Higgs-mass predictions

Thomas Schücker

Abstract

A compilation of Higgs-mass predictions is proposed.

PCAC-06: 14.80.Bn Standard-model Higgs boson

0708.3344

1 Unité Mixte de Recherche (UMR 6207) du CNRS et des Universités Aix–Marseille 1 et 2 et Sud Toulon–Var, Laboratoire affilié à la FRUMAM (FR 2291)
2 also at Université Aix–Marseille 1, thomas.schucker@gmail.com
1 Introduction

Many physicists hope that the electro-weak Higgs scalar will be observed soon at the LHC. The literature contains a plethora of predictions or upper limits of the Higgs mass based on many different ideas, models and calculational techniques. Privileged among them is the value $m_H = 150 \pm 36$ GeV currently given by the LEP Electroweak Working Group, because it only relies on precision electro-weak data, non-observation of the Higgs today and the minimal hypothesis that the standard model is correct as it stands.

A compilation of all other predictions is attempted here. Some models make additional predictions or postdictions, that are indicated. The point in time separating pre- and postdiction is taken as the time of publication of the model. In this task it is unavoidable to miss references and I acknowledge the feedback to the successive versions from colleagues.

The predictions are organised in increasing order of the central value of the predicted mass interval. In a second section the upper limits are presented in increasing order as well. A third section contains two lower limits. Older predictions and limits incompatible with today’s experimental lower limit of 114 GeV are not recorded here. As another example not covered I should mention the supersymmetric model by Dermíšek & Gunion (2005) with a Higgs mass of 100 GeV. Because of exotic decay channels this model is still compatible with LEP data. Also not recorded are predictions that come with postdictions contradicting present experimental numbers.

The references are in alphabetical order of the first author’s last name with first name and date as secondary criteria.

2 Predictions

- $m_H = 109 \pm 12$ GeV
  Authors: O. Buchmüller et al. (2007)
  Idea: constrained minimal supersymmetric standard model combined with electro-weak precision data, flavor physics and abundance of cold dark matter
  Techniques: multi-parameter fit, renormalisation group equation. The top mass is taken to be $m_t = 170.9 \pm 1.8$ GeV.
  Other predictions: many supersymmetric particles

- $m_H = 115.3 \pm 0.1$ GeV
  Author: Schücking (2007)
  Idea: interpretation of the $SU(2) \times U(1)$ group of the electro-weak forces as symmetry group of the Eguchi-Hanson metric
  Techniques: differential geometry and quaternions

- $m_H = 115.4 \pm 0.9$ GeV
  Author: Popovic (2010)
  Idea: top quark as bound state of 3 prequarks, Higgs of 2 prequarks
  Techniques: arithmetic

- $m_H = 115.9 \pm 2$ GeV
**Authors:** Cassel & Ghilencea (2011)

**Idea:** supersymmetry

**Techniques:** constrained minimal supersymmetric extension of the standard model plus consistency of the lightest supersymmetric particle as dark matter with the WMAP data

**Other predictions:** many supersymmetric particles

- \( m_H = 117 \pm 4 \text{ GeV} \)

**Authors:** Gogoladze, Okada & Shafi (2007)

**Idea:** Higgs boson as zero mode of gauge boson along a fifth compactified dimension

**Techniques:** a boundary condition on the Higgs self-coupling at compactification scale \( \Lambda \) and renormalisation group flow up to energies of \( \Lambda \sim 10^8 \text{ GeV} \)

- \( m_H = 117 \pm 12 \text{ GeV} \)

**Authors:** Kane, Kumar, Lu & Zheng (2011)

**Idea:** compactified string/M theories

**Techniques:** minimal supersymmetric extension of the standard model

**Other predictions:** many supersymmetric particles

- \( m_H = 118 \)

**Authors:** Arbuzov, Barbashov, Pervushin, Shuvalov & Zakharov (2008)

**Idea:** Three peaks of the cosmic microwave background are explained by the decay of primordial Higgs-, W- and Z-bosons into photons.

**Techniques:** conformal cosmology

**Other prediction:** \( m_H = 216 \)

- \( m_H = 120 \pm 6 \text{ GeV} \)

**Authors:** Ellis, Nanopoulos, Olive & Santoso (2005)

**Idea:** supersymmetry

**Techniques:** minimal supersymmetric extension of the standard model with universal soft supersymmetry-breaking masses

**Other predictions:** many supersymmetric particles

- \( m_H = 121 \pm 6 \text{ GeV} \)

**Authors:** Feldstein, Hall & Watari (2006)

**Idea:** superstring inspired landscape of vacua and some probability density for the parameters of the Higgs potential

**Techniques:** renormalisation group flow up to energies of \( \Lambda \sim 10^{19} \text{ GeV} \)

**Postdiction:** \( m_t = 176 \pm 2 \text{ GeV} \)

- \( m_H = 121.25 \pm 2.25 \text{ GeV} \)

**Authors:** Li, Maxin, Nanopoulos & Walker (2011)

**Idea:** supersymmetry

**Techniques:** F-theory no scale supergravity and \( SU(5) \)

**Other predictions:** many supersymmetric particles

- \( m_H = 121.8 \pm 11 \text{ GeV} \)

**Authors:** Froggatt & Nielsen (1995)

**Idea:** two approximately degenerate vacua, one in which we live, the other of Planck
energy

Techniques: renormalisation group equations

Postdiction: \( m_t = 173 \pm 4 \text{ GeV} \)

- \( m_H = 122 \pm 10 \text{ GeV} \)

Authors: Djouadi, Heinemeyer, Mondragon & Zoupanos (2004)

Idea: a supersymmetric version of \( SU(5) \)

Techniques: renormalisation group flow up to energies of \( \Lambda \sim 10^{16} \text{ GeV} \)

Other predictions: many supersymmetric particles

Postdictions:
- \( m_t = 174 - 183 \text{ GeV} \)
- \( m_H = 122 \pm 10 \text{ GeV} \)

Author: Bogan (2009)

Idea: simple relations between cosmological constant, GUT scale and masses of the electron, inflaton, and Higgs

Techniques: geometric mean

- \( m_H = 123 \text{ GeV} \)

Author: Stech (2010)

Idea: \( SO(10) \) or \( E_6 \) grand unification plus a \( SO(3) \) flavour symmetry

Techniques: group representations

- \( m_H = 123.5 \pm 5.5 \text{ GeV} \)

Authors: Heinemeyer, M. Mondragon & G. Zoupanos (2007)

Idea: a supersymmetric Grand Unified Theory that can be made all-loop finite

Techniques: renormalisation group flow with \( m_t = 170.9 \text{ GeV} \)

Other predictions: supersymmetric particles

- \( m_H = 124 \pm 21 \text{ GeV} \)

Authors: Barger, Deshpande, Jiang, Langacker & Li (2007)

Idea: supersymmetry broken at \( 10^5 - 10^{16} \text{ GeV} \) and gauge coupling unification at \( \Lambda \sim 10^{16} - 10^{17} \text{ GeV} \)

Techniques: renormalisation group flow up to energies of \( \Lambda \)

Other predictions: new vectorlike fermions with masses in the 200 - 1000 GeV range

- \( m_H = 124 \pm 10 \text{ GeV} \)

Authors: Arbuzov, Glinka, Lednicky & Pervushin (2007), version 6

Idea: condensates, conformal cosmology

Techniques: Coleman-Weinberg potential

Other predictions: \( m_H = 275 \pm 25 \text{ GeV} \), version 1

- \( m_H = 124.2 \pm 13.2 \text{ GeV} \)

Authors: Codoban, Jurcisin & Kazakov (1999)

Idea: supersymmetry

Techniques: minimal supersymmetric extension of the standard model with non-universal soft supersymmetry-breaking masses

Other predictions: many supersymmetric particles
• $m_H = 125 \pm 5 \text{ GeV}$

**Authors:** Kahana & Kahana (1993)

**Idea:** dynamical symmetry breaking and the Higgs as a deeply bound state of two top quarks

**Techniques:** Nambu Jona-Lasinio theory

**Other predictions:** $m_t = 175 \pm 5 \text{ GeV}$. Note that the top was discovered in 1995.

• $m_H = 125 \pm 4 \text{ GeV}$

**Authors:** Gogoladze, Okada & Shafi (2007)

**Idea:** Higgs boson as zero mode of gauge boson along a fifth compactified dimension

**Techniques:** a boundary condition on the Higgs self-coupling at compactification scale $\Lambda$ and renormalisation group flow up to energies of $\Lambda \sim 10^{13} - 10^{14} \text{ GeV}$.

• $m_H = 126.3 \pm 2.2 \text{ GeV}$

**Authors:** Shaposhnikov & C. Wetterich (2009)

**Idea:** Assume that gravity is asymptotically safe, that there are no intermediate energy scales between the Fermi and Planck scales, that the gravity induced anomalous dimension of the Higgs self-coupling is positive.

**Techniques:** renormalisation group flow with $m_t = 171.2 \text{ GeV}$

• $m_H = 127.5 \pm 7.5 \text{ GeV}$

**Authors:** Chankowski, Falkowski, Pokorski & Wagner (2004)

**Idea:** supersymmetry and the Higgs as a pseudo-Goldstone boson of some extra global symmetry

**Techniques:** smaller fine-tuning than in the minimal supersymmetric extension of the standard model. The computation of the Higgs mass depends on the top mass taken to be $m_t = 178 \pm 4.3 \text{ GeV}$.

