Moriond 2012 Theory Proposal: 3-mass-state SM Higgs preserves consistency up to Planck Scale

by Frank Dodd (Tony) Smith Jr.

Abstract:

CERN's analysis of 5/fb of data collected by the LHC by Halloween 2011 will be discussed at the Moriond 2012 Theory Conference in March 2012.

A Standard Model Higgs with 3 Mass States at 145, 180-200, and 240 GeV will stabilize the Standard Model up to the Planck Scale and is consistent with the gamma-gamma and ZZ-4l data from the LHC.

This paper is a proposal that the 3-mass-state SM Higgs should be discussed at the Moriond 2012 Theory Conference.

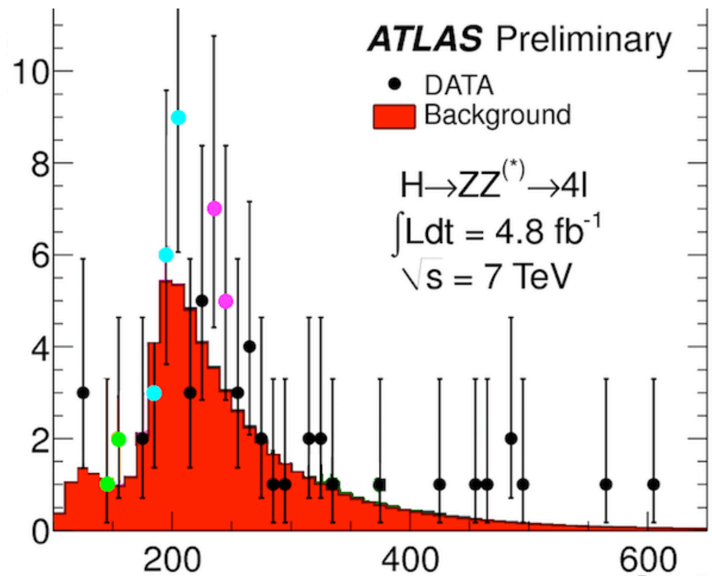
(References are included in the body of the paper and in linked material.)

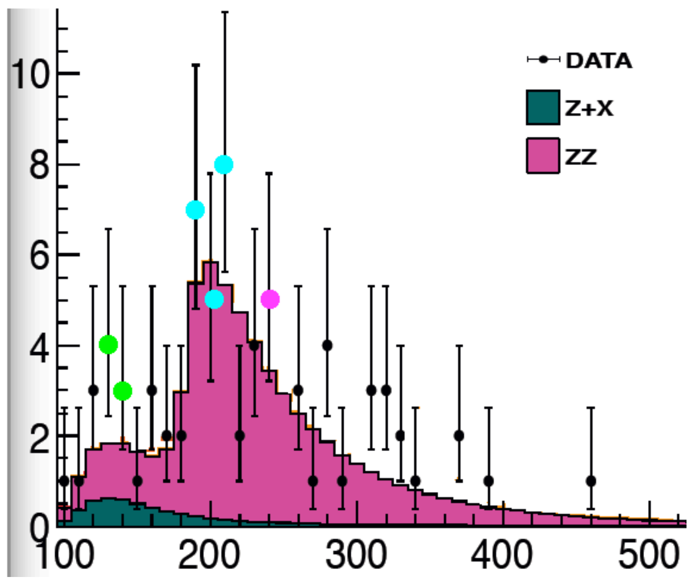
Moriond 2012 Theory Proposal:

3-mass-state SM Higgs preserves consistency up to Planck scale

Frank Dodd (Tony) Smith, Jr. - 2011

In light of the fact that a single SM Higgs at 126 GeV may not be consistent
with Standard Model stability up to the Planck scale,
this paper is a proposal for discussion at Moriond 2012
of a simple extension of the Standard Model
with 3 mass states for the Higgs (and the total cross section being
the Standard Model cross section, divided among those 3 mass states)
that seems to be consistent with the LHC data for the ZZ to 4l channel
and seems to show a Higgs mass state around 145 GeV
which would stabilize the Standard Model up to the Planck scale.

