Should Consensus Suppress the Individual ?

Frank Dodd (Tony) Smith, Jr. - 2017 - viXra 1705.0271

Consider three cases, each with

Consensus = the Physics Establishment including:
Organizers of 2010 Banff Workshop on Structure and Representations of Exceptional Groups (page 3-4);
Moriond 2017 (page 4):
the Princeton Institute for Advanced Study (page 4);
the Simons Center for Geometry and Physics (page 4);
Fermilab, CDF, and D0 Collaborations (pages 9-17);
the Cornell arXiv (pages 16; 30-31);
CERN CDS (pages 17; 31); and
LHC, ATLAS, and CMS Collaborations (pages 18-29)

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 2-4):

Does E8 represent Realistic Standard Model plus Gravity ?
Consensus = NO   Individual = YES

Individual says Cl(16) contains E8 Lagrangian as basis for Realistic AQFT =
= Completion of Union of All Tensor Products of Cl(16)
whose Geometric and Combinatorial Structure
allows calculation of particle masses and force strengths (see page 2).

Second Case (pages 5-29):

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

Third Case (pages 30-36):

Dark Energy and Dark Matter
Consensus = Unknown   Individual = Segal Conformal Structure

This paper idescribes some of the interactions between Consensus and Individual in each of those cases.

First Case:

Does E8 represent Realistic Standard Model plus Gravity ?
Consensus = NO   Individual = YES

Individual says Cl(16) contains E8 Lagrangian as basis for Realistic AQFT =
= Completion of Union of All Tensor Products of Cl(16)
whose Geometric and Combinatorial Structure
allows calculation of particle masses and force strengths:

Quark masses are constituent masses. Most of the calculations are tree-level.
Fermions are Schwinger Sources with geometry of Complex Bounded Domains
and Kerr-Newman Black Hole structure size about 10^(-24) cm.
Since ratios are calculated, values for one particle mass and one force strength are assumed.

Particle/Force	Tree-Level	Higher-Order
e-neutrino	0	0 for nu_1
mu-neutrino	0	9 x 10^(-3) eV for nu_2
tau-neutrino	0	5.4 x 10^(-2) eV for nu_3
electron	0.5110 MeV	
down quark	312.8 MeV	charged pion = 139 MeV
up quark	312.8 MeV	proton = 938.25 MeV
		neutron - proton = 1.1 MeV
muon	104.8 MeV	106.2 MeV
strange quark	625 MeV	
charm quark	2090 MeV	
tauon	1.88 GeV	
beauty quark	5.63 GeV	
truth quark (low state)	130 GeV	(middle state) 174 GeV
		(high state) 218 GeV
W+	80.326 GeV	
W-	80.326 GeV	
W0	98.379 GeV	Z0 = 91.862 GeV
Mplanck 1.217x10^19 GeV		
Higgs VEV (assumed)	252.5 GeV	
Higgs (low state)	126 GeV	(middle state) 182 GeV
		(high state) 239 GeV
Gravity Gg (assumed)	1	
(Gg)(Mproton^2 / Mplanck^2)		5 x 10^(-39)
EM fine structure	1/137.03608	
Weak Gw	0.2535	
Gw(Mproton^2 / (Mw+^2 + Mw-^2 + Mz0^2))		1.05 x 10^(-5)
Color Force at 0.245 GeV	0.6286	0.106 at 91 GeV

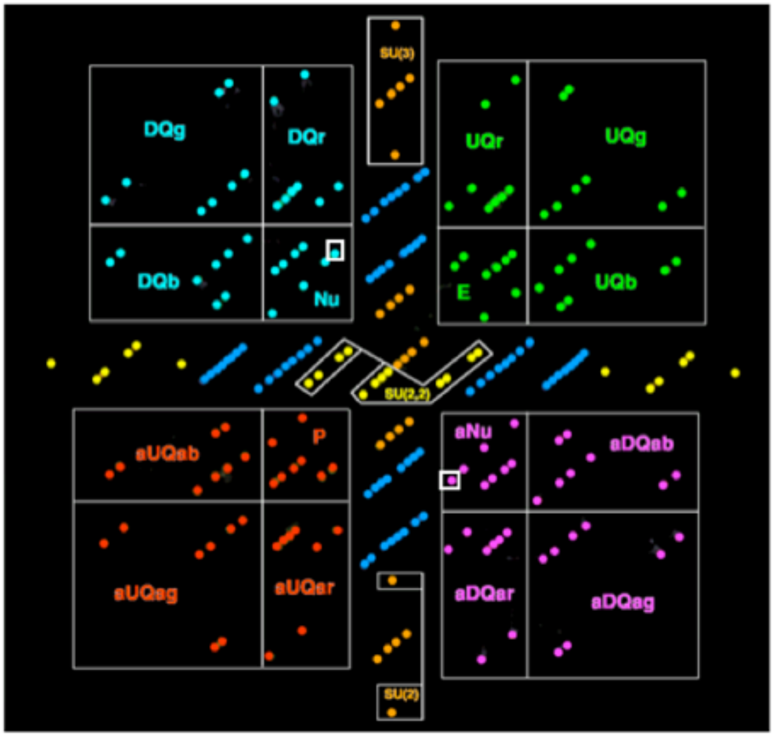
Kobayashi-Maskawa parameters for W+ and W- processes are:

	d	s	b
u	0.975	0.222	0.00249 -0.00388i
c	-0.222 -0.000161i	0.974 -0.0000365i	0.0423
t	0.00698 -0.00378i	-0.0418 -0.00086i	0.999

The phase angle d13 is taken to be 1 radian.

Dark Energy : Dark Matter : Ordinary Matter = 0.75 : 0.21 : 0.04

The basis of the model is representation of physics by the 240 Root Vectors of E8:



E = electron, UQr = red up quark, UQg = green up quark, UQb = blue up quark
Nu = neutrino, DQr = red down quark, DQg = green down quark, DQb = blue down quark
P = positron, aUQar = anti-red up antiquark,
aUQag = anti-green up antiquark, aUQab = anti-blue up antiquark
aNu = antineutrino, aDQar = anti-red down antiquark
white boxes enclose time components of neutrino and antineutrino
aDQag = anti-green down antiquark, aDQab = anti-blue down antiquark
Each Lepton and Quark has 8 components with respect to 4+4 dim Kaluza-Klein
6 orange SU(3) and 2 orange SU(2) represent Standard Model root vectors
24-6-2 = 16 orange represent U(2,2) Conformal Gravity Ghosts
12 yellow SU(2,2) represent Conformal Gravity SU(2,2) root vectors
24-12 = 12 yellow represent Standard Model Ghosts
32+32 = 64 blue represent 4+4 dim Kaluza-Klein spacetime position and momentum

Details of the E8-Cl(16) model and the calculations are in viXra 1602.0319.

Garrett Lisi’s E8 physics model represents the 240 Root Vectors differently
but it attracted the attention of not only the math/physics community
but also the general public to the possibility of using E8 for a realistic physics model.

Some in the math/physics community saw flaws in Garrett’s E8 model
and resented its popularity with the general public. In particular,
Skip Garibaldi and Jacques Distler wrote arXiv 0905.2658 entitled
“There is no “Theory of Everything” inside E8”
and in July 2010 David Vogan (MIT) et al held an E8 physics workshop in Banff
to which both Garrett and Skip were invited, but I was not allowed to attend it
even though my E8 model did not have the flaws of Garrett’s E8 model.

Although I had not been allowed to attend the Banff E8 workshop in 2010,
I still wanted to present my E8 Physics model,
including its calculations of force strengths, particle masses, etc,
to the math/physics community
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 realistic E8 based calculations
of force strengths, particle masses, etc, with E8 describing Lagrangian structure
embedded in Cl(16) leading, by 8-Periodicity, to an Algebraic Quantum Field Theory
generalizing the Hyperfinite II1 von Neumann factor algebra,
then

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

Second Case:

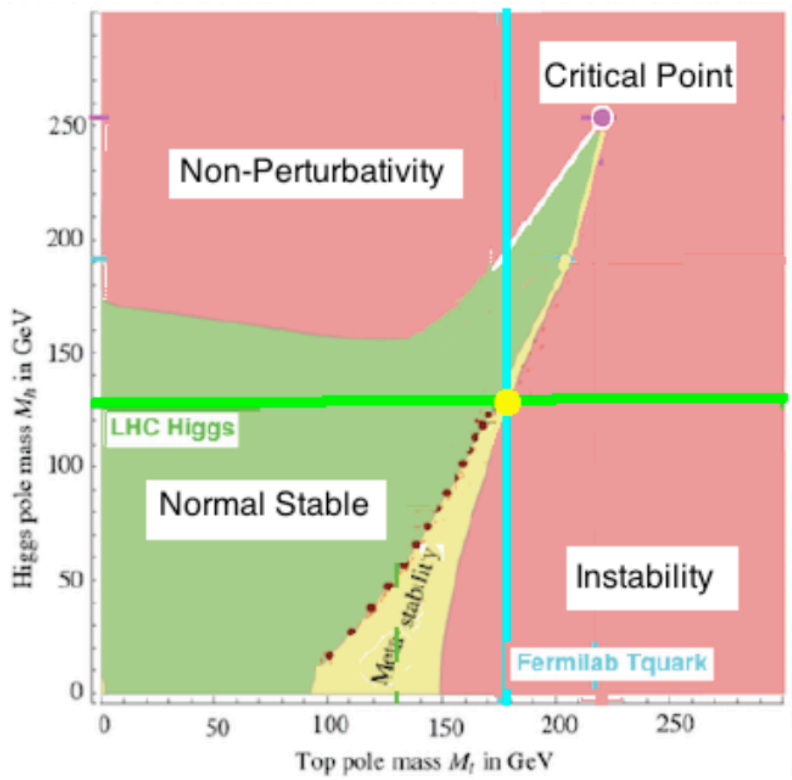
Our Universe: Is it Stable ?
Consensus = NO (only metastable)   Individual = YES

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

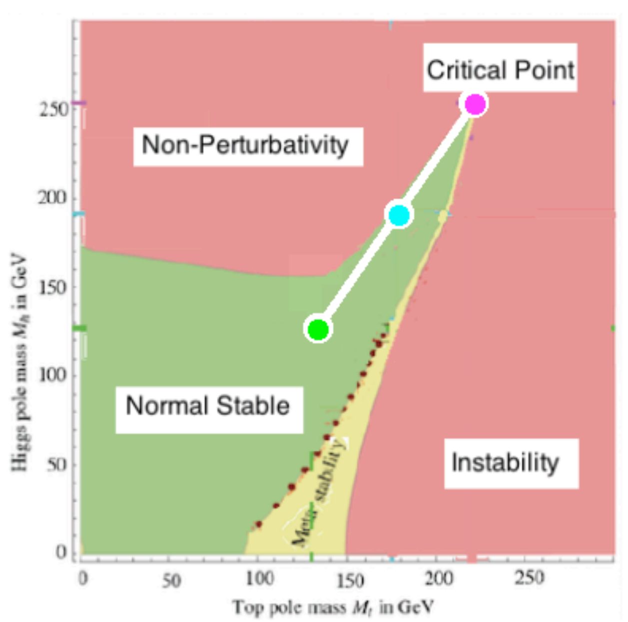


so **Consensus says that Our Universe is NOT Stable**
but is rather at the boundary of Metastability and Instability.