**Other predictions:** many supersymmetric particles and an additional $Z$-boson with a mass of 3 TeV

• $m_H = 129.6 \text{ GeV}$

**Authors:** X. Calmet & H. Fritzsch (2001)

**Idea:** confining $SU(2)$ and a ‘complementarity principle’

**Techniques:** 1-loop corrections

• $m_H = 130 \pm 6 \text{ GeV}$

**Authors:** Dae Sung Hwang, Chang-Yeong Lee & Ne’eman (1996)

**Idea:** embedding of the electro-weak Lie algebra $su(2) \oplus u(1)$ in the superalgebra $su(2|1)$

**Techniques:** renormalisation group flow

**Postdictions:** $\sin^2 \theta_w = 0.229 \pm 0.005$

• $m_H = 130 \pm 10 \text{ GeV}$

**Authors:** Nakayama & F. Takahashi (2011)

**Idea:** Identify the Higgs with the inflaton and use correlation between Higgs mass and a spectral index of density perturbations of 0.95 – 0.96.

**Techniques:** PeV scale supersymmetry breaking

**Other predictions:** many supersymmetric particles
• $m_H = 131 \pm 10$ GeV  
  **Authors:** Gogoladze, Li, Senoguz & Shafi (2006)  
  **Idea:** 7 dimensional orbifold with $SU(7)$ grand unification and split supersymmetry  
  **Techniques:** a boundary condition on the Higgs self-coupling at unification scale $\Lambda$ and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV  
  **Other predictions:** $m_H = 146 \pm 8$ GeV

• $m_H = 134 \pm 9$ GeV  
  **Authors:** Ni, Lou, Lu & Yang (1998)  
  **Idea:** a Gaussian effective potential  
  **Techniques:** renormalisation group flow up to energies of $\Lambda \sim 10^{15}$ GeV

• $m_H = 135 \pm 6$ GeV  
  **Authors:** Gogoladze, Li & Shafi (2006)  
  **Idea:** 7 dimensional $N = 1$ supersymmetric orbifold with $SU(7)$ grand unification  
  **Techniques:** a boundary condition on the Higgs self-coupling at unification scale $\Lambda$ and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV  
  **Other predictions:** $m_H = 144 \pm 4$ GeV

• $m_H = 135 \pm 15$ GeV  
  **Authors:** Arkani-Hamed & Dimopoulos (2004)  
  **Idea:** split supersymmetry  
  **Techniques:** fine tuning and renormalisation group flow up to energies of $10^{16}$ GeV

• $m_H = 137 \pm 23$ GeV  
  **Authors:** Medina, Shah & Wagner (2007)  
  **Idea:** a warped fifth dimension and an extension of the electro-weak gauge symmetry to $SO(5) \times U(1)$ in the bulk, broken at the boundaries  
  **Techniques:** Coleman-Weinberg potential

• $m_H = 140 \pm 10$ GeV  
  **Authors:** Babu, Gogoladze, Rehman & Shafi (2008)  
  **Idea:** minimal supersymmetric extension of the standard model plus complete vectorlike multiplets of grand unified groups  
  **Techniques:** some fine tuning and renormalisation group flow up to energies of $10^{16}$ GeV. The top mass is taken to be $m_t = 172.6 \pm 1.4$ GeV.  
  **Other predictions:** many supersymmetric particles

• $m_H = 141 \pm 2$ GeV  
  **Authors:** Hall & Y. Nomura (2009)  
  **Idea:** minimal supersymmetric extension of the standard model plus supersymmetry breaking at very high scale, motivated from a multiverse  
  **Techniques:** huge fine tuning and 2-loop corrections with a top mass of 173.1 GeV  
  **Other predictions:** no supersymmetric particles

• $m_H = 143 \pm 37$ GeV  
  **Authors:** Cabibbo, Maiani, Parisi & Petronzio (1979)  
  **Idea:** the big desert: no new particles besides the Higgs and validity of perturbative
quantum field theory up to the Planck scale

**Techniques:** renormalisation group flow up to energies of $10^{19}$ GeV. The computation of the Higgs mass depends on the top mass taken here to be $m_t = 171.5 \pm 2$ GeV.

- $m_H = 143.2 \pm 28.8$ GeV
  **Authors:** Gogoladze, Okada & Shafi (2007b)
  **Idea:** 2 extra dimensions compactified on an orbifold
  **Techniques:** a boundary condition on the Higgs self-coupling at compactification scale $\Lambda$ and renormalisation group flow up to energies of $\Lambda \sim 10^{19}$ GeV.

- $m_H = 143.4 \pm 1.3$ GeV
  **Author:** Popovic (2010)
  **Idea:** radiatively generated Higgs mass
  **Techniques:** cancellation of certain leading divergences

- $m_H = 144 \pm 4$ GeV
  **Authors:** Gogoladze, Li & Shafi (2006)
  **Idea:** 7 dimensional $N=1$ supersymmetric orbifold with $SU(7)$ grand unification
  **Techniques:** a boundary condition on the Higgs self-coupling at unification scale $\Lambda$ and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV.

**Other predictions:** $m_H = 135 \pm 6$ GeV

- $m_H = 145 \pm 7$ GeV
  **Author:** Liu (2005)
  **Idea:** supersymmetry broken at $10^{11}$ GeV and a $\mathbb{Z}_3$ symmetry among generations
  **Techniques:** radiative corrections

- $m_H = 146 \pm 8$ GeV
  **Authors:** Gogoladze, Li, Senoguz & Shafi (2006)
  **Idea:** 7 dimensional orbifold with $SU(7)$ grand unification and split supersymmetry
  **Techniques:** a boundary condition on the Higgs self-coupling at unification scale $\Lambda$ and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV.

**Other predictions:** $m_H = 131 \pm 10$ GeV

- $m_H = 146 \pm 19$ GeV
  **Authors:** Barger, Jiang, Langacker & Li (2005)
  **Idea:** supersymmetry broken at high scale and gauge coupling unification at $\Lambda \sim 10^{16} - 10^{17}$ GeV
  **Techniques:** renormalisation group flow up to energies of $\Lambda$

- $m_H = 148.1 \pm 10.7$ GeV
  **Author:** Popa (2009)
  **Idea:** Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.
  **Techniques:** effective action with $m_t = 171.3$ GeV and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

- $m_H = 150 \pm 36$ GeV
  **Authors:** The LEP Electroweak Working Group
Idea: non-observation of the Higgs and quantum corrections by Higgs loops to precision electro-weak data
Techniques: experiment and quantum field theory

- $m_H = 150 \pm 10$ GeV
Authors: Barger, Chiang, Jiang & Li (2004)

Idea: supersymmetry broken at $10^{11}$ GeV and Peccei-Quinn symmetry
Techniques: radiative corrections

- $m_H = 150 \pm 20$ GeV
Authors: Arvanitaki, Davis, Graham & Wacker (2004)

Idea: split supersymmetry
Techniques: fine tuning and renormalisation group flow up to energies of $10^{16}$ GeV

- $m_H = 150 \pm 50$ GeV
Authors: Bai, Fan & Han (2007)

Idea: supersymmetry and a long-lived metastable supersymmetry breaking vacuum
Techniques: little Higgs mechanism, 1-loop corrections
Other predictions: many supersymmetric particles plus new gauge bosons and electro-weak triplets at 1 TeV

- $m_H = 150 \pm 24$ GeV
Authors: Shaposhnikov & Wetterich (2009)

Idea: Assume that gravity is asymptotically safe, that there are no intermediate energy scales between the Fermi and Planck scales.
Techniques: renormalisation group flow with $m_t = 171.2$ GeV

- $m_H = 150$ GeV
Authors: Chiang & Nomura (2010)

Idea: $E_6$ unification in six dimensions and $S^2/Z_2$ orbifold compactification
Techniques: tree level masses from Kaluza-Klein model

- $m_H = 153 \pm 3$ GeV
Author: Okumura (1997)

Idea: a vague variant of the Connes-Lott model
Techniques: 2-loop renormalisation group flow up to energies of $10^{13}$ GeV. The computation of the Higgs mass depends on the top mass taken here to be $m_t = 171.5 \pm 2$ GeV.

- $m_H = 154 \pm 6$ GeV
Authors: Ananthanarayan & Pasupathy (2001)

Idea: weak dependence of the ratio between Higgs self-coupling and top Yukawa coupling squared on renormalisation scale
Techniques: 1- and 2-loop corrections

- $m_H = 154 \pm 37$ GeV
Authors: Gogoladze, He & Shafi (2010)

Idea: Vectorlike isospin doublets of quarks with masses of several 100 GeV are added to the standard model to achieve gauge unification at $3 \cdot 10^{16}$ GeV. Assuming the validity of perturbative quantum field theory up to this energy constrains the Higgs-mass as in
Cabibbo, Maiani, Parisi & Petronzio (1979).

**Techniques:** renormalisation group flow

**Other predictions:** these new vectorlike quarks

- $m_H = 154.4 \pm 0.5 \text{ GeV}$

**Author:** Beck (2001)

**Idea:** ‘chaotic strings’ describing the dynamics of vacuum fluctuations underlying dark energy

**Techniques:** stochastic quantization

**Postdictions:** all fermion and gauge bosons masses, all gauge couplings

- $m_H = 155 \pm 8 \text{ GeV}$

**Authors:** Schrempp & Schrempp (1993)

**Idea:** A strongly infrared attractive line in the $m_t - m_H$ plane is found.

**Techniques:** 1-loop renormalization group equations

- $m_H = 160 \pm 8 \text{ GeV}$

**Authors:** Roepstorff & Vehns (2000)

**Idea:** combining gauge and Yukawa interactions in one generalised Dirac operator

**Techniques:** superconnections

**Postdictions:** $m_t = 160 \pm 8 \text{ GeV}$

- $m_H = 160 \pm 20 \text{ GeV}$

**Authors:** Langacker, Paz, Wang & Yavin (2007)

**Idea:** an extension of the minimal supersymmetric extension of the standard model plus a hidden sector plus a $Z'$ mediating supersymmetry breaking by couplings to the hidden sector

**Techniques:** 2-loop corrections up to energies of $10^7 - 10^{11} \text{ GeV}$

**Other predictions:** many supersymmetric particles

- $m_H = 160 \pm 24.5 \text{ GeV}$

**Authors:** Barvinsky, Kamenshchik, Kiefer, Starobinsky & Steinwachs (2009)

**Idea:** Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.

**Techniques:** effective action to 1-loop with $m_t = 171 \text{ GeV}$ and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

- $m_H = 160 \pm 30 \text{ GeV}$

**Author:** Bezrukov (2008)

**Idea:** Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.

**Techniques:** effective action and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

- $m_H = 160 \pm 34 \text{ GeV}$

**Authors:** Bezrukov & Shaposhnikov (2009)

**Idea:** Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.
Techniques: effective action to 2-loop with $m_t = 171.2$ GeV and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

- $m_H = 160.7 \pm 24$ GeV

Authors: Bezrukov, Magnin & Shaposhnikov (2008)

Idea: Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.