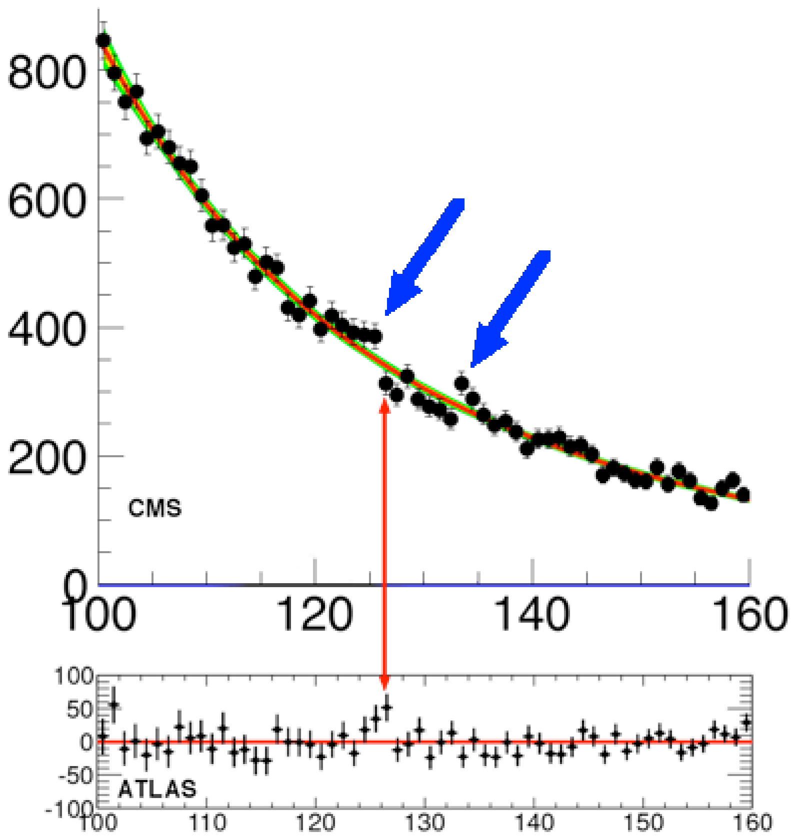




The green data points are interpreted as Higgs mass state around 145 GeV
and the cyan data points are interpreted as Higgs mass state around 180-200 GeV
and the magenta data pointe are interpreted as Higgs mas state around 240 GeV.

It seems that CMS sees clearly a 145 GeV Higgs state
and
that both ATLAS and CMS see clearly a 180-200 GeV Higgs state
(the 180-200 GeV Higgs state was predicted by Yamawaki (at Nagoya) et al in arXiv 0311165)
and
that ATLAS sees clearly a 240 GeV Higgs state.

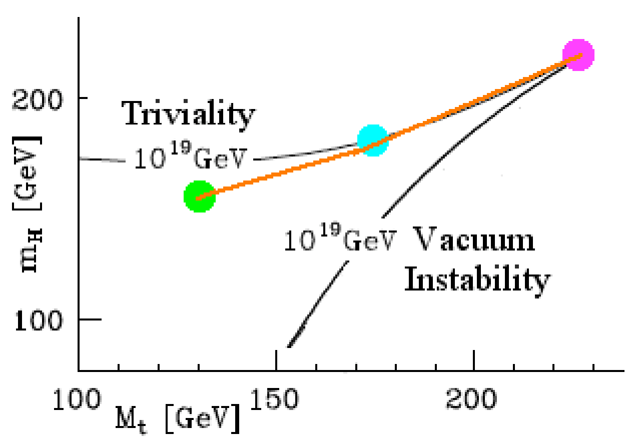
Also, the two apparent peaks (blue arrows) in the CMS diphoton histogram



could be interpreted as:
T0 meson (Tquark and Up antiquark) with low-mass-state Tquark
and
T0c meson (Tquark and Charm antiquark) with low-mass-state Tquark

With the Tquark lifetime being extended due to its being involved in the meson state (somewhat like a heavy version of the neutral spin-0 pion).