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.



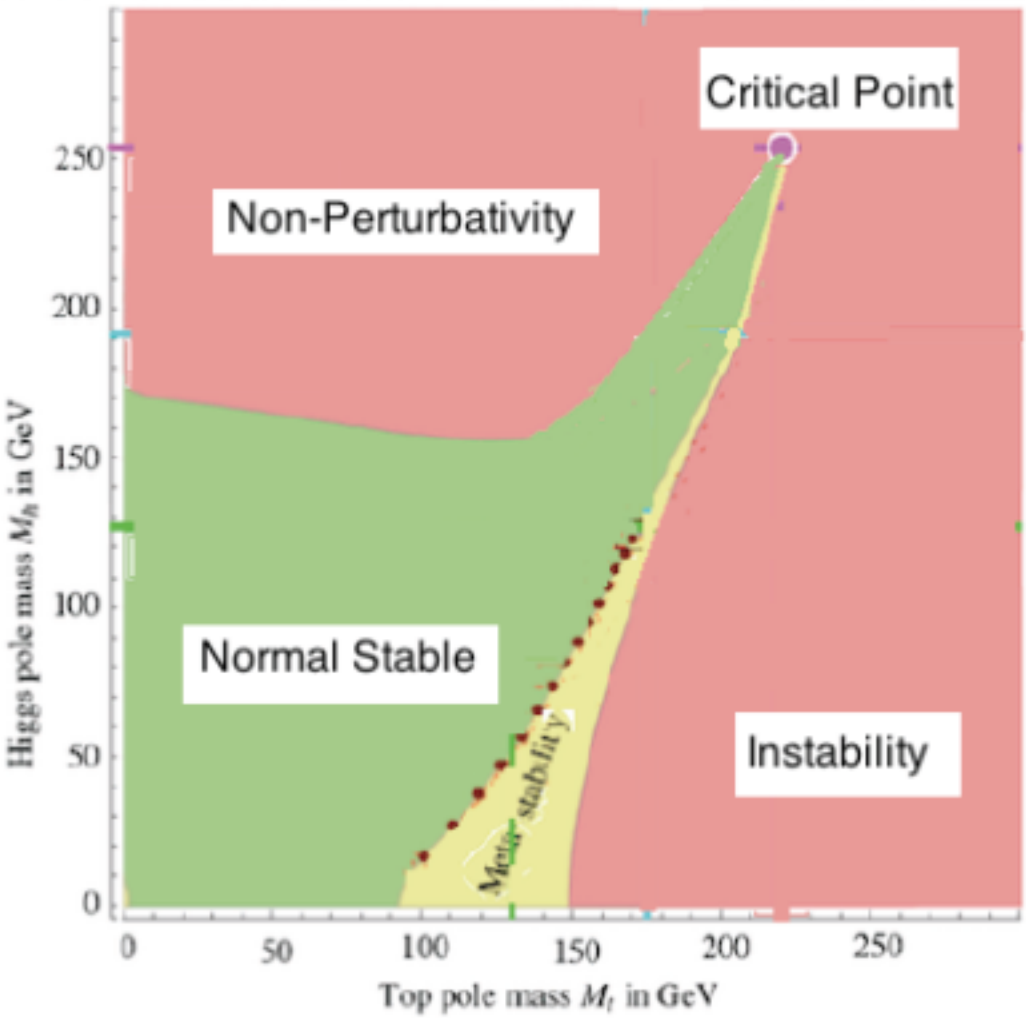
Only at the Critical Point (where the Higgs Mass is at the Higgs VEV)
is the zone of Vacuum Instability or Metastability encountered.

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:

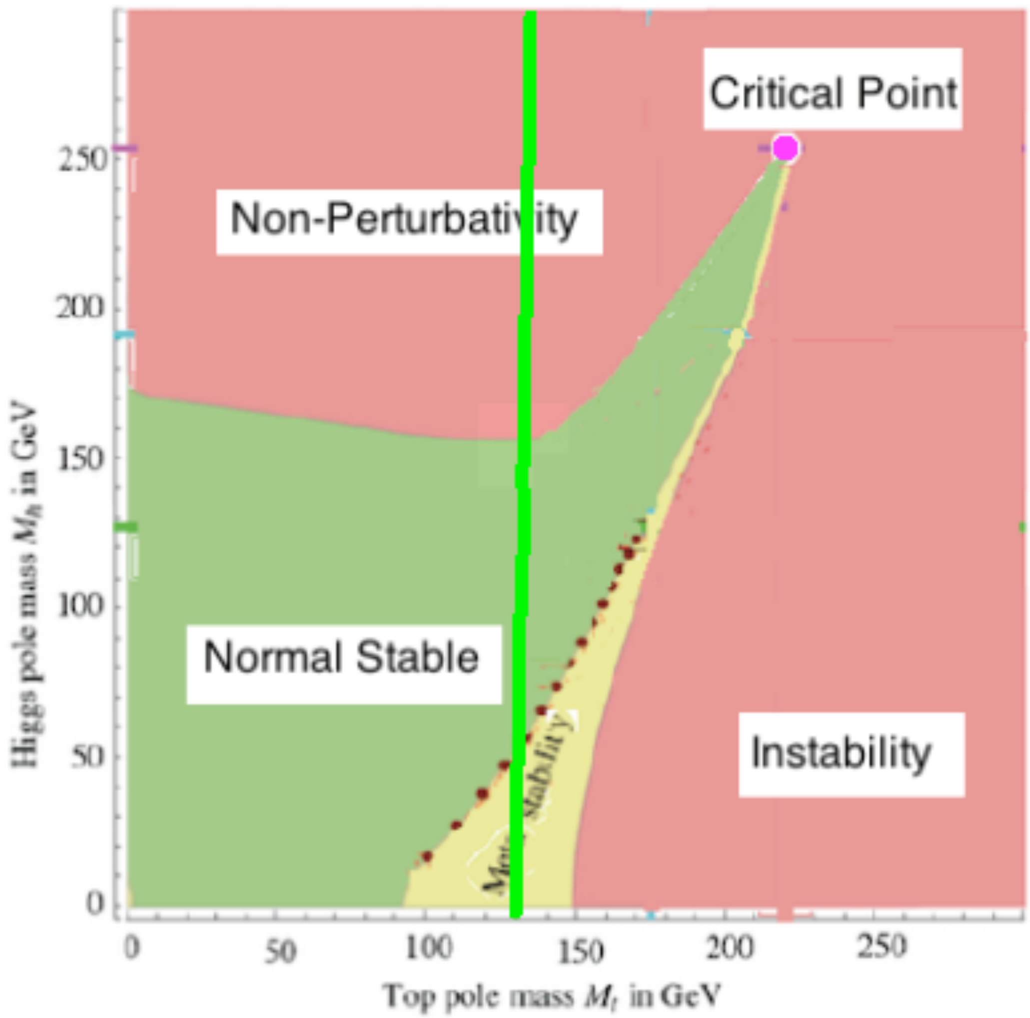
You can plot characteristics of a Nambu-Jona-Lasinio type Higgs-Tquark system on a Higgs Mass - Tquark Mass diagram like this:



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.

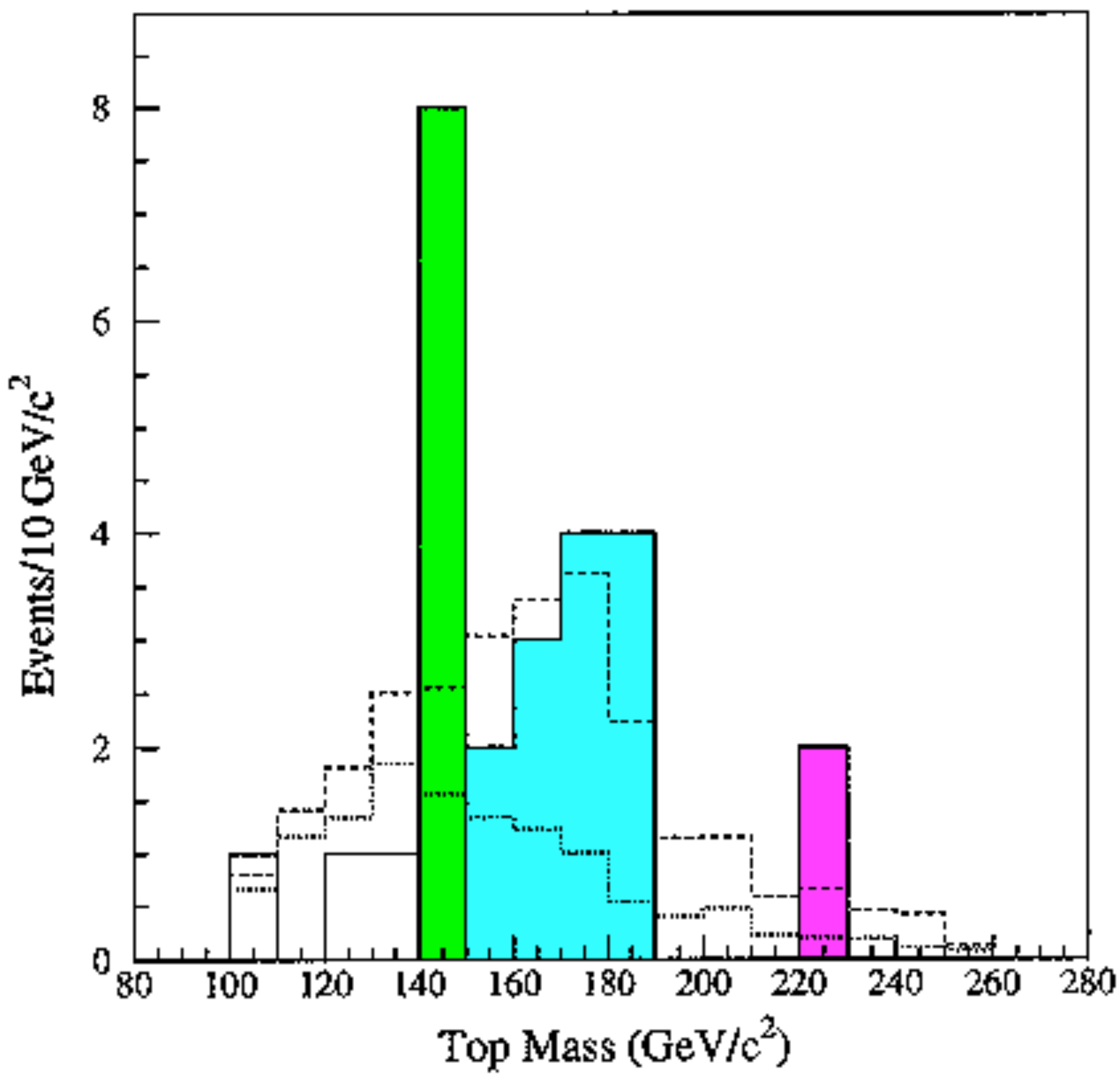
On 22 May 1992 the paper
"ANALYSIS OF TOP-ANTITOP PRODUCTION AND DILEPTON DECAY EVENTS AND THE TOP QUARK MASS"
by R. H. Dalitz and Gary R. Goldstein was received by Physics Letters B (Phys. Lett. B 287 (1992) 225-230).
It stated that: "A simple idealized procedure is proposed for the analysis of individual 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)