Techniques: effective action to 1-loop with $m_t = 171$ GeV and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

- $m_H = 160.9 \pm 0.1$ GeV

Author: Ne’eman (1986)

Idea: embedding of the electro-weak Lie algebra $su(2) \oplus u(1)$ in the superalgebra $su(2|1)$

Techniques: classical field theory

Postdictions: $\sin^2 \theta_w = 1/4$

- $m_H = 161.8033989$ GeV

Author: El Naschie (2005)

Idea: E-infinity theory

Techniques: ?

- $m_H = 165 \pm 5$ GeV

Authors: El Naschie (2005b)

Idea: minimal supersymmetric extension of the standard model plus ’Pauli’s principle of bidivision and symmetry reduction’

Techniques: no quantum corrections

- $m_H = 170 \pm 10$ GeV

Authors: Chamseddine & Connes (1996)

Idea: derivation of the standard model from gravity by generalising Riemannian to non-commutative geometry

Techniques: operator algebras, heat-kernel expansion and renormalisation group flow up to energies of $\Lambda \sim 10^{13} - 10^{17}$ GeV. The computation of the Higgs mass depends on the top mass taken to be $m_t = 170.9 \pm 2.5$ GeV.

Other predictions: conceptual uncertainty in proper time measurements of $\Delta \tau \sim h/\Lambda = 10^{-41} - 10^{-37}$ s

Postdictions: $m_W^2 / (\cos^2 \theta_w m_z^2) = 1$, gluons must be massless and must have pure vector-couplings, $m_t < 186.3$ GeV.

- $m_H = 177.5 \pm 7.5$ GeV

Authors: Antusch, Kersten, Lindner & Ratz (2002)

Idea: the Higgs as a composite particle from neutrino condensation

Techniques: seesaw mechanism, gap equation, renormalisation group flow up to the condensation scale $\Lambda = 10^{16}$ GeV

- $m_H = 182 \pm 4$ GeV

Author: Namsrai (1996)
Idea: Higgs mass from space-time curvature
Techniques: general relativity and solitons

• $m_H = 185 \pm 5$ GeV
Author: Schrempp & Schrempp (1986)

Idea: A largely unspecified strong interaction is assumed to soften the elastic scattering of longitudinally polarised $W$ bosons.
Techniques: a superconvergence sum rule

• $m_H = 185.7 \pm 0.1$ GeV
Author: Trostel (1987)

Idea: a geometrisation of the Yukawa couplings
Techniques: spinor connections

• $m_H = 186 \pm 8$ GeV
Authors: Tolksdorf & Thumstädter (2006)

Idea: differential geometric unification of general relativity and the standard model
Techniques: generalised Dirac operators, heat kernel expansion and renormalisation group flow up to energies of $\Lambda \sim 10^{10}$ GeV. The computation of the Higgs mass depends on the top mass taken to be $m_t = 174 \pm 3$ GeV.

• $m_H = 194 \pm 80$ GeV
Authors: García-Bellido, Figueroa & Rubio (2008)

Idea: Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.
Techniques: effective action and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background, lower limit from non-observation of the Higgs at LEP

• $m_H = 196$ GeV
Authors: Chiang, Nomura & Sato (2011)

Idea: $SO(12)$ unification in six dimensions and $S^2/Z_2$ orbifold compactification
Techniques: tree level masses from Kaluza-Klein model

• $m_H = 197.2 \pm 124.8$ GeV
Authors: Froggatt, Lapерashvili, Nevzorov, Nielsen & Sher (2006)

Idea: non-supersymmetric extension of the standard model with two Higgs doublets and the multiple point principle
Techniques: renormalisation group flow up to energies of $\Lambda \sim 10^4 - 10^{19}$ GeV
Other predictions: additional neutral and charged scalars with masses larger than 202.4 GeV

• $m_H = 200 \pm 20$ GeV
Authors: Froggatt, Nevzorov, Nielsen & Thompson (2008)

Idea: non-supersymmetric extension of the standard model with two Higgs doublets and the multiple point principle
Techniques: renormalisation group flow up to energies of $\Lambda \sim 10^5$ GeV. The computation of the Higgs mass depends on the top mass taken to be $m_t = 171.4 \pm 2.1$ GeV.
Other predictions: enhanced top-Higgs coupling

- $m_H = 200 \pm 50$ GeV

**Author:** Cvetic (1995)

**Idea:** It is supposed that the 1-loop contributions of the scalar self-interactions to the effective potential are distinctly less than those of the Yukawa couplings of the top.

**Techniques:** 1-loop corrections with cut-off at $10^3$ GeV. The computation of the Higgs mass depends on the top mass taken to be $m_t = 180$ GeV.

- $m_H = 203 \pm 2.2$ GeV

**Author:** Squellari & Stephan (2007)

**Idea:** extension of Chamseddine and Connes’ spectral action to include three vectorlike isospin doublets

**Techniques:** operator algebras, heat-kernel expansion and renormalisation group flow up to $\Lambda = 3 - 5 \cdot 10^7$ GeV. The computation of the Higgs mass depends on the top mass taken to be $m_t = 170.9 \pm 2.6$ GeV.

**Other predictions:** six new leptons with masses of $10 - 550$ TeV, conceptual uncertainty in proper time measurements of $\Delta \tau \sim h/\Lambda \sim 10^{-32}$ s

**Postdictions:** $m^2_W/(\cos^2 \theta_w m^2_Z) = 1$, gluons must be massless and must have pure vector-couplings.

- $m_H = 210 \pm 10$ GeV

**Authors:** Andrianov & Romanenko (1995)

**Idea:** modified Veltman condition and fixed point in running of Yukawa coupling

**Techniques:** renormalisation group flow up to energies of $10^{16}$ GeV

**Postdictions:** $m_t = 175 \pm 5$ GeV

- $m_H = 216$ GeV

**Authors:** Arbuzov, Barbashov, Pervushin, Shuvalov & Zakharov (2008)

**Idea:** Three peaks of the cosmic microwave background are explained by the decay of primordial Higgs-, W- and Z-bosons into photons.

**Techniques:** conformal cosmology

**Other prediction:** $m_H = 118$

- $m_H = 218$ GeV

**Authors:** Elias, Mann, McKeon & Steele (2003)

**Idea:** Absence of tree-level scalar-field masses

**Techniques:** Coleman-Weinberg potential and summation of leading logarithms

- $m_H = 226 \pm 50$ GeV

**Authors:** Aranda, Díaz-Cruz & Rosado (2005)

**Idea:** unification of the weak gauge couplings at intermediate energy $\Lambda$ and linear or quadratic relation of these to the Higgs self-coupling

**Techniques:** renormalisation group flow up to energies of $\Lambda \sim 10^{13}$ GeV

- $m_H = 241.2 \pm 1.6$ GeV

**Author:** Stephan (2007)

**Idea:** extension of Chamseddine and Connes’ spectral action to $SU(4) \times SU(3) \times SU(2) \times SU(2)$...
Techniques: operator algebras, heat-kernel expansion and renormalisation group flow up to $\Lambda = 2 \cdot 10^4$ GeV. The computation of the Higgs mass depends on the top mass taken to be $m_t = 170.9 \pm 2.6$ GeV.

Other predictions: confined $SU(4)$ singlets in the TeV range, conceptual uncertainty in proper time measurements of $\Delta \tau \sim \hbar/\Lambda = 3.3 \cdot 10^{-29}$ s

Postdictions: $m_W^2/(\cos^2 \theta_w m_Z^2) = 1$, gluons must be massless and must have pure vector-couplings.

- $m_H = 250 \pm 50$ GeV

Authors: Barbieri, Hall, Nomura & Rychkov (2006)

Idea: extending the minimal supersymmetric extension of the standard model by adding a chiral singlet with a superpotential interaction with the Higgs doublets

Techniques: renormalisation group flow up to energies of $\Lambda \sim 10$ TeV

- $m_H \approx 250$ GeV

Authors: Ne’eman & Thierry Mieg (1982)

Idea: embedding of the electro-weak Lie algebra $su(2) \oplus u(1)$ in the superalgebra $su(2|1)$

Techniques: classical field theory

Postdictions: $\sin^2 \theta_w = 1/4$

- $m_H = 253 \pm 10$ GeV

Authors: Arbuzov & Zaitsev (2011)

Idea: Higgs as bound state of heavy quarks

Techniques: Bogoliubov compensation principle

Other predictions: $m_H = 306 \pm 16$ GeV

- $m_H = 255 \pm 145$ GeV

Author: Mahbubani (2004)

Idea: split supersymmetry

Techniques: fine tuning and renormalisation group flow up to energies of $10^{16}$ GeV

- $m_H = 271 \pm 5$ GeV

Authors: Connes & Lott (1991)

Idea: derivation of the Higgs sector of the standard model from the Yang-Mills sector by generalising Euclidean to noncommutative geometry

Techniques: operator algebras. The computation of the Higgs mass depends on the top mass taken here to be $m_t = 170.9 \pm 2.5$ GeV.

Postdictions: $m_W^2/(\cos^2 \theta_w m_Z^2) = 1$, gluons must be massless and must have pure vector-couplings, $m_t > 139.3$ GeV, $\sin^2 \theta_w < 0.543$.