A low-mass-state Tquark mass on the order of 130 GeV is roughly consistent with the two CMS diphoton peaks. The 3 states of the Higgs-Tquark system are:



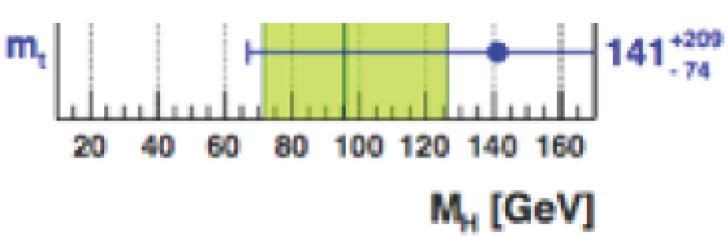
The Magenta Dot
is the high-mass state of a 220 GeV Tauark and a 240 GeV Higgs.
It is at the critical point of the Higgs-Tquark System
with respect to Vacuum Instability and Triviality.
It corresponds to the description in hep-ph/9603293 by Koichi Yamawaki
of the Bardeen-Hill-Lindner model.
That high-mass Higgs is in the 210-260 GeV range
of the Higgs Vacuum Instability Boundary
which range includes the Higgs VEV.

The Gold Line leading down from the Critical Point goes roughly along
the Triviality Boundary line based on Renormalization Group calculations
described by Koichi Yamawaki in hep-ph/9603293 .

The Cyan Dot where the Gold Line leaves the Triviality Boundary
to go into our Ordinary Phase
is the middle-mass state of a 174 GeV Tquark and a 180 GeV Higgs.
It corresponds to the Higgs mass calculated by Hashimoto, Tanabashi,
and Yamawaki in hep-ph/0311165 where they show that
for 8-dimensional Kaluza-Klein spacetime
with the Higgs as a Tquark condensate
172 < MT < 175 GeV and 178 < MH < 188 GeV.
That mid-mass Higgs is in the 160-210 GeV range of the Higgs Triviality Boundary.
The physical meaning of the Triviality Bound is described by Pierre Ramond
in his book Journeys Beyond the Standard Model (Perseus Books 1999)
where he says at pages 175-176:
“... for a ... (large) Higgs mass, we expect the standard model
to enter a strong coupling regime ... losing ... our ability to calculate
... it is natural to think ... that the Higgs actually is a composite ...
The resulting bound ... is sometimes called the triviality bound.
The reason for this unfortunate name (the theory is anything but trivial)
stems from lattice studies where the coupling is assumed to be finite everywhere;
in that case the coupling is driven to zero, yielding in fact a trivial theory.
In the standard model ... the coupling ... is certainly not zero. ...”.

The Green Dot where the Gold Line terminates in our Ordinary Phase
is the low-mass state of a 130 GeV Tquark and a 145 GeV Higgs.
Its location is determined by calculation of the basic Tquark Mass in
an E8 physics model with mass calculations motivated by the techniques
used by Armand Wyler based on mathematics of Hua Luogeng.
The 145 GeV Higgs also comes from such calculations,
and is the Higgs state that is necessary for agreement with arXiv 0960.0954
by Ellis, Espinosa, Giudice, Hoecker and Riotto
who require a Higgs with 135 < MH < 158 GeV in order that
“... the Standard Model may survive all the way to the Planck scale ...".

Since in the 3-state system the Tquark mass is not fixed
Gfitter shows that the ElectroWeak data has a best
fit Higgs mass at 141 GeV (+209 -74)
A chart for best fit with mt omitted shows:



Since the Moriond 2012 Theory Conference is by invitation only,
and since I am not invited,
I wrote this proposal for discussion in the hope that somebody
who is invited might discuss the subject matter at the Conference.
Actually, that would be better than if I had been invited,
because the discussion would then be solely about the physics
and not distracted by my personal issues (which are many and controversial).