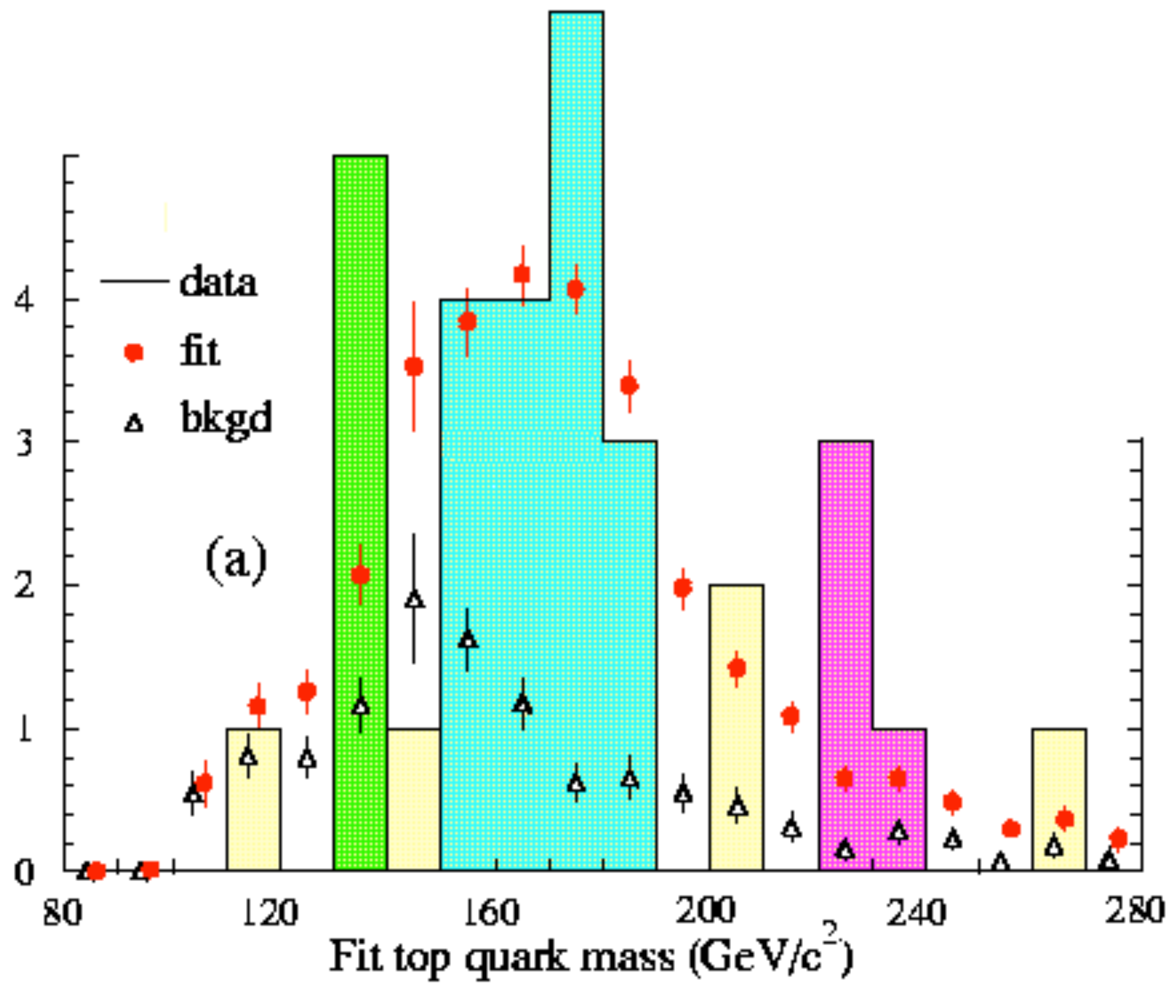


Fermilab ignored the magenta small peak corresponding to the Critical Point State, without comment,
and also ignored the green large peak corresponding to my prediction
and the Dalitz-Goldstein paper, saying
"... We assume the mass combinations in the 140 to 150 GeV/c^2 bin represent a statistical fluctuation 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

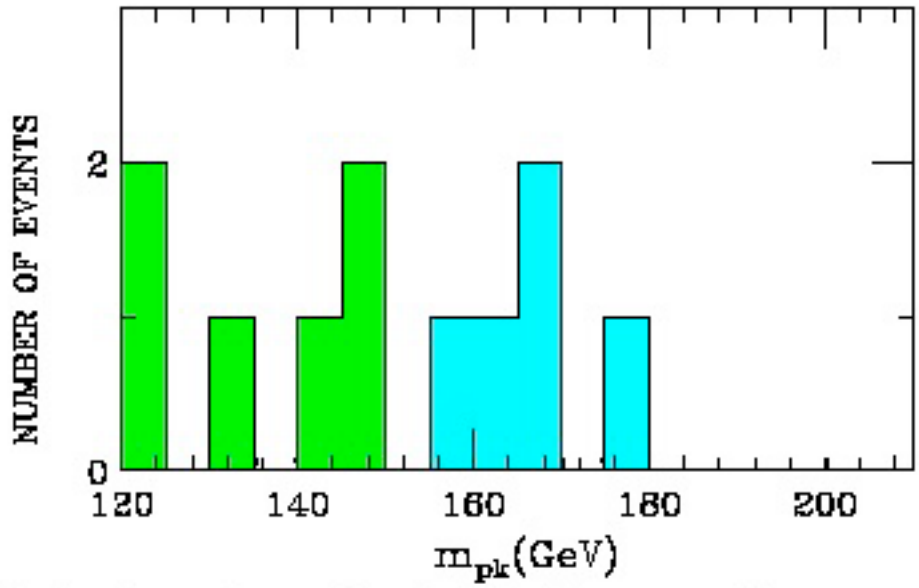
and continued to do so even when Fermilab's other detector, D0,
in 1997 (hep-ex/9703008) also saw semileptonic histogram peaks around
the Critical Point Mass State (magenta)
and the predicted Dalitz-Goldstein Mass State (green)



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

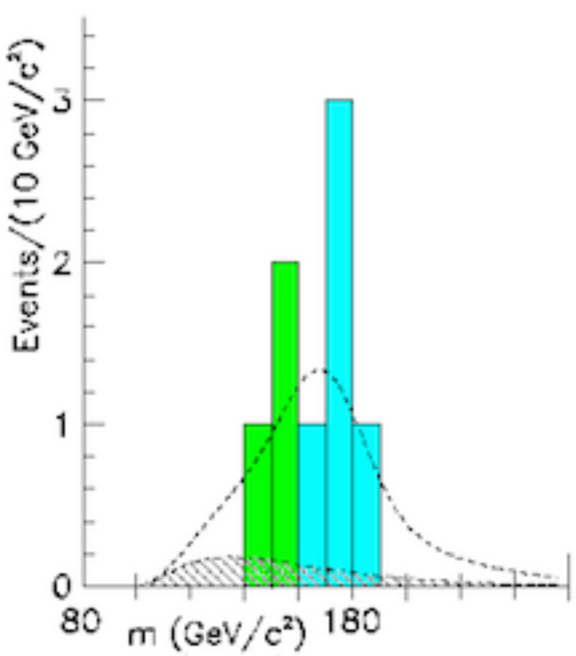
Here, on the following 2 pages, are a few of those details:

In February 1998 a dilepton histogram of 11 events from CDF (hep-ex/9802017)



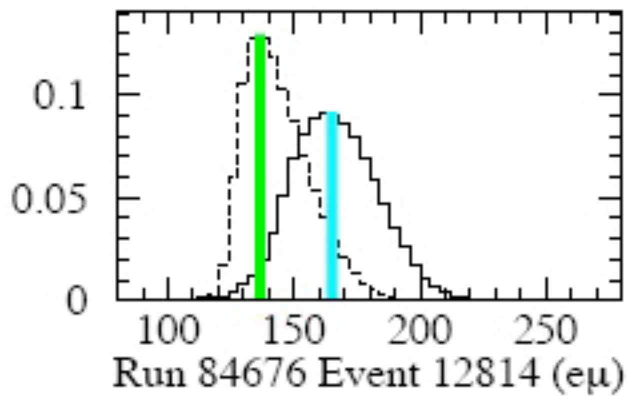
The distribution of m_{pk} values determined from 11 CDF dilepton events available empirically.

shows both the low (green) state and the middle (cyan) T-quark state
but
in October 1998 CDF revised their analysis by using only 8 Dilepton CDF events (hep-ex/9810029)



CDF kept the 8 highest-mass dilepton events, and threw away the 3 lowest-mass dilepton events that were indicated to be in the 120-135 GeV range, and shifted the mass scale upward by about 10 GeV, indicating to me tthat Fermilab was attempting to discredit the low-mass T-quark state by use of cuts etc on its T-quark data.

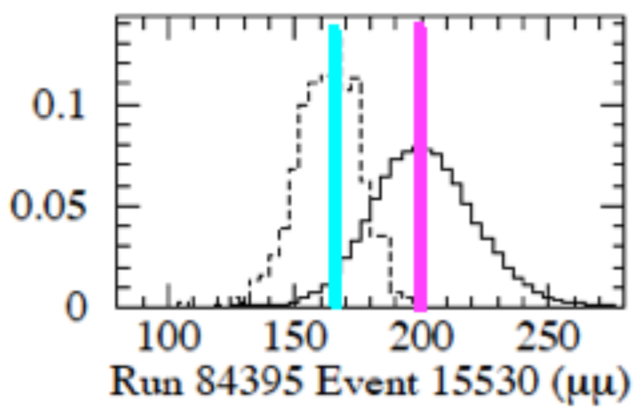
In his 1997 Ph.D. thesis Erich Ward Varnes (Varnes-fermilab-thesis-1997-28 at page 159) said: "... distributions for the dilepton candidates. For events with more than two jets, the dashed curves show the results of considering only the two highest ET jets in the reconstruction ...