- $m_H = 275 \pm 25$ GeV

Authors: Arbuzov, Glinka, Lednicky & Pervushin (2007), version 1

Idea: condensates, conformal cosmology

Techniques: Coleman-Weinberg potential

Other predictions: $m_H = 124 \pm 10$ GeV, version 6

- $m_H = 306 \pm 16$ GeV
Authors: Arbuzov & Zaitsev (2011)
Idea: Higgs as bound state of heavy quarks
Techniques: Bogoliubov compensation principle
Other predictions: $m_H = 253 \pm 10$ GeV

- $m_H = 308.6 \pm 0.3$ GeV

Authors: López Castro & Pestieau (1995)
Idea: absence of quadratic and logarithmic divergences in the top mass
Techniques: 1-loop quantum corrections
Other predictions: $m_t = 170.5 \pm 0.3$ GeV

- $m_H = 309 \pm 6$ GeV

Authors: Decker & Pestieau (1979), also Veltman (1981)
Idea: absence of quadratic 1-loop divergences
Techniques: dimensional reduction. The computation of the Higgs mass depends on the top mass taken here to be $m_t = 170.9 \pm 2.5$ GeV.

- $m_H = 317 \pm 80$ GeV

Authors: Bazzocchi & Fabbrichesi (2004)
Idea: Flavour symmetry broken together with electro-weak symmetry, little Higgs
Techniques: Coleman-Weinberg effective potential
Other predictions: Many new particles including a charged scalar with mass $560 \pm 192$ GeV

- $m_H = 348.2$ GeV

Authors: Bednyakov, Giokaris & Bednyakov (2007)
Idea: $m_H = 2m_t$
Techniques: arithmetic

- $m_H = 374 \pm 6$ GeV

Author: Xiao-Gang He (2002)
Idea: no dependence of total vacuum energy (Casimir plus minimum of Higgs potential) on renormalisation scale
Techniques: Casimir effect and quantum corrections. The computation of the Higgs mass depends on the top mass taken here to be $m_t = 170.9 \pm 2.5$ GeV.

- $m_H = 426$ GeV

Author: Fairlie (1979)
Idea: embedding of the electro-weak Lie algebra $su(2) \oplus u(1)$ in the superalgebra $su(2|1)$
Techniques: classical field theory
Postdictions: $\sin^2 \theta_w = 1/4$

- $m_H = 500 \pm 100$ GeV

Authors: Barbieri, Hall & Rychkov (2006)
Idea: adding an inert isospin doublet of pseudo scalars
Techniques: renormalisation group flow up to energies of $\Lambda \sim 1.5$ TeV
Other predictions: pseudo scalars with masses between 60 GeV and 1 TeV leading in particular to an increased width of the ordinary Higgs scalar
• \( m_H = 515 \pm 64 \text{ GeV} \)
Authors: Langguth, Montvay & Weisz (1986)
Idea: lattice gauge theory and triviality of the continuum limit
Techniques: Monte Carlo simulations on \( 12^4 \) lattices

• \( m_H = 536 \pm 10 \text{ GeV} \)
Authors: Babic, Guberina, Horvat & Stefancic (2001)
Idea: no dependence of cosmological constant on renormalisation scale
Techniques: quantum corrections. The computation of the Higgs mass depends on the top mass taken here to be \( m_t = 170.9 \pm 2.5 \text{ GeV} \).

• \( m_H = 760 \pm 21 \text{ GeV} \)
Authors: Cea, Consoli & Cosmai (2003)
Idea: lattice gauge theory and triviality of the continuum limit
Techniques: extrapolation from Ising limit

• \( m_H = 1900 \pm 100 \text{ GeV} \)
Authors: Ibañez-Meier & Stevenson (1992)
Idea: vanishing bare Higgs mass and 1-loop effective potential
Techniques: autonomous renormalisation

• \( m_H = 10^{18} \text{ GeV} \)
Authors: Batakis & Kehagias (1991)
Idea: Higgs field as massive excitation of the vacuum configuration of a sigma field coupled to gravity
Techniques: non-linear sigma models

3 Upper bounds

• \( m_H < 123 \text{ GeV} \)
Authors: Belyaev, Dar, Gogoladze, Mustafayev & Shafi (2007)
Idea: constrained minimal supersymmetric standard model combined with supersymmetry constraints from colliders and low energy physics and constraints on dark matter
Techniques: renormalisation group equation. The top mass is taken to be \( m_t = 171.4 \text{ GeV} \).
Other predictions: many supersymmetric particles

• \( m_H < 125 \text{ GeV} \)
Authors: Froggatt, Nevzorov, Nielsen & Thompson (2008)
Idea: non-supersymmetric extension of the standard model with two Higgs doublets and the multiple point principle
Techniques: renormalisation group flow up to energies of \( \Lambda \sim 10^{16} \text{ GeV} \). The computation of the Higgs mass depends on the top mass taken to be \( m_t = 171.4 \pm 2.1 \text{ GeV} \).

• \( m_H < 125 \text{ GeV} \)
Authors: Babu, Gogoladze, Rehman & Shafi (2008)
Idea: minimal supersymmetric extension of the standard model plus complete vectorlike
multiplets of grand unified groups

**Techniques:** some fine tuning and renormalisation group flow up to energies of $10^{16}$ GeV. The top mass is taken to be $m_t = 172.6 \pm 1.4$ GeV.

**Other predictions:** many supersymmetric particles

- $m_H < 126$ GeV

**Authors:** De Simone, Hertzberg & Wilczek (2008)

**Idea:** Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.

**Techniques:** effective action to 2-loop with $m_t = 171.2$ GeV and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

- $m_H < 127$ GeV

**Authors:** Carena, Nardini, Quiros & Wagner (2008)

**Idea:** minimal supersymmetric extension of the standard model with a light stop and electro-weak baryo-genesis

**Techniques:** renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV

**Other predictions:** the light stop with mass < 120 GeV

- $m_H < 130$ GeV

**Authors:** Okada, Yamaguchi & Yanagida (1991)

**Idea:** minimal supersymmetric extension of the standard model

**Techniques:** soft supersymmetry breaking at 1 TeV and quantum corrections

**Other predictions:** many supersymmetric particles

- $m_H < 130$ GeV

**Authors:** Bento, Bertolami & Rosenfeld (2001)

**Idea:** introduction of a stable gauge singlet scalar of mass around 1 GeV coupled to the Higgs, playing the role of cold dark matter and solving problems with small scale structure formation

**Techniques:** phenomenological constraints from cosmology and particle physics

**Other predictions:** Higgs decay into a pair of these stable light scalars

- $m_H < 130$ GeV

**Authors:** Birkedal, Chacko & Gaillard (2004)

**Idea:** supersymmetry and the Higgs as a pseudo-Goldstone boson of some extra global symmetry

**Techniques:** $SU(6)$ grand unification

**Other predictions:** many supersymmetric particles

- $m_H < 130$ GeV

**Authors:** Passera, Marciano & Sirlin (2008)

**Idea:** hypothetical errors in the determination of the hadronic leading-order contribution to cure the present discrepancy between experiment and prediction of the muon $g − 2$

**Techniques:** quantum corrections by Higgs loops to precision electro-weak data with $m_t = 172.6 \pm 1.4$ GeV
• $m_H < 130$ GeV  
**Authors:** Nakayama, Yokozaki & Yonekura (2011)  
**Idea:** minimal supersymmetric extension of the standard model plus a scalar singlet  
**Techniques:** quantum corrections  
**Other predictions:** many supersymmetric particles

• $m_H < 139$ GeV  
**Authors:** Kaeding & Nandi (1999)  
**Idea:** a non-minimal supersymmetric extension of the standard model  
**Techniques:** gauge mediated supersymmetry breaking and quantum corrections  
**Other predictions:** many supersymmetric particles

• $m_H < 144$ GeV  
**Authors:** Suematsu & Zoupanos (2001)  
**Idea:** a non-minimal supersymmetric extension of the standard model  
**Techniques:** non-universal soft supersymmetry breaking and quantum corrections  
**Other predictions:** many supersymmetric particles

• $m_H < 144$ GeV  
**Author:** Ma (2011)  
**Idea:** minimal supersymmetric extension of the standard model plus another $U(1)$ gauge boson  
**Techniques:** supersymmetry breaking and quantum corrections  
**Other predictions:** many supersymmetric particles

• $m_H < 146$ GeV  
**Authors:** Huo, Li, Nanopoulos & Tong (2011)  
**Idea:** supersymmetry  
**Techniques:** F-theory and flipped $SU(5) \times U(1)$  
**Other predictions:** many supersymmetric particles

• $m_H < 150$ GeV  
**Authors:** Maloney, Pierce & Wacker (2004)  
**Idea:** supersymmetric extension of the standard model with non-decoupling D-terms  
**Techniques:** soft supersymmetry breaking and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV  
**Other predictions:** many supersymmetric particles and new gauge bosons with masses in the TeV range

• $m_H < 150$ GeV  
**Authors:** Moroi & Okada (1992)  
**Idea:** supersymmetric extension of the standard model plus a gauge singlet  
**Techniques:** soft supersymmetry breaking and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV  
**Other predictions:** many supersymmetric particles

• $m_H < 150$ GeV  
**Authors:** Carena, Nardini, Quiros & Wagner (2008)
Idea: minimal supersymmetric extension of the standard model with a light stop
Techniques: renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV
Other predictions: the light stop
  • $m_H < 163$ GeV
Authors: Chishtie, Hanif, Jia, Mann, McKeon, Sherry & Steele (2006)

Idea: Absence of tree-level scalar-field masses
Techniques: Coleman-Weinberg potential and summation of (next to)$^4$ leading logarithms
  • $m_H < 165$ GeV
Authors: Delgado & Quiros (2000)

