation

[Here is some motivation for the above correspondence:

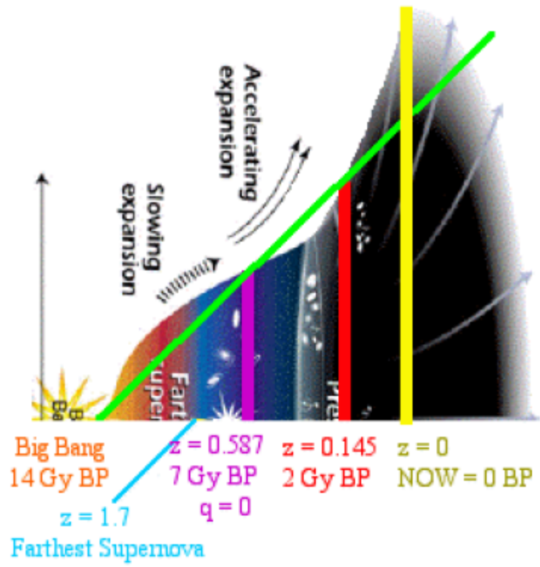
  - DE is the NORMAL state of stuff in our universe (it is now, according to WMAP, about 73% of it). It looks more like deSitter spacetime than Minkowski spacetime. In Segal's model and as Aldrovandi and Peireira show in some mathematical detail in their paper at gr-qc/9809061 the DE spacetime structure comes from "... the group Q, formed by a semi-direct product between Lorentz and special conformal transformation groups ...". Those are the 10 Rotations, Boosts and Special Conformal generators that correspond to DE.
  - DM is a lesser part (it is now, according to WMAP, about 23% of it) of our universe, and differs from the dominant DE by being based on the 4 Translations that are the basis for Einstein's description of spacetime curvature, which in turn describes effective mass (such as the mass of such DM candidates as primordial black holes). Those 4 Translations therefore correspond to DM.
  - OM (the stuff of which we and Earth are made) is sort of weird and exceptional (it is now, according to WMAP, only about 4% of it). For us to call it ordinary is quite provincial, because it is only ordinary in the context of our physical bodies and the planet on which we live. What characterizes all OM is that its mass comes from the Higgs mechanism. The Dilatation gives the spin 0 Higgs field, and therefore all the mass of OM, so the 1 Dilatation therefore corresponds to OM.

In terms of I. E. Segal's book Mathematical Cosmology and Extragalactic Astronomy (Academic Press 1976), you might say that DE and DM are respectively related to Unispace and Minkowski space, and that OM is something like a little frothy foam on/in the DE/DM system.]

As a first-order calculation, the correspondence gives the ratio

DE : DM : OM = 10/15 : 4/15 : 1/15 = **.67 : .27 : .06**

However, the various components of DE, DM, and OM vary differently with time (or, equivalently, with the radius of our expanding universe), so the ratio 0.67 : 0.27 : 0.06 is valid only for a particular time, or scale factor, of our Universe, so it is necessary to ask at what stage of the expansion of the universe should the first-order ratio 0.67 : 0.27 : 0.06 be valid. In order to answer that question, we should try to see **what are the Special Times in the History of our Universe ?**



There seem to be four Special Times in the history of our Universe:

- the **Big Bang Beginning of Inflation** (about 13.7 Gy BP);
- the **End of Inflation** = Beginning of Decelerating Expansion (beginning of green line also about 13.7 Gy BP);
- the **End of Deceleration** (q=0) = Inflection Point = Beginning of Accelerating Expansion (purple vertical line at about z = 0.587 and about 7 Gy BP). According to a hubble site web page credited to Ann Feild, the above diagram "... reveals changes in the rate of expansion since the universe's birth 15 billion years ago. ... **The curve changes noticeably about 7.5 billion years ago**, when objects in the universe began flying apart as a faster rate. ...". According to a CERN Courier web page: "... Saul Perlmutter, who is head of the Supernova Cosmology Project ... and his team have studied altogether some 80 high red-shift type Ia supernovae. Their results imply that **the universe was decelerating for the first half of its existence, and then began accelerating approximately 7 billion years ago**. ...". According to astro-ph/0106051 by Michael S. Turner and Adam G. Riess: "... **current supernova data ... favor deceleration at z > 0.5** ... **SN 1997ff at z = 1.7** provides direct evidence for an early phase of slowing expansion if the dark energy is a cosmological constant ...".
- the **Last Intersection** of the Accelerating Expansion of our Universe with Linear Expansion

(green line) from End of Inflation (first interesection) through Inflection Point (second intersection, at purple vertical line at about z = 0.587 and about 7 Gy BP) to the Third Intersection (at red vertical line at z = 0.145 and about 2 Gy BP), which is also around the times of the beginning of the Proterozoic Era and Eukaryotic Life, Fe2O3 Hematite ferric iron Red Bed formations, a Snowball Earth, and the start of the Oklo fission reactor.

After the Last Intersection at the end of the Early Part of the Accelerating Expansion of our Universe, expansion of our Universe continues to accelerate with the Late Part of its Accelerating Expansion.

Those four Special Times define four Special Epochs:

- The **Inflation Epoch**, beginning with the Big Bang and ending with the End of Inflation. The Inflation Epoch is described by Zizzi Quantum Inflation, ending with Self-Decoherence of our Universe.
- The **Decelerating Expansion Epoch**, beginning with the End of Inflation. During the Decelerating Expansion Epoch, the Radiation Era is succeeded by the Matter Era, and the Matter Components (Dark and Ordinary) remain more prominent than they would be under the "standard norm" conditions of Linear Expansion.
- The **Early Accelerating Expansion Epoch**, beginning with the End of Deceleration and ending with the Last Intersection of Accelerating Expansion with Linear Expansion. During Accelerating Expansion, the prominence of Matter Components (Dark and Ordinary) declines, reaching the "standard norm" condition of Linear Expansion at the end of the Early Accelerating Expansion Epoch at the Last Intersection with the Line of Linear Expansion.
- The **Late Accelerating Expansion Epoch**, beginning with the Last Intersection and continuing into the far future. During the Late Accelerating Expansion Epoch, DE dark energy is more prominent than it would be under the "standard norm" conditions of Linear Expansion.

In making my estimation of the ratio DE : DM : OM, **the time of the first approximation ratio 0.67 : 0.27 : 0.06** is taken to be the time of the Last Intersection, which **is about 2 billion years ago**.

To see how the ratio DE : DM : OM evolved during the 2 billion years from the Last Intersection to the present time, you must know the value of w in equation of state

density =proportional= 1 / R^3(1+w)

for DE, DM, and OM in our universe at a time when its scale factor is R.

- For DE (dark energy cosmological constant), w = -1
- For DM(dark matter) that obeys the ordinary matter equation of state, w = 0
- For OM, w = 0

About 2 billion years ago, the redshift z = 0.145 , or 1+z = 1.145, or (1+z)^3 = 1.5,

so that from then to now:

- DM density would decline by the1 / R^3 factor as Ordinary Matter, from .27 to .27 / 1.5 = .18.
- OM density would decline by the1 / R^3 factor as Ordinary Matter, from .06 to .06 / 1.5 = .04
- DE density would remain constant at .67.

Therefore, the ratio as of now would be

DE : DM : OM = .67 : .18 : .04 = .753 : 202 : 0.45

or

75.3% : 20.2% : 4.5%

which is quite close to the WMAP observation of

73% : 23% : 4%.