...” (colored bars added by me)

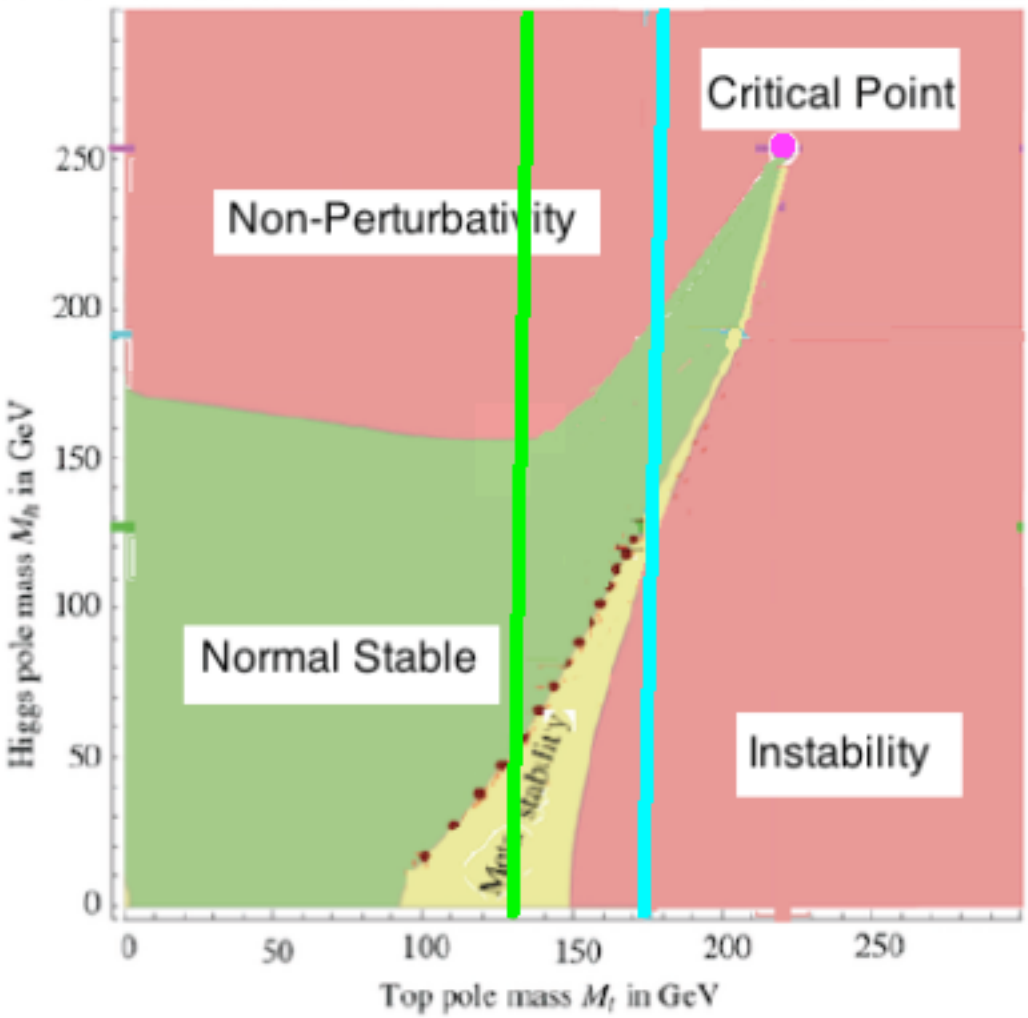
The event for all 3 jets (solid curve) seems to me to correspond to
decay of a middle (cyan) T-quark state
with one of the 3 jets corresponding to
decay from the Triviality boundary to the Normal Stable Region (green) T-quark state,
whose immediately subsequent decay corresponds to the 2-jet (dashed curve) event at the low (green) energy level.

In the Varnes thesis there is one dilepton event with 3 jets (solid curve)

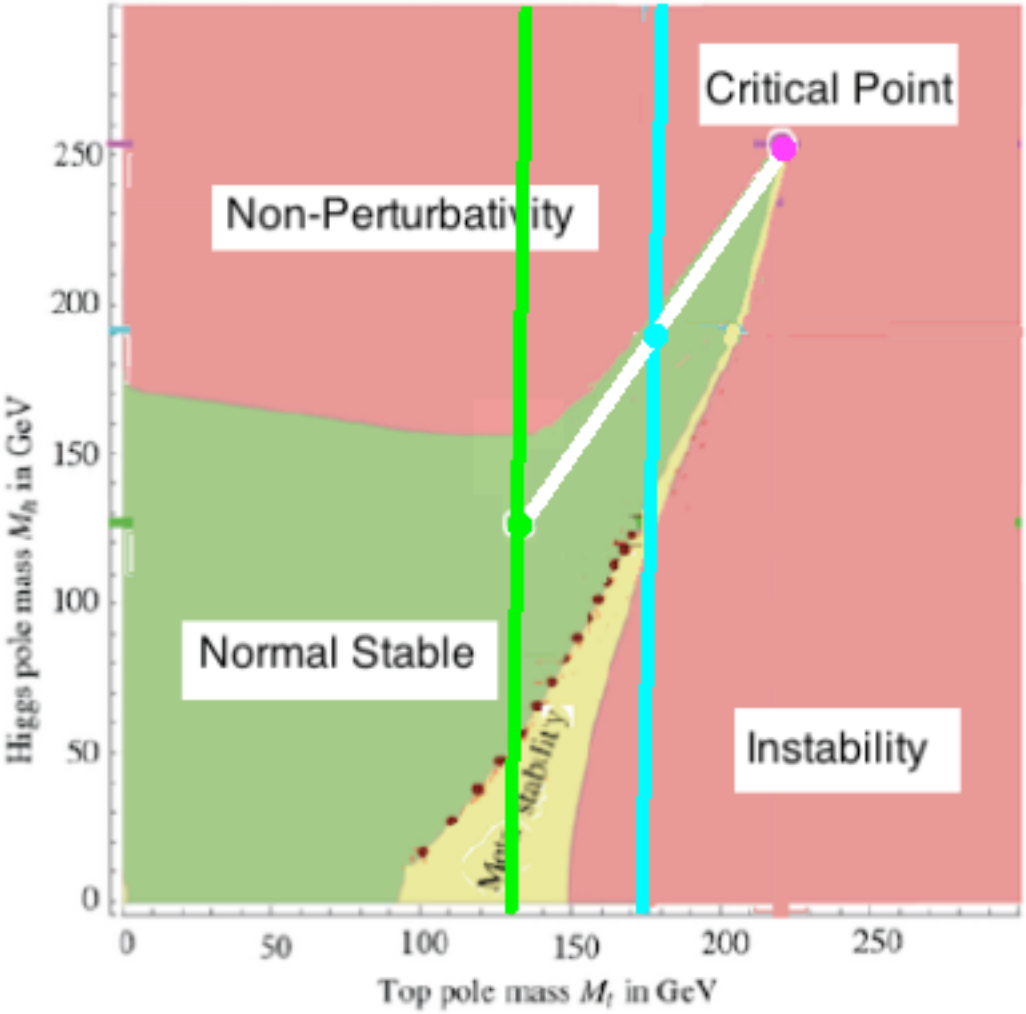


that seems to me to correspond to decay of a high (magenta) T-quark state
with one of the 3 jets corresponding to
decay from the Critical Point down to the Triviality Boundary (cyan) T-quark state,
whose immediately subsequent decay corresponds to the 2-jet (dashed curve) event.

No matter whatever the reality of the green low mass or magenta high mass peaks, **it is clear that Fermilab was observing the broad cyan middle mass Nambu-Jona-Lasinio Tquark Mass 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

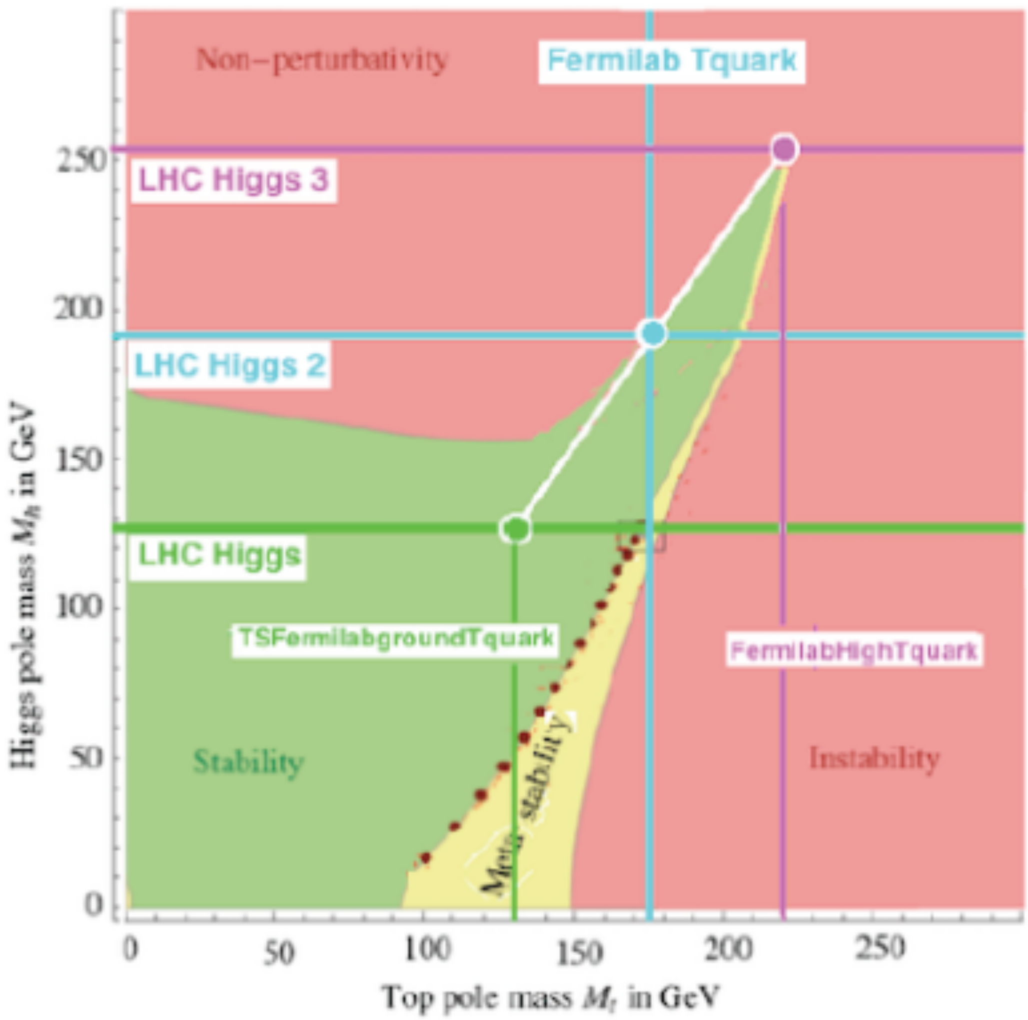


At this point, mid-1990s, assuming a Nambu-Jona-Lasinio-type Higgs-Tquark System, Fermilab had seen the Tquark Masses of the three Higgs-Tquark Mass States but the Higgs Masses were only NJL predictions not yet seen by LHC.

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.