Idea: supersymmetric extension of the standard model plus one extra dimension compactified on an orbifold
Techniques: renormalisation group flow with all Higgses in the bulk
Other predictions: many supersymmetric particles
  • $m_H < 180$ GeV
Authors: Moroi & Okada (1992)

Idea: supersymmetric extension of the standard model plus extra matter multiplets
Techniques: soft supersymmetry breaking and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV
Other predictions: many supersymmetric particles
  • $m_H < 200$ GeV
Authors: Espinosa & Quiros (1998)

Idea: supersymmetric extension of the standard model plus extra matter multiplets
Techniques: soft supersymmetry breaking and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV
Other predictions: many supersymmetric particles
  • $m_H < 200$ GeV
Authors: Elsayed, Khalil & Morettis (2011)

Idea: supersymmetric extension of the standard model plus an extra $U(1)$ gauge boson with $B - L$ couplings and inverse seesaw
Techniques: radiative corrections
Other predictions: many supersymmetric particles
  • $m_H < 230$ GeV
Authors: Bhattacharyya, Majee & Raychaudhuri (2007)

Idea: supersymmetric extension of the standard model plus one extra dimension
Techniques: Kaluza-Klein and radiative corrections
  • $m_H < 235$ GeV
Authors: Bhattacharyya, Majee & Ray (2008)

Idea: supersymmetric extension of the standard model plus one extra dimension, Higgs confined to the TeV brane
Techniques: Kaluza-Klein and radiative corrections
• $m_H < 260$ GeV  
Authors: Batra, Delgado, Kaplan & Tait (2004)  
Idea: supersymmetric extension of the standard model plus a gauge singlet  
Techniques: soft supersymmetry breaking and renormalisation group flow up to energies of $\Lambda \sim 10^{16}$ GeV  
Other predictions: many supersymmetric particles and a charged Higgs boson lighter than the neutral one

• $m_H < 280$ GeV  
Authors: Ham, Shim, Kim & Oh (2010)  
Idea: minimal supersymmetric extension of the standard model plus a few vectorlike quarks of masses in the $300 - 550$ GeV range  
Techniques: renormalisation group flow to one-loop  
Other predictions: many supersymmetric particles

• $m_H < 300$ GeV  
Authors: Babu, Gogoladze & Kolda (2004)  
Idea: minimal supersymmetric extension of the standard model plus complete vectorlike multiplets of grand unified groups  
Techniques: renormalisation group flow up to energies of $10^{16}$ GeV  
Other predictions: many supersymmetric particles

• $m_H < 350$ GeV  
Authors: Batra, Delgado, Kaplan & Tait (2003)  
Idea: supersymmetric extension of the standard model plus some new gauge bosons  
Techniques: soft supersymmetry breaking, some fine tuning  
Other predictions: many supersymmetric particles and new gauge bosons with masses in the TeV range

• $m_H < 400$ GeV  
Authors: Litsey & M. Sher (2009)  
Idea: minimal supersymmetric extension of the standard model with a fourth generation  
Techniques: radiative corrections  
Other predictions: the fourth generation at LHC energies and many supersymmetric particles

• $m_H < 446$ GeV  
Authors: Huitu, Pandita & Puolamaki (1997)  
Idea: supersymmetric extension of the left-right symmetric extension of the standard model  
Techniques: soft supersymmetry breaking, 1-loop corrections

• $m_H < 450$ GeV  
Authors: Bhattacharyya, Majee & Raychaudhuri (2007)  
Idea: supersymmetric extension of the standard model plus two extra dimensions  
Techniques: Kaluza-Klein and radiative corrections

• $m_H < 724$ GeV
Authors: Langguth & Montvay (1987)
Idea: lattice gauge theory and triviality of the continuum limit
Techniques: Monte Carlo simulations on $16^4$ lattices

- $m_H < 800$ GeV

Authors: Appelquist & Yee (2002)
Idea: Kaluza-Kein with one or two extra comactified dimensions
Techniques: computation of quantum corrections induced by Kaluza-Klein particles on precision electro-weak measurements of the flavour changing process $b \rightarrow s + \gamma$ and on the anomalous magnetic moment of the muon
Other predictions: new dimensions with inverse compactification radius as low as 250 GeV

- $m_H < 880$ GeV

Authors: Jegerlehner, Kalmykov & Veretin (2001)
Idea: Quantum corrections in the relation between $\overline{\text{MS}}$- and pole-masses of the $W$- and $Z$-bosons should remain perturbative.
Techniques: 2-loop corrections, asymptotic expansions

- $m_H < 1008$ GeV

Authors: Lee, Quigg & Thacker (1977)
Idea: unitarity requirement
Techniques: partial-wave amplitude of elastic boson scattering in lowest order of perturbation to be bounded by unity

- $m_H < 1020$ GeV

Authors: Dicus & Mathur (1973)
Idea: unitarity requirement
Techniques: partial-wave amplitude of $Z_LZ_L \rightarrow Z_LZ_L$ in lowest order of perturbation to be bounded by unity

- $m_H < 1400$ GeV

Authors: Grzadkowski & Gunion (2007)
Idea: $W^+W^-$ scattering in the Randall-Sundrum model with one extra dimension and two 3-branes should remain perturbatively unitary after inclusion of string/M-theoretic excitations.
Techniques: summation of Kaluza-Klein gravitons

4 Lower bounds

- $m_H > 120$ GeV

Authors: Bin He, Okada & Shafi (2009)
Idea: Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity, add type III seesaw mechanism and demand vacuum stability and perturbativity
Techniques: renormalisation group flow
• $m_H > 230$ GeV

**Authors:** Barvinsky, Kamenshchik & Starobinsky (2008)

**Idea:** Let the Higgs be the inflaton by adding a strong, non-minimal coupling $\varphi^2 R$ of the scalar to gravity.

**Techniques:** effective action and its confrontation with the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background

## 5 Final remarks

Our list contains 96 Higgs-mass predictions. Supersymmetry is behind 26 of them with central values between 120 and 255 GeV. Compactified additional dimensions motivate ten predictions ranging from 117 to 450 GeV. There are three superstring inspired predictions: 117, 121 and 154.4 GeV. The embedding of the electro-weak Lie algebra $su(2)\oplus u(1)$ in the superalgebra $su(2|1)$ produces four predictions: 130, 161, 250 and 426 GeV. Five predictions, between 124 and 317 GeV use the Coleman-Weinberg potential. One prediction, $m_H = 125$ GeV uses dynamical symmetry breaking with the Higgs being a deeply bound state of two top quarks. At the same time this model predicted two years prior to the discovery to the top its mass to be $m_t = 175$. Another prediction for the Higgs mass motivated by dynamical symmetry breaking via a neutrino condensate is at 178 GeV. We have listed four predictions from Connes’s noncommutative geometry: 170, 203, 241 and 271 GeV. Lattice gauge theories lead to two predictions: 515 and 760 GeV. Eight predictions are based on the (approximate) vanishing of particular terms related to quantum corrections: 154, 155, 200, 210, 309, 374 and 536 GeV.

We have two lower bounds for the Higgs mass and 37 upper bounds, 26 of which come from supersymmetry.

Five predictions, one upper and one lower bound come from the recent idea that inflation is driven by the Higgs scalar together with a strong non-minimal coupling to gravity. The Higgs mass is obtained from fitting the observed spectral index and tensor-to-scalar ratio of the Cosmic Microwave Background.

The oldest entry is: $m_H < 1020$ GeV by Dicus & Mathur (1973).

The most precise prediction is: $m_H = 161.8033989$ GeV by El Naschie (2005).

The highest prediction is: $m_H = 10^{18}$ GeV by Batakis & Kehagias (1991).

The highest number of predictions by a single co-author, Gogoladze, is 12.

Three intervals are still free of Higgs-mass predictions:

- $600 – 739$ GeV
- $781 – 1800$ GeV
- $2000 – 10^{18}$ GeV.

In this compilation we have only considered numerical post- and predictions. Today particle physicists are used to interpret experimental numbers not only in terms of numbers like coupling constants, but also in terms of groups and representations and even in terms of Lagrangians. Only few of the listed models come with constraints on groups, representations and Lagrangians. Supersymmetric models for instance need representations for supersymmetric particles and thereby may be falsified by the LHC. However supersymmetry does not constrain the gauge group nor the Lagrangian. This is different for Connes’ noncommutative geometry, which — just as Riemannian geometry — puts
severe constraints on the admissible Lagrangians, puts constraints on gauge groups and severe constraints on representations. In particular the Higgs representation of the non-commutative standard model is not chosen but computed to be one colourless isospin doublet. This is certainly its most startling and robust prediction and may lead to its falsification if more than one physical Higgs is found as predicted by any supersymmetric standard model.

The first version of this compilation from 2007 contained 60 references. This seventh version has 125 references. It might well be the last one.

