The Experimental Facts, the 115 GeV Higgs and the "GUTs" of SUSY

A. Dedes, R. Dermisek and S. Raby

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Physikalisches Institut der Universitat Bonn,Nussallee 12, D-53115 Bonn, Germany

Abstract

We prove that a possible 115 GeV Higgs mass is a prediction of the Supersymmetric SO(10) Model (???).

1 Experimental Facts

E1: An excess of 3σ beyond the background expectation is found by L3 and ALEPH, (mainly in the four-jet channel) consistent with the production of the Higgs boson with a mass around 115 GeV.

E2: The bottom pole mass is 4.9 ± 0.2 GeV.

E3: The top pole mass is known : 175 ± 5 GeV .

E4: The strong QCD coupling is now well measured : $\alpha_s(M_Z) = 0.118 \pm 0.002$.

E5: The proton decays (if decays at all) rather rarely! : $\tau(p \to K\nu) \geq 10^{33}$ yr.

E6: Evidence for $b \to s\gamma = 3.15(\pm 0.5) \times 10^{-4}$.

E7: No Evidence of electron or neutron Electric dipole moments.

E8: No evidence for SUSY flavour changing neutral currents.

E9: No evidence for supersymmetric particle(s).

E10: Perfect agreement of the SM with the EW precision observables.

E11: Evidence for neutrino masses.

2 Theoretical facts

T1: GUTs : SO(10) aestheticaly the nicest scenario.

T2: SUSY predicts a light Higgs boson.

T3: The EW symmetry is broken radiatively.

3 Question

- T1+T3 $\rightarrow$ $\tan\beta \simeq 50 \div 55$
- E6+E2+E4+T1 $\rightarrow$ $m_0^2 >> \mu m_{\tilde{g}},\ \mu A_t$
- E5+T1 $\rightarrow$ $m_{1/2} << m_0$
- E7+E8+E9+T1 $\rightarrow$ $m_0, m_{1/2} >>$
- E11+T1 $\rightarrow$ consistent
- E3+T1+T3 $\rightarrow$ consistent
- E4+E10 $\rightarrow$ $m_0, m_{1/2} >>$

  After all these constraints, *does T1+T2+T3 predict E1 ????*