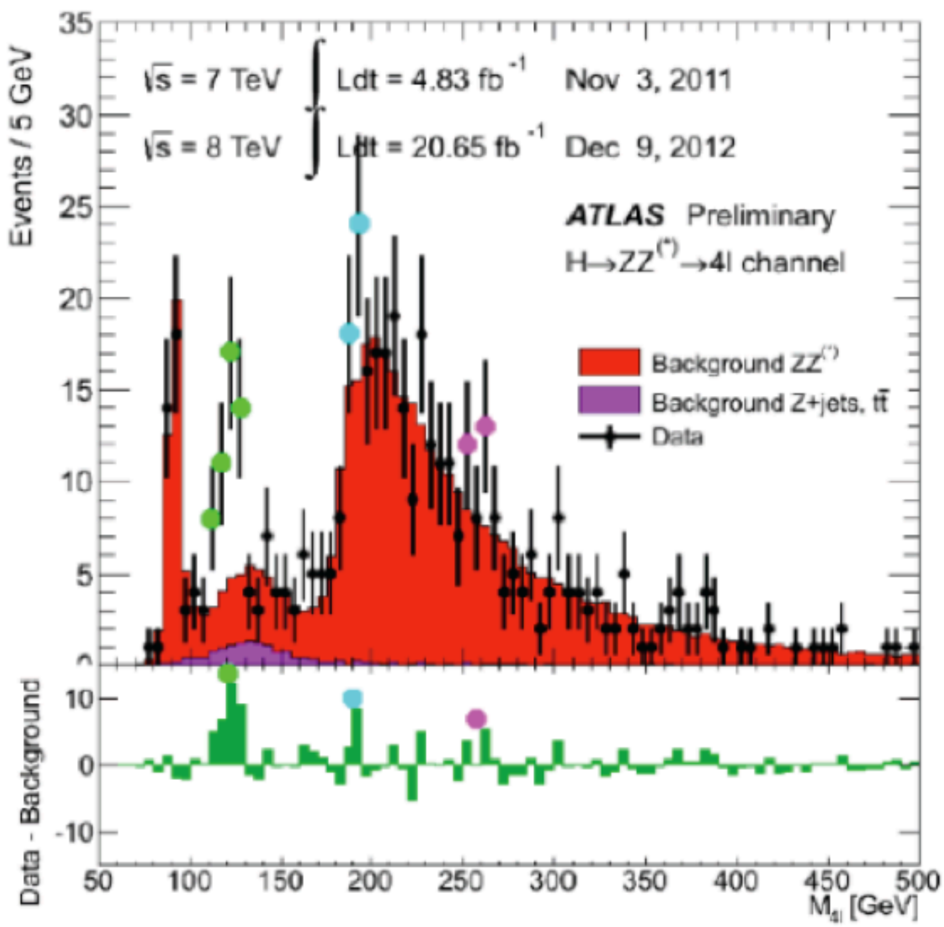
The cleanest most reliable channel in the LHC experiment is Higgs -> ZZ* -> 4l which would show a Higgs Mass State as a clean peak

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.

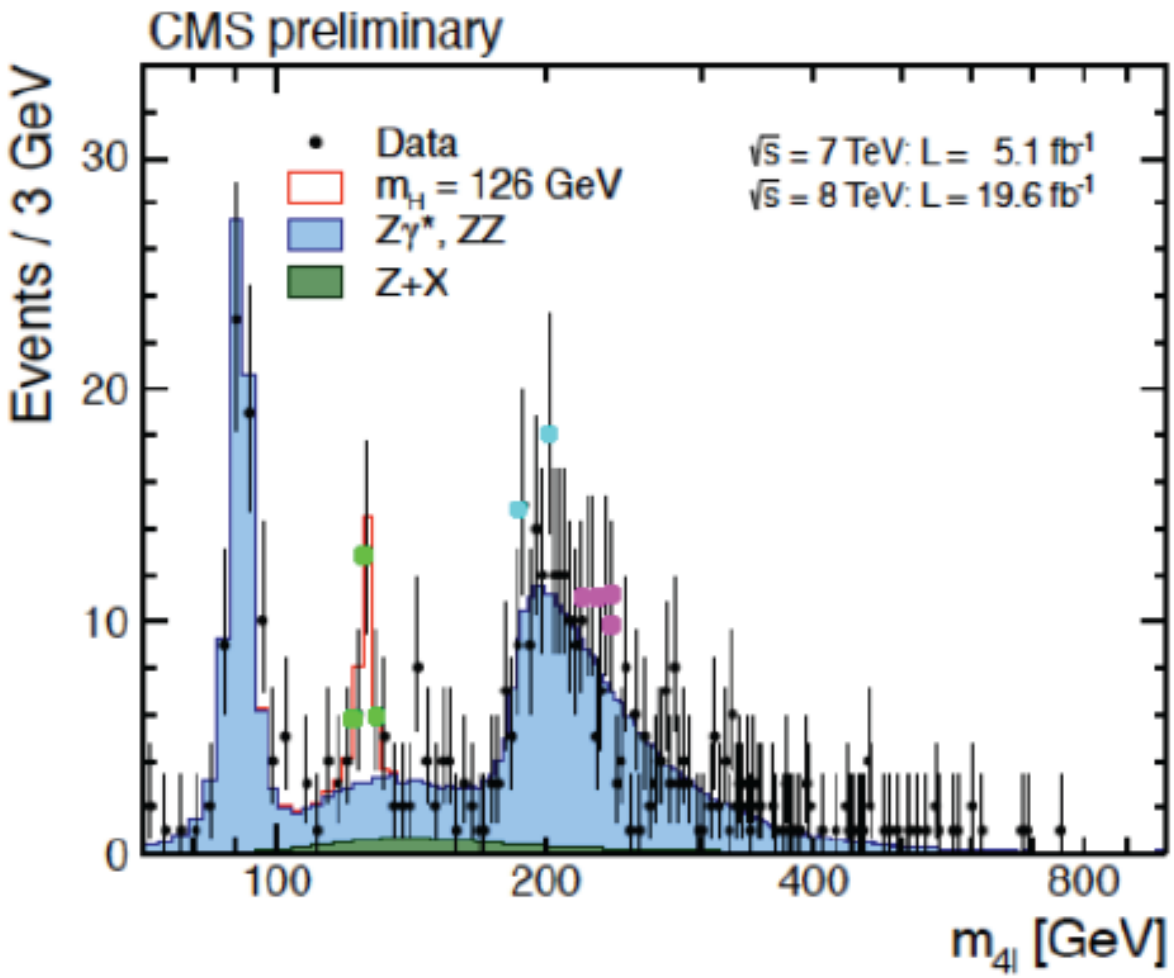
In 2008 the LHC started up to run at 14 TeV,
but defective electrical connections caused an explosion that terminated operation.

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



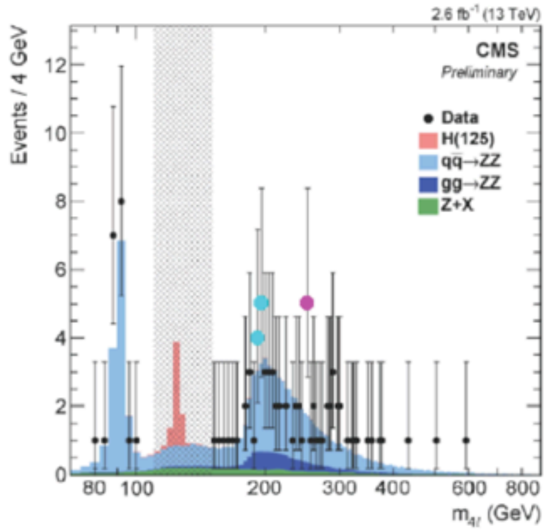
CMS also saw indications of the same two Higgs Mass States
with cross sections around 25% of Standard Model expectations:



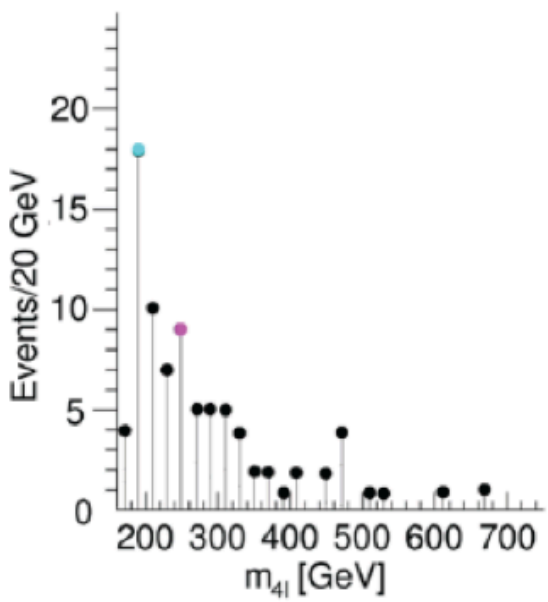
The LHC shut down in 2013-2014 for repair and reconstruction needed for operation at 13 TeV.

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

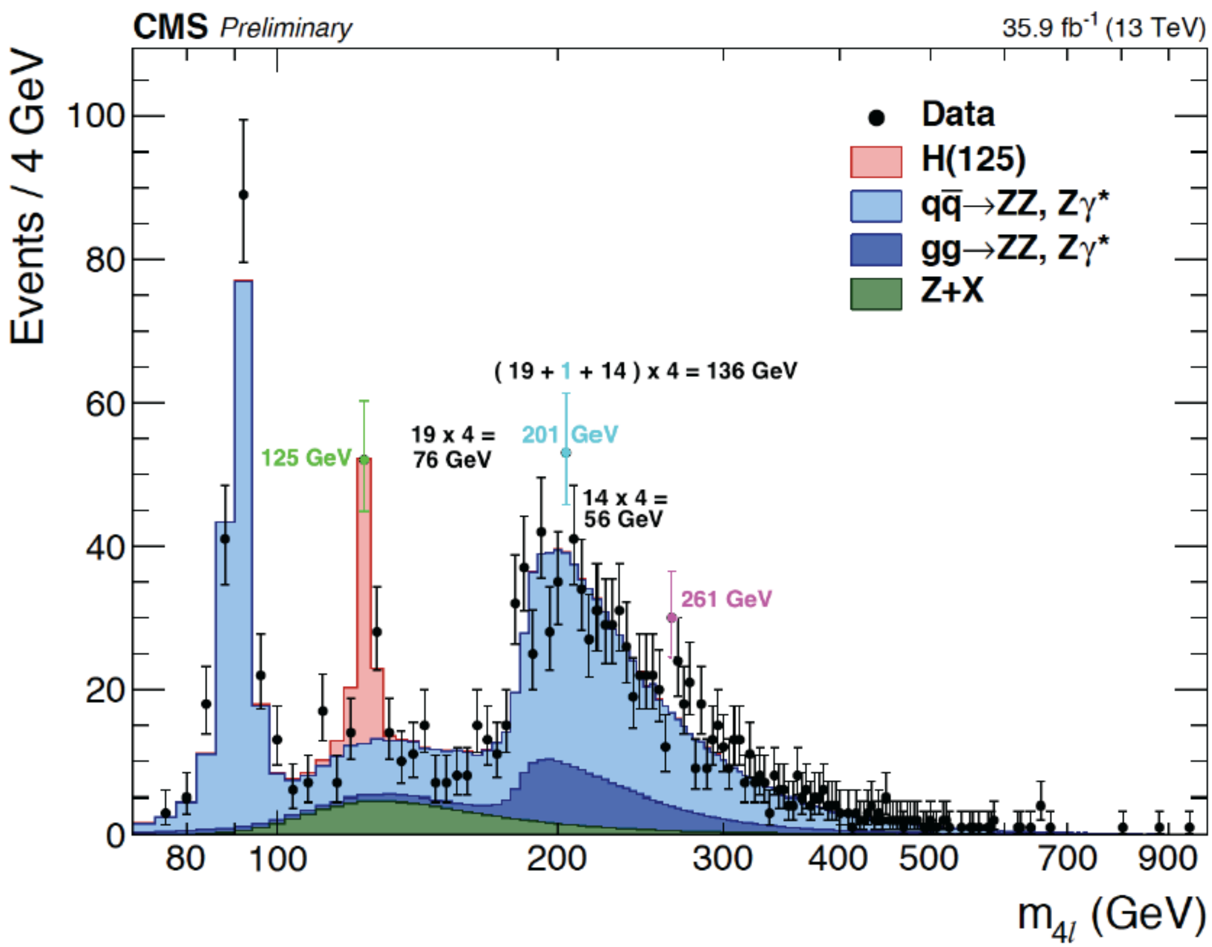


ATLAS saw



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



a histogram with peaks at 201 GeV and 261 GeV,

close enough to the 200 GeV and 250 GeV predictions of my E8 Physics Model

to be consistent with my E8-Cl(16) Physics Model with NJL Higgs-Tquark sector.