References

[1] The LEP Electroweak Working Group, [http://lepewwg.web.cern.ch] 150 GeV
[2] A. A. Andrianov & N. V. Romanenko, Vacuum Fine Tuning And Masses Of The T Quark And Higgs Boson, Phys. Lett. B343 (1995) 295, 210 GeV
[3] S. Antusch, J. Kersten, M. Lindner & M. Ratz, Dynamical electroweak symmetry breaking by a neutrino condensate, [hep-ph/0211385], Nucl. Phys. B658 (2003) 203, 177.5 GeV
[4] T. Appelquist & Ho-Ung Yee, Universal extra dimensions and the Higgs boson mass, [hep-ph/0211023], Phys. Rev. D67 (2003) 055002, < 800 GeV
[5] A. Aranda, J. L. Díaz-Cruz & A. Rosado, Electroweak-Higgs unification and the Higgs boson mass, [hep-ph/0507230], Int. J. Mod. Phys. A22 (2007) 1417, 226 GeV
[6] A. B. Arbuzov, L. A. Glinka, R. Lednicky & V. N. Pervushin, Higgs Particle Mass in Cosmology, [arXiv:0705.4672], 124 and 275 GeV
[7] A. B. Arbuzov, B. M. Barbashov, V. N. Pervushin, S. A. Shuvalov & A. F. Zakharov, Is it possible to estimate the Higgs Mass from the CMB Power Spectrum?, [arXiv:0802.3427], 118 and 216 GeV
[8] A. B. Arbuzov & I. V. Zaitsev, Non-perturbative solutions in the electro-weak theory and the Higgs boson mass, [arXiv:1103.3951] [hep-ph], 253 and 306 GeV
[9] N. Arkani-Hamed & S. Dimopoulos, Supersymmetric unification without low energy supersymmetry and signatures for fine-tuning at the LHC, [hep-th/0405159], JHEP 0506 (2005) 073, 135 GeV
[10] A. Arvanitaki, C. Davis, P. W. Graham & J. G. Wacker, One loop predictions of the finely tuned SSM, [hep-ph/0406034], Phys. Rev. D70 (2004) 117703, 150 GeV
[11] A. Babic, B. Guberina, R. Horvat & H. Stefancic, Renormalization-group running of the cosmological constant and its implication for the Higgs boson mass in the standard model, [hep-ph/0111207], Phys. Rev. D65 (2002) 085002, 536 GeV
[12] K. S. Babu, I. Gogoladze & C. Kolda, *Perturbative unification and Higgs boson mass bounds*, arXiv:hep-ph/0410085, < 300 GeV

[13] K. S. Babu, I. Gogoladze, M. U. Rehman & Q. Shafi, *Higgs Boson Mass, Sparticle Spectrum and Little Hierarchy Problem in Extended MSSM*, arXiv:0807.3055, 140 GeV, < 125 GeV

[14] Y. Bai, J. Fan & Z. Han, *Higgs boson from the meta-stable SUSY breaking sector*, arXiv:0706.0007, 150 GeV

[15] R. Barbieri, L. J. Hall & V. S. Rychkov, *Improved naturalness with a heavy Higgs: An alternative road to LHC physics*, hep-ph/0603188, Phys. Rev. D74 (2006) 015007, 500 GeV

[16] R. Barbieri, L. J. Hall, Y. Nomura & V. S. Rychkov, *Supersymmetry without a light Higgs boson*, hep-ph/0607332, Phys. Rev. D75 (2007) 035007, 250 GeV

[17] V. Barger, C. W. Chiang, J. Jiang & T. Li, *Axion models with high-scale supersymmetry breaking*, hep-ph/0410252, Nucl. Phys. B705 (2005) 71, 150 GeV

[18] V. Barger, J. Jiang, P. Langacker & T. Li, *Gauge coupling unification in the standard model*, hep-ph/0503226, Phys. Lett. B624 (2005) 233

*Non-canonical gauge coupling unification in high-scale supersymmetry breaking*, hep-ph/0504093, Nucl. Phys. B726 (2005) 149, 146 GeV

[19] V. Barger, N. G. Deshpande, J. Jiang, P. Langacker & T. Li, *Implications of canonical gauge coupling unification in high-scale supersymmetry breaking*, hep-ph/0701136, 124 GeV

[20] A. O. Barvinsky, A. Y. Kamenshchik & A. A. Starobinsky, *Inflation scenario via the Standard Model Higgs boson and LHC*, arXiv:0809.2104 [hep-ph], JCAP 0811 (2008) 021, > 230 GeV

[21] A. O. Barvinsky, A. Y. Kamenshchik, C. Kiefer, A. A. Starobinsky & C. Steinwachs, *Asymptotic freedom in inflationary cosmology with a non-minimally coupled Higgs field*, arXiv:0904.1698 [hep-ph], JCAP 0912 (2009) 003, 160 GeV

[22] N. A. Batakis & A. A. Kehagias, *Higgs mass determined in the gravity coupled sigma model*, Phys. Lett. B253 (1991) 149, 10^{18} GeV

[23] P. Batra, A. Delgado, D. E. Kaplan & T. M. P. Tait, *The Higgs mass bound in gauge extensions of the minimal supersymmetric standard model*, hep-ph/0309149, JHEP 0402 (2004) 043, < 350 GeV

[24] P. Batra, A. Delgado, D. E. Kaplan & T. M. P. Tait, *Running into new territory in SUSY parameter space*, hep-ph/0404251, JHEP 0406 (2004) 032, < 260 GeV
[25] F. Bazzocchi & M. Fabbrichesi, *A Heavy Higgs boson from flavor and electroweak symmetry breaking unification*, [hep-ph/0407358](http://arxiv.org/abs/hep-ph/0407358), Phys. Rev. D70 (2004) 115008, 317 GeV

[26] C. Beck, *Chaotic strings and standard model parameters*, [hep-th/0105152](http://arxiv.org/abs/hep-th/0105152), Physica D 171 (2002) 72, 154.4 GeV

[27] V. A. Bednyakov, N. D. Giokaris & A. V. Bednyakov, *On Higgs mass generation mechanism in the Standard Model*, [hep-ph/0703280](http://arxiv.org/abs/hep-ph/0703280), Phys. Part. Nucl. 39 (2008) 13, 348.2 GeV

[28] A. Belyaev, S. Dar, I. Gogoladze, A. Mustafayev & Q. Shafi, *Interplay of Higgs and Sparticle Masses in the CMSSM with updated SUSY constraints*, [arXiv:0712.1049](http://arxiv.org/abs/0712.1049), < 123 GeV

[29] M. C. Bento, O. Bertolami & R. Rosenfeld, *Cosmological constraints on an invisibly decaying Higgs boson*, [hep-ph/0103340](http://arxiv.org/abs/hep-ph/0103340), Phys. Lett. B518 (2001) 276, < 130 GeV

[30] F. L. Bezrukov, *The Standard model Higgs as the inflaton*, [arXiv:0805.2236](http://arxiv.org/abs/0805.2236) [hep-ph], 160 GeV

[31] F. L. Bezrukov, A. Magnin & M. Shaposhnikov, *Standard Model Higgs boson mass from inflation*, [arXiv:0812.4950](http://arxiv.org/abs/0812.4950) [hep-ph], Phys. Lett. B 675 (2009) 88, 160.7 GeV

[32] F. Bezrukov & M. Shaposhnikov, *Standard Model Higgs boson mass from inflation: two loop analysis*, [arXiv:0904.1537](http://arxiv.org/abs/0904.1537) [hep-ph], JHEP 0907 (2009) 089, 160 GeV

[33] G. Bhattacharyya, S. K. Majee & A. Raychaudhuri, *Extra-dimensional relaxation of the upper limit of the lightest supersymmetric neutral Higgs mass*, [arXiv:0705.3103](http://arxiv.org/abs/0705.3103), < 230 and < 450 GeV

[34] G. Bhattacharyya, S. K. Majee & T. S. Ray, *Radiative correction to the lightest neutral Higgs mass in warped supersymmetry*, [arXiv:0806.3672](http://arxiv.org/abs/0806.3672), < 235 GeV

[35] A. Birkedal, Z. Chacko & M. K. Gaillard, *Little supersymmetry and the supersymmetric little hierarchy problem*, [hep-ph/0404197](http://arxiv.org/abs/hep-ph/0404197), JHEP 0410 (2004) 036, < 130 GeV

[36] J. R. Bogan, *From the Cosmological Constant: Higgs Boson, Quantum Gravity, and Horizon Scales*, [arXiv:0902.2600](http://arxiv.org/abs/0902.2600) [physics.gen-ph], 122.8 GeV

[37] O. Buchmüller et al., *Prediction for the Lightest Higgs Boson Mass in the CMSSM using Indirect Experimental Constraints*, [arXiv:0707.3447](http://arxiv.org/abs/0707.3447), Phys. Lett. B657 (2007) 87, 109 GeV

[38] N. Cabibbo, L. Maiani, G. Parisi & R. Petronzio, *Bounds on the fermions and Higgs boson masses in grand unified theories*, Nucl. Phys. B158 (1979) 295, 143 GeV

[39] X. Calmet & H. Fritzsch, *Calculation of the Higgs boson mass using the complementarity principle*, [hep-ph/0107085](http://arxiv.org/abs/hep-ph/0107085), Phys. Lett. B525 (2002) 297, 129.6 GeV
[40] M. Carena, G. Nardini, M. Quiros & C. E. M. Wagner, *The Effective Theory of the Light Stop Scenario*, arXiv:0806.4297, JHEP 0810 (2008) 062, < 150 GeV

[41] M. Carena, G. Nardini, M. Quiros & C. E. M. Wagner, *The Baryogenesis Window in the MSSM*, arXiv:0809.3760, Nucl. Phys. B812 (2009) 243, < 127 GeV

[42] S. Cassel & D. M. Ghilencea, *A Review of naturalness and dark matter prediction for the Higgs mass in MSSM and beyond*, arXiv:1103.4793 [hep-ph], 115.9 GeV

[43] P. Cea, M. Consoli & L. Cosmai, *Indications on the Higgs boson mass from lattice simulations*, hep-lat/0309050, Nucl. Phys. Proc. Suppl. 129 (2004) 780, 760 GeV

P. Cea & L. Cosmai, *The Higgs boson: from the lattice to LHC*, arXiv:0911.5220 [hep-ph], 754 GeV

[44] A. Chamseddine & A. Connes, *The spectral action principle*, hep-th/9606001, Comm. Math. Phys. 182 (1996) 155

A. Chamseddine, A. Connes & M. Marcolli, *Gravity and the standard model with neutrino mixing*, hep-th/0610241, Adv. Theor. Math. Phys. 11 (2007) 991, 170 GeV

[45] P. H. Chankowski, A. Falkowski, S. Pokorski & J. Wagner, *Electroweak symmetry breaking in supersymmetric models with heavy scalar superpartners*, hep-ph/0407242, Phys. Lett. B598 (2004) 252, 127.5 GeV