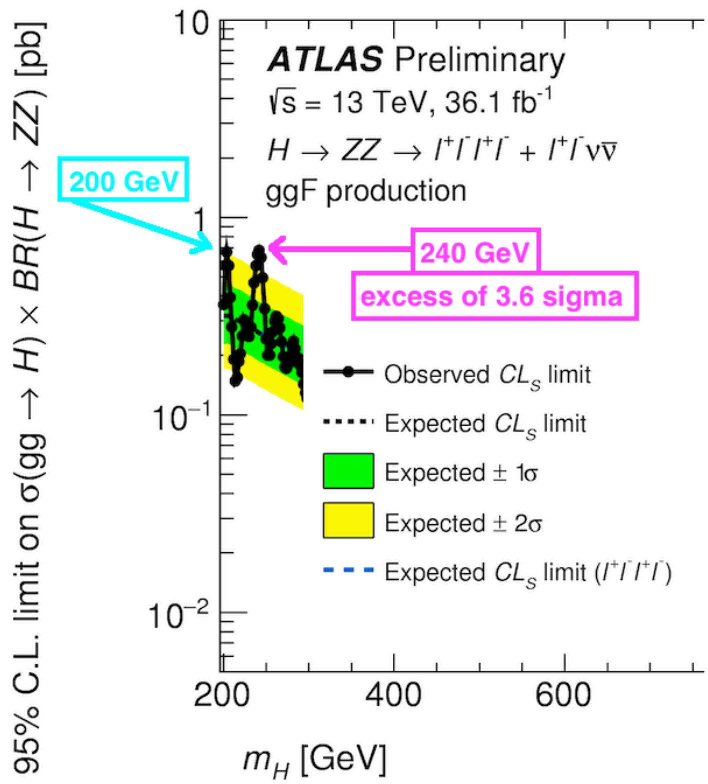
ATLAS, for the Full 2016 36.1 fb-1 of data in the Higgs -> ZZ* -> 4l channel,
on 5 July 2017 released **ATLAS-CONF-2017-058** saying:
"... A search for heavy resonances decaying into a pair of Z bosons leading to l+ l- l+ l- ... final state... where l stands for either an electron or a muon, is presented.

[that includes the Higgs -> ZZ* -> 4l channel]

The search uses proton–proton collision **data at a centre-of-mass energy of 13 TeV corresponding to an integrated luminosity of 36.1 fb-1 collected with the ATLAS detector during 2015 and 2016 at the Large Hadron Collider** ...

excess ...[is]... observed in the data for m4l around 240 ... GeV ...
with a local significance of 3.6 sigma

estimated under the asymptotic approximation,
assuming the signal comes only from ggF production ...
The excess at 240 GeV is observed mostly in the 4e channel ...
Figure 6 presents the expected and observed limits at 95% confidence level on sigma x BR(H->ZZ) of a narrow-width scalar for the ggF ... production modes, as well as the expected limits [figure truncated to relevant 140 - 300 GeV range]...



...".

E8-Cl(16) Physics Model (viXra 1602.0319) has a Nambu-Jona-Lasinio (NJL) type structure for the Higgs-Tquark system resulting in 3 mass states for them,
the **3 Higgs mass states being around 125 GeV (observed) and 200 and 250 GeV**.

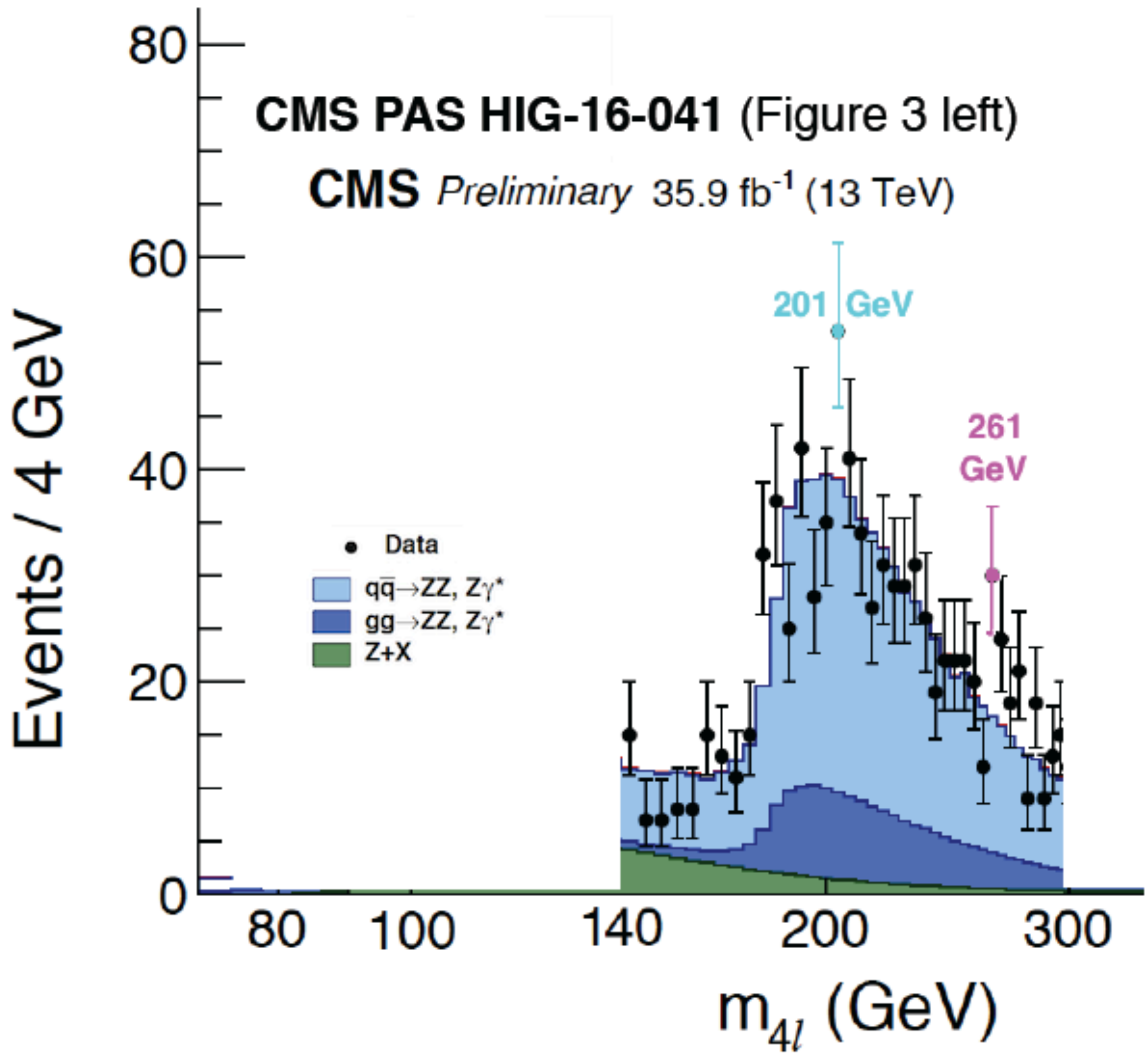
240 GeV is close enough to 250 GeV that the ATLAS 3.6 sigma peak should not be suppressed by LEE.

Background and Histograms:

CMS in CMS PAS HIG-16-041 dated 13 April 2017 released their histogram of 35.9 fb-1 of LHC data for the 13 TeV run (2015-2016) using a background from which two Higgs candidate peaks, one at 201 GeV and one at 261 GeV, clearly stand out.

The CMS background differs significantly from the ATLAS background.

The CMS histogram has also been truncated to the 140 - 300 GeV range that is relevant for evaluating the E8-Cl(16) physics model of viXra 1602.0319 with respect to its Higgs Mass States around 200 and 250 GeV.



201 and 261 GeV are close enough to 200 and 250 GeV that the two CMS peaks should not be suppressed by LEE.

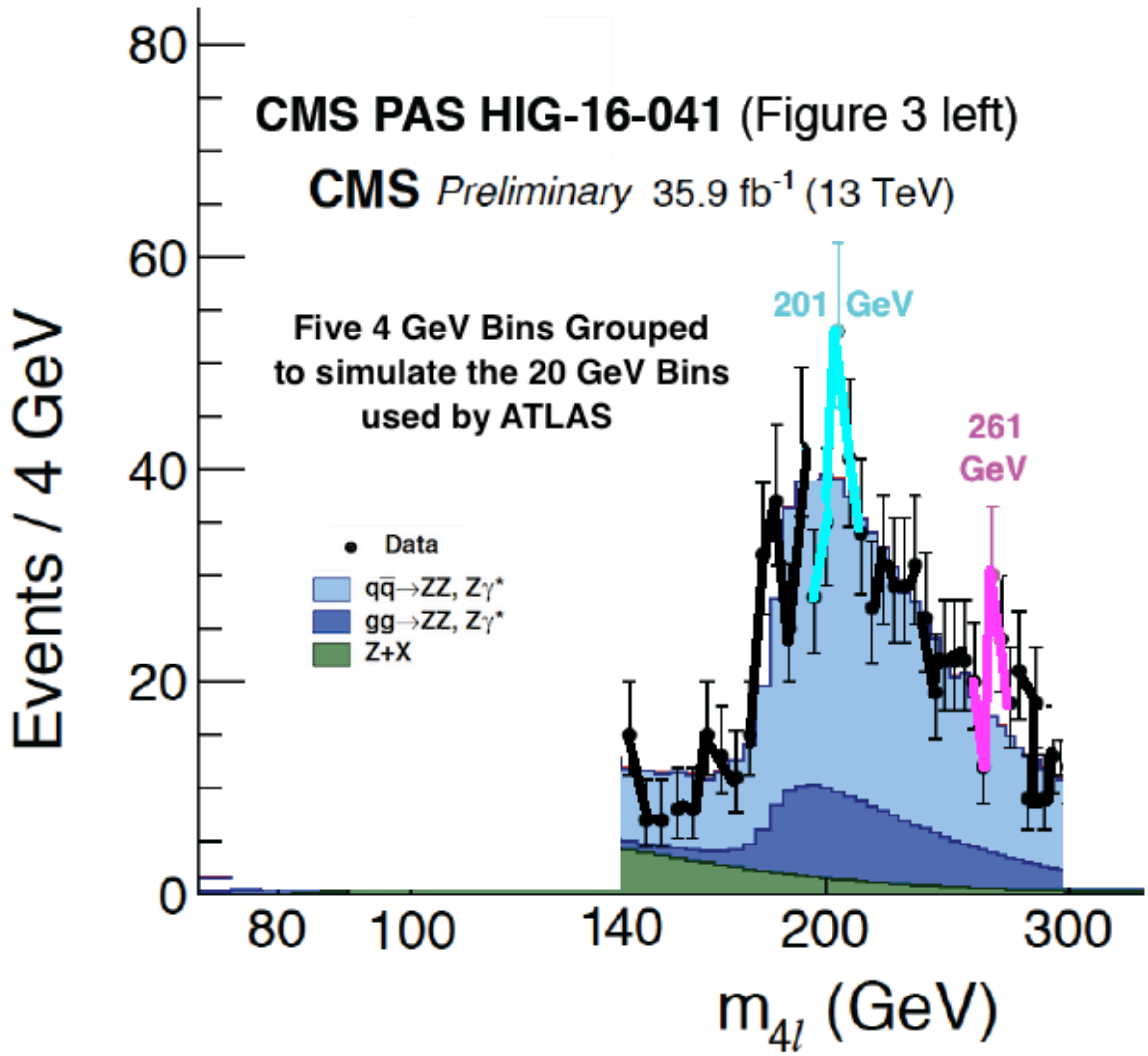
Also,

the CMS 261 GeV and the ATLAS 240 GeV are both close enough to the E8-Cl(16) model prediction of 250 GeV that they both are confirmation of its NJL sector.

The CMS histogram uses bins that are 4 GeV wide
while ATLAS uses bins that are 20 GeV wide

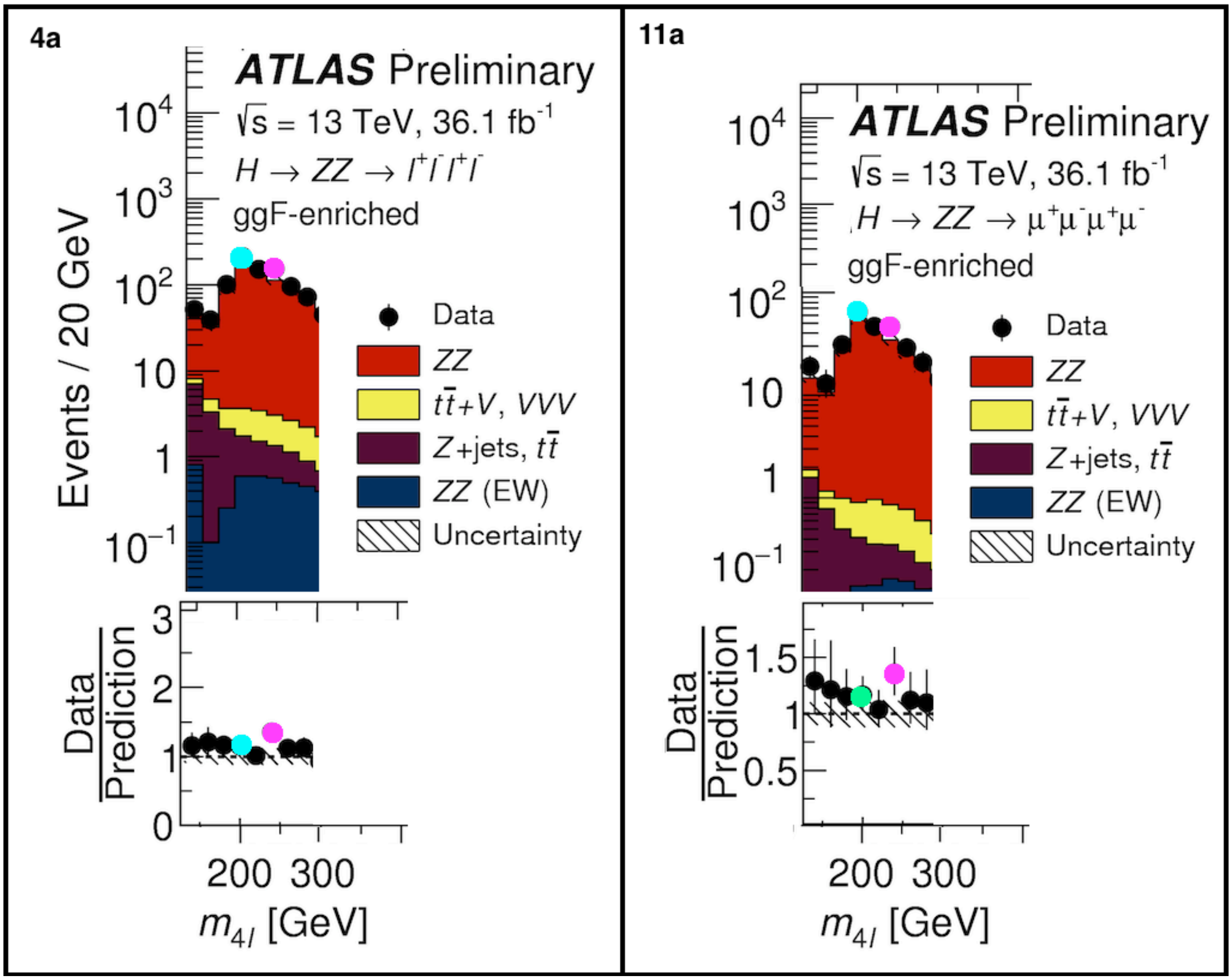
so

to facilitate comparison between the histograms,
here is an image of the CMS histogram with 5 adjacent 4 GeV bins grouped together to simulate the 20 GeV bins uses by ATLAS:



ATLAS-CONF-2017-058 has 4 histograms that cover the 140 - 300 GeV range for testing the E8-Cl(16) model in the Higgs -> ZZ* -> 4l channel -

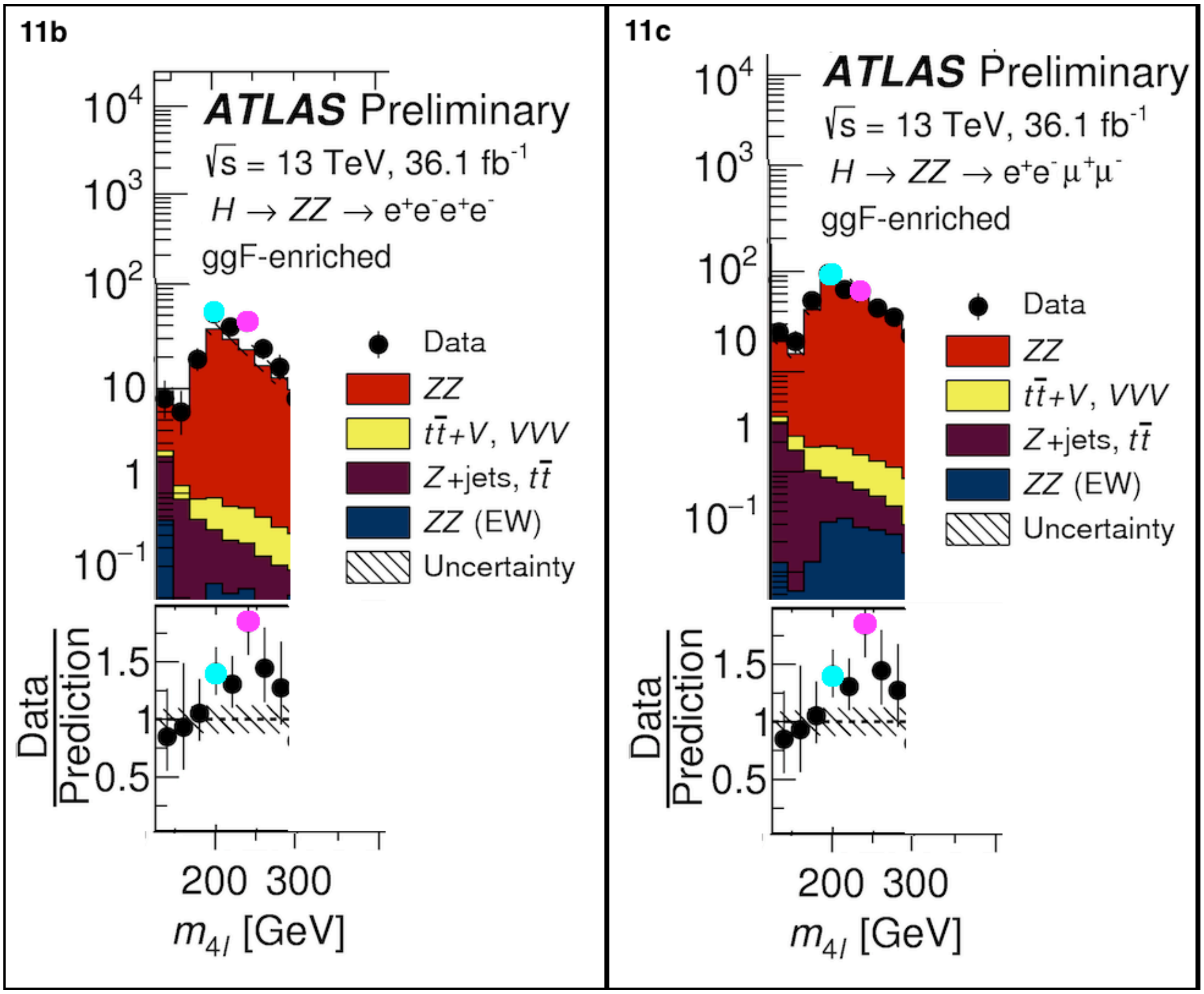
Figures 4a (4+/- muons, 4+/- electrons, 2+/- of each)
11a (4+/- muons) 11b (4+/- electrons) 11c (2+/- of each)



It is clear from the ATLAS-CONF-2017-058 histograms of Figures 4a and 11a that the ZZ background is set so that the 200 GeV bin is the peak of ZZ background which results in no excess in the 200 GeV bin.

That is not consistent with the background used by CMS in CMS PAS HIG-16-041.