[46] C.-W. Chiang & T. Nomura, *A Six-dimensional gauge-Higgs unification model based on E_6 gauge symmetry*, arXiv:1006.4446 [hep-ph], Nucl. Phys. B 842 (2011) 362, 150 GeV

[47] C.-W. Chiang, T. Nomura & J. Sato, *Gauge-Higgs unification models in six dimensions with S^2/Z_2 extra space and GUT gauge symmetry*, arXiv:1109.5835 [hep-ph], 196 GeV

[48] F. A. Chishtie, T. Hanif, J. Jia, R. B. Mann, D. G. C. McKeon, T. N. Sherry & T. G. Steele, *Can the Renormalization Group Improved Effective Potential be used to estimate the Higgs Mass in the Conformal Limit of the Standard Model?*, arXiv:1006.5887 [hep-ph], Phys. Rev. D 83 (2011) 105009, i 163 GeV

[49] S. Codoban, M. Jurcisin & D. Kazakov, *Higgs mass prediction with non-universal soft supersymmetry breaking in MSSM*, hep-ph/9912504, Phys. Lett. B477 (2000) 223, 124.2 GeV

[50] A. Connes & J. Lott, *The metric aspect of noncommutative geometry*, in the proceedings of the 1991 Cargèse Summer Conference, eds.: J. Fröhlich et al., Plenum Press (1992)

D. Kastler & T. Schücker, *The standard model à la Connes-Lott*, hep-th/9412185, J. Geom. Phys. 24 (1997) 1, 271 GeV

[51] G. Cvetič, *Top quark effects on the scalar sector of the minimal Standard Model*, hep-ph/9509350, Int. J. Mod. Phys. A11 (1996) 5405, 200 GeV
A. De Simone, M. P. Hertzberg & F. Wilczek, *Running Inflation in the Standard Model*, arXiv:0812.4946 [hep-ph], Phys. Lett. B 678 (2009) 1, > 126 GeV

R. Decker & J. Pestieau, *Lepton self-mass, Higgs scalar and heavy quark masses*, DESY Workshop 1979, hep-ph/0512126
Z. Y. Fang, G. Lopez Castro, J. L. Lucio & J. Pestieau, *Effective SU(2)_L × U(1) theory and the Higgs boson mass*, hep-ph/9612430, Mod. Phys. Lett. A12 (1997) 1531
G. Lopez Castro & J. Pestieau, *The unit of electric charge and the mass hierarchy of heavy particles*, hep-ph/0609131, 309 GeV

A. Delgado & M. Quiros, *The lightest Higgs mass in supersymmetric models with extra dimensions*, hep-ph/0004124, Phys. Lett. B484 (2000) 355, < 165 GeV

R. Dermišek & J. F. Gunion, *Escaping the large fine tuning and little hierarchy problems in the next to minimal supersymmetric model and h → aa decays*, hep-ph/0502105, Phys. Rev. Lett. 95 (2005) 041801

Consistency of LEP event excesses with an h → aa decay scenario and low-fine-tuning NMSSM models, hep-ph/0510322, Phys. Rev. D73 (2006) 111701
The NMSSM solution to the fine-tuning problem, precision electroweak constraints and the largest LEP Higgs event excess, arXiv:0705.4387
A Comparison of Mixed-Higgs Scenarios In the NMSSM and the MSSM, arXiv:0709.2269 (100 GeV)

D. A. Dicus & V. S. Mathur, *Upper Bounds On The Values Of Masses In Unified Gauge Theories*, Phys. Rev. D7 (1973) 3111, < 1020 GeV

A. Djouadi, S. Heinemeyer, M. Mondragon & G. Zoupanos, *Finite unified theories and the Higgs mass prediction*, hep-ph/0404208, 122 GeV

M. S. El Naschie, *On Pauli’s principles of “Zweiteilung und symmetrie vermin-derung” in Higgs physics and non-linear dynamics*, Chaos, Solitons & Fractals 23 (2005) 739, 161.8033989 GeV

M. S. El Naschie, *Experimental and theoretical arguments for the number and the mass of the Higgs particles*, Chaos, Solitons & Fractals 23 (2005) 1091, 165 GeV

V. Elias, R. B. Mann, D. G. C. McKeon & T. G. Steele, *Optimal renormalization group improvement of two radiatively broken gauge theories*, hep-ph/0308301, Nucl. Phys. B 678 (2004) 147 [Erratum-ibid. B 703 (2004) 413], 218 GeV

J. Ellis, D. Nanopoulos, K. Olive & Y. Santoso, *On the Higgs mass in the CMSSM*, hep-ph/0509331, Phys. Lett. B633 (2006) 583, 120 GeV

A. Elsayed, S. Khalil & S. Moretti, *Higgs Mass Corrections in the SUSY B-L Model with Inverse Seesaw*, arXiv:1106.2130 [hep-ph], < 200 GeV
[63] J. R. Espinosa & M. Quiros, *Gauge unification and the supersymmetric light Higgs mass*, hep-ph/9804235, Phys. Rev. Lett. 81 (1998) 516, < 200 GeV

[64] D. B. Fairlie, *Higgs field and the determination of the Weinberg angle*, Phys. Lett. B82 (1979) 97, 426 GeV

[65] B. Feldstein, L. J. Hall & T. Watari, *Landscape Predictions for the Higgs Boson and Top Quark Masses*, hep-ph/0608121, Phys. Rev. D74 (2006) 095011, 121 GeV

[66] C. D. Froggatt & H. B. Nielsen, *Standard model criticality prediction: top mass 173 ± 5 GeV and Higgs mass 135 ± 9 GeV*, hep-ph/9511371, Phys. Lett. B368 (1996) 96
C. D. Froggatt, H. B. Nielsen & Y. Takanishi, *Standard model Higgs boson mass from borderline metastability of the vacuum*, hep-ph/0104161, Phys. Rev. D64 (2001) 113014, 121.8 GeV

[67] C. D. Froggatt, L. Laperashvili, R. Nevzorov, H. B. Nielsen & M. Sher, *Implementation of the multiple point principle in the two-Higgs doublet model of type II*, hep-ph/0602054, Phys. Rev. D73 (2006) 095005, 197.2 GeV

[68] C. D. Froggatt, R. Nevzorov, H. B. Nielsen & D. Thompson, *On the origin of Z(2) symmetry in the Two-Higgs Doublet extension of the SM*, arXiv:0806.3190, 200 GeV and < 125 GeV

[69] I. Gogoladze, T. Li & Q. Shafi, *Higgs boson mass from orbifold GUTs*, hep-ph/0602040, Phys. Rev. D73 (2006) 066008, 135 and 144 GeV

[70] I. Gogoladze, T. Li, V. N. Senoguz & Q. Shafi, *Higgs boson mass from orbifold GUTs with split supersymmetry*, hep-ph/0604217, Phys. Lett. B639 (2006) 332, 131 and 146 GeV

[71] I. Gogoladze, N. Okada & Q. Shafi, *Higgs boson mass from gauge-Higgs unification*, arXiv:0705.3035, 117 and 125 GeV

[72] I. Gogoladze, N. Okada & Q. Shafi, *Window for Higgs boson mass from gauge-Higgs unification*, arXiv:0708.2503, 143.2 GeV

[73] I. Gogoladze, B. He & Q. Shafi, *New Fermions at the LHC and Mass of the Higgs Boson*, arXiv:1004.4217 [hep-ph], 154 GeV

[74] J. García-Bellido, D. G. Figueroa & J. Rubio, *Preheating in the Standard Model with the Higgs-Inflaton coupled to gravity*, arXiv:0812.4624 [hep-ph], Phys. Rev. D79 (2009) 063531, 194 GeV

[75] B. Grzadkowski & J. F. Gunion, *Higgs-Boson Mass Limit within the Randall-Sundrum Model*, arXiv:0709.3726, < 1400 GeV

[76] L. J. Hall & Y. Nomura, *A Finely-Predicted Higgs Boson Mass from A Finely-Tuned Weak Scale*, arXiv:0910.2235 [hep-ph], 141 GeV
[77] S. W. Ham, S. A. Shim, C. M. Kim & S. K. Oh, *Higgs boson masses in an extension of the MSSM with vectorlike quarks*, [arXiv:1004.1974](https://arxiv.org/abs/1004.1974) [hep-ph], < 280 GeV

[78] Bin He, N. Okada & Q. Shafi, *Higgs Boson Mass Bounds in Seesaw Extended Standard Model with Non-Minimal Gravitational Coupling*, [arXiv:1009.1878](https://arxiv.org/abs/1009.1878) [hep-ph], Phys. Lett. B 695 (2011) 219, < 120 GeV

[79] Xiao-Gang He, *Higgs mass from Casimir energy induced cosmological constant in the standard model*, [hep-ph/0211396](https://arxiv.org/abs/hep-ph/0211396), Mod. Phys. Lett. A19 (2004) 1195, 374 GeV

[80] S. Heinemeyer, M. Mondragon & G. Zoupanos, *Confronting Finite Unified Theories with Low-Energy Phenomenology*, [arXiv:0712.3630](https://arxiv.org/abs/0712.3630) [hep-ph] JHEP 0807 (2008) 135, 123.5 GeV

[81] K. Huitu, P. N. Pandita & K. Puolamaki, *Mass of the lightest Higgs boson in supersymmetric left-right models*, [hep-ph/9708486](https://arxiv.org/abs/hep-ph/9708486), Phys. Lett. B423 (1998) 97, < 446 GeV

[82] Y. Huo, T. Li, D. V. Nanopoulos & C. Tong, *The Lightest CP-Even Higgs Boson Mass in the Testable Flipped SU(5) × U(1)X Models from F-Theory*, [arXiv:1109.2329](https://arxiv.org/abs/1109.2329) [hep-ph], < 146 GeV

[83] Dae Sung Hwang, Chang-Yeong Lee & Y. Ne’eman, *BRST quantization of SU(2|1) electroweak theory in the superconnection approach and the Higgs meson mass*, Int. J. Mod. Phys. A11 (1996) 3509, 130 GeV