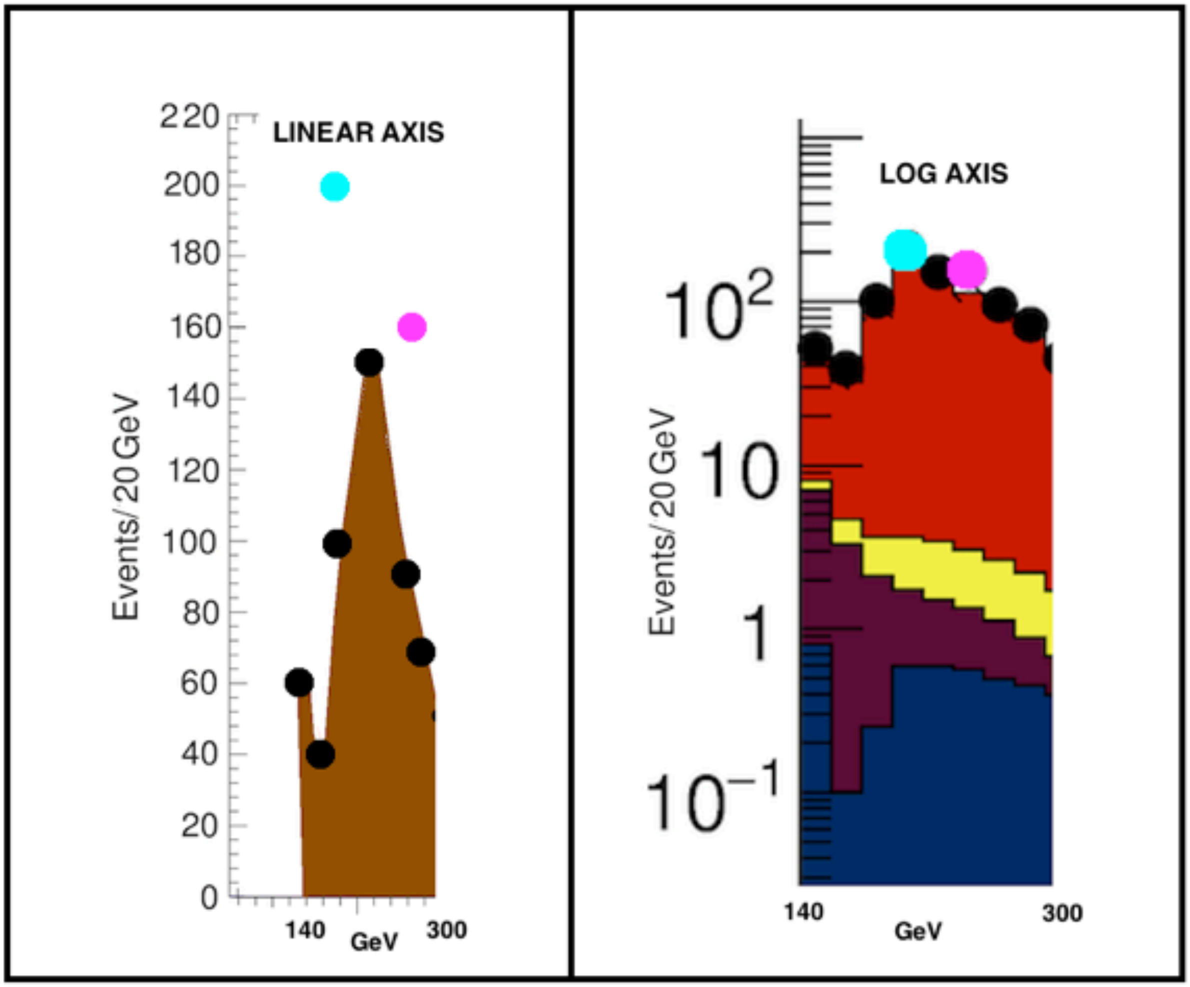
If ATLAS had used backgrounds of CMS PAS HIG-16-041 then **excesses** would have appeared i**n both the 200 GeV bin and the 240 GeV bin which would be consistent with my E8-Cl(16) Physics Model with NJL Higgs-Tquark sector**.



In fact, excesses do appear in both the 200 GeV and 240 GeV bins in Figures 11b and 11c. As to the 4e channel of Figure 11b, ATLAS-CONF-2017-058 says “The excess at 240 GeV is observed mostly in the 4e channel ...”.

Further, the 4 histograms of ATLAS-CONF-2017-058 use a log axis for Events / 20 GeV.

If a linear axis for Events / 20 GeV had been used, along with background similar to that of CMS PAS HIG-16-041, then ATLAS Figure 4a (right side of the following figure) would have looked something like the left side of the following figure:



It is obvious that the use of the log axis significantly obscures the excesses of the 200 and 240 GeV bins.

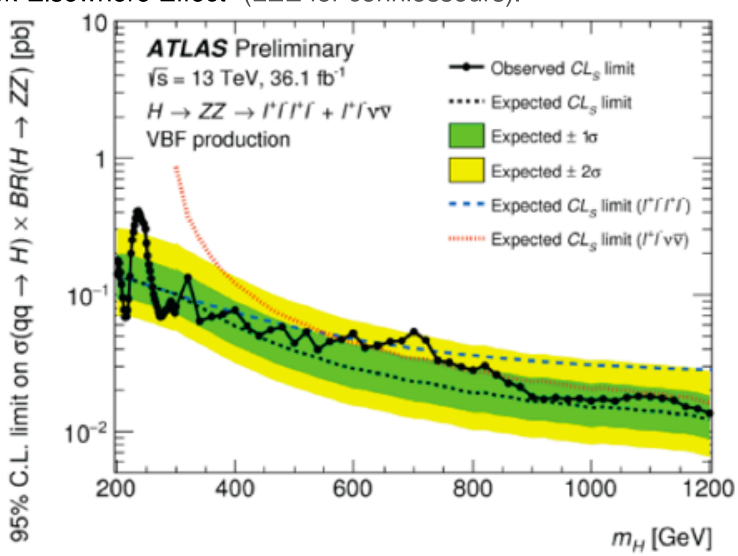
On 27 July 2017 Tommaso Dorigo posted this on his blog:

"... An ATLAS 240 GeV Higgs-Like Fluctuation Meets Predictions From Independent Researcher

A new **analysis by the ATLAS** collaboration, based of the data collected **in 13 TeV proton-proton collisions delivered by the LHC in 2016**, finds

an excess of X-->4 lepton events at a mass of 240 GeV, with a local significance of 3.6 standard deviations.

The search, which targeted objects of similar phenomenology to the 125 GeV Higgs boson discovered in 2012, is published in ATLAS CONF-2017-058.
Besides the 240 GeV excess,
another one at 700 GeV is found, with the same statistical significance.
3.6 standard deviations correspond to a "one-in-six-thousand" chance to observe data at least as discrepant with the background model as what is observed, if they do come from background only.
So it is something interesting, as one may entertain the hypothesis that the data do contain some extra signal in it, causing the observation. However, in general such fluctuations are common in collider data.
Physicists have learnt to "derate" the computed significances of bumps appearing in new particle searches - equivalently, to increase the estimate of the probability (p-value) of seeing the data if coming from background-only fluctuations - by considering the number of independent places where a bump was sought for in the first place. The p-value-enhancing factor is commonly called "trials factor" and the effect addressed to as "Look-Elsewhere Effect" (LEE for conniosseurs).



Above: as a function of the reconstructed mass of the hypothetical particle decaying into four leptons, ATLAS plots the upper limit on the particle's production rate. The green+yellow band shows the range of values that the expected limit should take in the absence of any new particle, with green meaning "the central 68% quantiles" and yellow meaning "the central 95% quantiles". Whatever is above the curve is a significant-ish excess. The black points show the observed limit, which has a upward spike at 240 GeV due to the presence of an excess of events with that mass.

The two bumplets found by ATLAS have a "trial-factor-corrected" significance of just over 2 standard deviations (a few-in-hundred chance), so they appear insignificant. However, in case you have **a model which predicts in advance the mass at which the particle signal should be found, the local significance (3.6 sigma in this case) should be the one to look at**. And 3.6 sigma is a quite serious business: the number is called "strong evidence" by ATLAS itself when it refers to H->bb decays neatly evidenced in the same dataset through a careful new analysis (one which I have not had an occasion to talk about here, unfortunately).

Incidentally, 3.6 sigma are also about the significance of the 750 GeV X->gamma gamma bump found by ATLAS 2 years ago - you know, the one that caused 600 theoretical papers to flood the Cornell Arxiv in the matter of a few months. So you see: 3.6 sigmas can both be the first hint of a real signal -
the 125 GeV H->bb one nobody doubts about - or a fluctuation that should not be taken too seriously and which is destined to die away, as the 750 GeV fairy.
Today, the 240 GeV ATLAS signal looks intriguing, for a couple of reasons.
One is that an independent researcher, who has a past involvement in experimental physics research but is now doing totally different things, has predicted such a particle in a toy model he put together several years ago. The guy is Tony Smith (Frank D. Smith his registered name), a long-time follower of this blog. His toy model is described in a vixra paper he wrote in February last year.
(see http://vixra.org/abs/1602.0319 and http://vixra.org/abs/1610.0318)
The other is that Tony himself points out that CMS also seems to have been seeing slight excesses more or less where he predicted them, in their 4-lepton mass distribution. Being a CMS member, I will not comment on that statement, as CMS has not issued any on the matter. Whether the 240 GeV Higgs will join the 750 GeV one in the trash bin or whether instead it will grow to become an astounding new find, confirming Tony's model, is a topic on which I accept bets. Not from Tony himself though, as I won two with him already and I don't want to look like I exploit his perseverance in pursuit of exotic new physics signals - he is sort of a friend now.
But if you believe this will become the next big LHC discovery,
and are willing to bet $500 on it, drop me a line!

COMMENTS
...
Well, I hope some real theorist who can write real arxiv papers picks it up as a possible divertissement - Tony has tried to publish in the arxiv but as far as I remember he is sort of banned there.
Cheers,
T.
Tommaso Dorigo | 07/28/17 | 1:42 PM ...".

Thanks to ATLAS for explicitly stating in ATLAS-CONF-2017-058 the existence of a possible Higgs Mass State around 240 GeV at 3.6 sigma local significance.

If ATLAS had ignored that possible peak,
then LHC analysis of 2017 and future runs in the Higgs -> ZZ* -> 4l channel
might have ignored possible peaks around 200 and 250 GeV,
and the **Individual's Nambu-Jona-Lasinio 3-State HIggs-Tquark System**
might have been Effectively Suppressed
and the Simple Consensus View
of a single Higgs state at 125 GeV might have prevailed,
just as the Simple Consensus View of a single Tquark state at 174 GeV
prevailed at Fermilab, by ignoring any Tquark data at 130 and 220 GeV.

ATLAS's honest public statement of Higgs -> ZZ* -> 4l observations at LHC
gives me hope that there might be full and complete discussion and analysis
not only of the NJL Sector of my E8-Cl(16) Physics model
but also its Dark Energy : Dark Matter : Ordinary Matter Sector
and its Calculation Sector (force strengths, paticle masses, etc)
and its AQFT Sector.

Third Case:

Dark Energy and Dark Matter
Consensus = Unknown   Individual = 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:

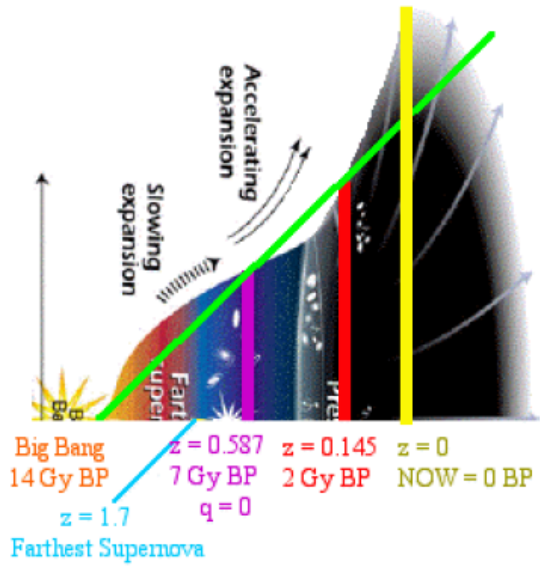
- DE is the NORMAL state of stuff in our universe (it is now, according to WMAP, about 73% of it). It looks more like deSitter spacetime than Minkowski spacetime. In Segal's model and as Aldrovandi and Peireira show in some mathematical detail in their paper at gr-qc/9809061 the DE spacetime structure 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%.