[84] R. Ibañez-Meier & P. M. Stevenson, *Autonomous renormalization of the one loop effective potential and a 2-TeV Higgs in SU(2) × U(1)*, [hep-ph/9207241](https://arxiv.org/abs/hep-ph/9207241), Phys. Lett. B297 (1992) 144, 1900 GeV

[85] F. Jegerlehner, M. Y. Kalmykov & O. Veretin, *MS-bar vs. pole masses of gauge bosons: Electroweak bosonic two-loop corrections*, [hep-ph/0105304](https://arxiv.org/abs/hep-ph/0105304), Nucl. Phys. B641 (2002) 285

*MS-bar vs pole masses of gauge bosons. II: Two-loop electroweak fermion corrections*, [hep-ph/0212319](https://arxiv.org/abs/hep-ph/0212319), Nucl. Phys. B658 (2003) 49, < 880 GeV

[86] T. A. Kaeding & S. Nandi, *The Higgs boson mass in gauge-mediated supersymmetry-breaking models with generalized messenger sectors*, [hep-ph/9906342](https://arxiv.org/abs/hep-ph/9906342), < 139 GeV

[87] D. E. Kahana & S. H. Kahana, *Top and Higgs masses in dynamical symmetry breaking*, [hep-ph/9312316](https://arxiv.org/abs/hep-ph/9312316), Phys. Rev. D 52 (1995) 3065, revisited: [arXiv:1112.2794](https://arxiv.org/abs/1112.2794) [hep-ph], 125 GeV

[88] G. Kane, P. Kumar, R. Lu & B. Zheng, *Higgs Mass Prediction for Realistic String/M Theory Vacua*, [arXiv:1112.1059](https://arxiv.org/abs/1112.1059) [hep-ph], 117 GeV

[89] P. Langacker, G. Paz, L. T. Wang & I. Yavin, *Z’-mediated Supersymmetry Breaking*, [arXiv:0710.1632](https://arxiv.org/abs/0710.1632), 160 GeV
[90] W. Langguth, I. Montvay & P. Weisz, *Monte Carlo Study Of The Standard SU(2) Higgs Model*, Nucl. Phys. B277 (1986) 11, 515 GeV

[91] W. Langguth & I. Montvay, *A numerical estimate of the upper limit for the Higgs bosons mass*, Z. Phys. C36 (1987) 725, < 724 GeV

[92] B. W. Lee, C. Quigg & H. B. Thacker, *Weak Interactions At Very High-Energies: The Role Of The Higgs Boson Mass*, Phys. Rev. D16 (1977) 1519, < 1008 GeV

[93] T. Li, J. A. Maxin, D. V. Nanopoulos & J. W. Walker, *A Natural Prediction for the Higgs Boson Mass: 120^{+3.5}_{-1} GeV*, [arXiv:1109.2110 [hep-ph]], 121.25 GeV

[94] S. Litsey & M. Sher, *Higgs Masses in the Four Generation MSSM*, [arXiv:0908.0502 [hep-ph]], Phys. Rev. D 80 (2009) 057701, < 400 GeV

[95] C. Liu, *Supersymmetry for Fermion Masses*, [hep-ph/0507298], Commun. Theor. Phys. 47 (2007) 1088, 145 GeV

[96] G. López Castro & J. Pestieau, *Determination of the Higgs boson mass by the cancellation of ultraviolet divergences in the SU(2)_L × U(1) theory*, [hep-ph/9504350], Mod. Phys. Lett. A10 (1995) 1155, 308.6 GeV

[97] E. Ma, *Exceeding the MSSM Higgs Mass Bound in a Special Class of U(1) Gauge Models*, [arXiv:1108.4029 [hep-ph]], Phys. Lett. B 705 (2011) 320, < 144 GeV

[98] R. Mahbubani, *Bounds on the Higgs mass in variations of Split Supersymmetry*, [hep-ph/0408096], 255 GeV

[99] A. Maloney, A. Pierce & J. G. Wacker, *D-terms, unification, and the Higgs mass*, [hep-ph/0409127], JHEP 0606 (2006) 034, < 150 GeV

[100] A. D. Medina, N. R. Shah & C. E. M. Wagner, *Gauge-Higgs unification and radiative electroweak symmetry breaking in warped extra dimensions*, [arXiv:0706.1281], 137 GeV

[101] T. Moroi & Y. Okada, *Upper bound of the lightest neutral Higgs mass in extended supersymmetric Standard Models*, Phys. Lett. B295 (1992) 73, < 150 and < 180 GeV

[102] K. Nakayama & F. Takahashi, *Higgs mass and inflation*, [arXiv:1108.3762 [hep-ph]], 130 GeV

[103] K. Nakayama, N. Yokozaki & K. Yonekura, *Relaxing the Higgs mass bound in singlet extensions of the MSSM*, [arXiv:1108.4338 [hep-ph]], JHEP 1111 (2011) 021, < 130 GeV

[104] K. Namsrai, *A theoretical estimate of the Higgs boson mass*, Int. J. Theor. Phys. 35 (1996) 1369, 182 GeV
[105] Y. Ne’eman & J. Thierry Mieg, *BRS algebra of the SU(2|1) electroweak ghost-gauge theory*, Nuov. Cim. 71A (1982) 104, 250 GeV

[106] Y. Ne’eman, *Internal supergroup prediction of the Goldstone-Higgs particle mass*, Phys. Lett. B181 (1986) 308, 160.9 GeV

[107] G. j. Ni, S. y. Lou, W. f. Lu & J. f. Yang, *lambda phi**4 model and Higgs mass in standard model calculated by Gaussian effective potential approach with a new regularization-renormalization method*, [hep-ph/9801264](https://arxiv.org/abs/hep-ph/9801264), Sci. China A41 (1998) 1206, 134 GeV

[108] Y. Okada, M. Yamaguchi & T. Yanagida, *Upper bound of the lightest Higgs boson mass in the minimal supersymmetric standard model*, Prog. Theor. Phys. 85 (1991) 1, < 130 GeV

[109] Y. Okumura, *An estimation of the Higgs boson mass in the two loop approximation in a noncommutative differential geometry*, [hep-ph/9707350](https://arxiv.org/abs/hep-ph/9707350), Eur. Phys. J. C4 (1998) 711, 153 GeV

[110] J. Pasupathy, *A calculation of Higgs mass in the standard model*, [hep-ph/0006258](https://arxiv.org/abs/hep-ph/0006258), Mod. Phys. Lett. A15 (2000) 1605

B. Ananthanarayan & J. Pasupathy, *Higgs mass in the standard model from coupling constant reduction*, [hep-ph/0104286](https://arxiv.org/abs/hep-ph/0104286), Int. J. Mod. Phys. A17 (2002) 335, 154 GeV

[111] M. Passera, W. J. Marciano & A. Sirlin, *The muon g-2 and the bounds on the Higgs boson mass*, [arXiv:0804.1142](https://arxiv.org/abs/0804.1142), < 130 GeV

M. Passera, W. J. Marciano & A. Sirlin, *The muon g-2 discrepancy: new physics or a relatively light Higgs?*, [arXiv:1001.4528](https://arxiv.org/abs/1001.4528) [hep-ph], < 135 GeV

[112] L. A. Popa, *Higgs mass from cosmological and astrophysical measurements*, [arXiv:0910.5312](https://arxiv.org/abs/0910.5312) [astro-ph.CO], 148.1 GeV

[113] M. B. Popovic, ‘*Thanks to 2D and maybe even beyond: 115 GeV and 140 GeV almost Standard Model Higgs without problems*, [arXiv:1009.5054](https://arxiv.org/abs/1009.5054) [hep-ph], 115.4 and 143.4 GeV

[114] G. Roepstorff & C. Vehns, *Towards a unified theory of gauge and Yukawa interactions*, [hep-ph/0006065](https://arxiv.org/abs/hep-ph/0006065), 160 GeV

[115] B. Schrempp & F. Schrempp, *An estimate for the Higgs mass*, Phys. Lett. B168 (1986) 259, 185 GeV

[116] B. Schrempp & F. Schrempp, *A renormalization group invariant line and infrared attractive top - Higgs mass relation*, Phys. Lett. B299 (1993) 321, 155 GeV

[117] E. Schucking, *The Higgs mass in the substandard theory*, [hep-th/0702177](https://arxiv.org/abs/hep-th/0702177), 115.3 GeV
[118] M. Shaposhnikov & C. Wetterich, *Asymptotic safety of gravity and the Higgs boson mass*, arXiv:0912.0208 [hep-th], Phys. Lett. B 683 (2010) 196, 126.3 and 150 GeV

[119] R. Squellari & C. A. Stephan, *Almost-Commutative Geometries Beyond the Standard Model III: Vector Doublets*, arXiv:0706.3112, J. Phys. A 40 (2007) 10685, 203 GeV

[120] B. Stech, *Flavor Symmetry and Grand Unification*, arXiv:1012.6028 [hep-ph], 123 GeV

[121] C. A. Stephan, *Almost-Commutative Geometries Beyond the Standard Model II: New Colours*, arXiv:0706.0595, J. Phys. A 40 (2007) 9941, 241.2 GeV

[122] D. Suematsu & G. Zoupanos, *mu-term due to the non-universal supersymmetry breaking and the Higgs mass*, hep-ph/0102096, JHEP 0106 (2001) 038, < 144 GeV

[123] J. Tolksdorf & T. Thumstädter, *Dirac type theories and the mass of the Higgs boson*, math-ph/0602028, J. Phys. A 40 (2007) 9691, 186 GeV

[124] R. Trostel, *Spinor connection within Weinberg-Salam model and prediction of Higgs mass*, Phys. Lett. B193 (1987) 464, 185.7 GeV

[125] M. Veltman, *The infrared-ultraviolet connection*, Acta Phys. Polon. 12 (1981) 437, 309 GeV