Gauge & Higgs Boson Summary Table

Searches for Higgs Bosons — H^0 and $H^{\pm}$

H^0 Mass $m >$ 58.4 GeV, CL = 95%

H^0_1 in Supersymmetric Models ($m_{H^0_1} < m_{H^0_2}$) [j]

Mass $m >$ 44 GeV, CL = 95% for tanβ >1

A^0 Pseudoscalar Higgs Boson in Supersymmetric Models [j]

Mass $m >$ 22 GeV, CL = 95% for 50>tanβ >1

$H^{\pm}$ Mass $m >$ 41.7 GeV, CL = 95%

See the Full Listings for a Note giving details of Higgs Bosons.

Searches for Heavy Bosons Other Than Higgs Bosons

Additional *W* Bosons

W_R — right-handed W
Mass $m >$ 406 GeV, CL = 90%
(assuming light right-handed neutrino)

W' with standard couplings decaying to $e\nu$, $\mu\nu$
Mass $m >$ 520 GeV, CL = 95%

Additional *Z* Bosons

Z'_{SM} with standard couplings
Mass $m >$ 412 GeV, CL = 95% ($p\overline{p}$ direct search)
Mass $m >$ 779 GeV, CL = 95% (electroweak fit)

Z_{LR} of SU(2)$_L\times$SU(2)$_R\times$U(1)
(with $g_L = g_R$)
Mass $m >$ 310 GeV, CL = 95% ($p\overline{p}$ direct search)
Mass $m >$ 389 GeV, CL = 95% (electroweak fit)

Z_χ of SO(10) $\rightarrow$ SU(5)$\times$U(1)$_\chi$
(coupling constant derived from G.U.T.)
Mass $m >$ 340 GeV, CL = 95% ($p\overline{p}$ direct search)
Mass $m >$ 321 GeV, CL = 95% (electroweak fit)

Z_ψ of E_6 $\rightarrow$ SO(10)$\times$U(1)$_\psi$
(coupling constant derived from G.U.T.)
Mass $m >$ 320 GeV, CL = 95% ($p\overline{p}$ direct search)
Mass $m >$ 160 GeV, CL = 95% (electroweak fit)

Z_η of E_6 $\rightarrow$ SU(3)$\times$SU(2)$\times$U(1)$\times$U(1)$_\eta$
(coupling constant derived from G.U.T.;
charges are $Q_\eta = \sqrt{3/8}Q_\chi - \sqrt{5/8}Q_\psi$)
Mass $m >$ 340 GeV, CL = 95% ($p\overline{p}$ direct search)
Mass $m >$ 182 GeV, CL = 95% (electroweak fit)

Scalar Leptoquarks

Mass $m >$ 120 GeV, CL = 95% (1st generation, pair prod.)
Mass $m >$ 181 GeV, CL = 95% (1st gener., single prod.)
Mass $m >$ 44.5 GeV, CL = 95% (2nd gener., pair prod.)
Mass $m >$ 73 GeV, CL = 95% (2nd gener., single prod.)
Mass $m >$ 45 GeV, CL = 95% (3rd gener., pair prod.)
(last four limits are for charge $-1/3$, weak isoscalar)

Searches for Axions (A^0) and Other Very Light Bosons

The standard Peccei-Quinn axion is ruled out. Variants with reduced couplings or much smaller masses are constrained by various data. The Full Listings in the full *Review* contain a Note discussing axion searches.

The best limit for the half-life of neutrinoless double beta decay with Majoron emission is $> 7.2 \times 10^{24}$ years (CL = 90%).

NOTES

In this Summary Table:

When a quantity has "(S = ...)" to its right, the error on the quantity has been enlarged by the "scale factor" S, defined as S = $\sqrt{\chi^2/(N-1)}$, where N is the number of measurements used in calculating the quantity. We do this when S > 1, which often indicates that the measurements are inconsistent. When S > 1.25, we also show in the Full Listings an ideogram of the measurements. For more about S, see the Introduction.

A decay momentum p is given for each decay mode. For a 2-body decay, p is the momentum of each decay product in the rest frame of the decaying particle. For a 3-or-more-body decay, p is the largest momentum any of the products can have in this frame.

[a] Theoretical value. A mass as large as a few MeV may not be precluded.
[b] ℓ indicates each type of lepton (e, μ, and τ), not sum over them.
[c] The Z-boson mass listed here corresponds to a Breit-Wigner resonance parameter. It lies approximately 34 MeV above the real part of the position of the pole (in the energy plane) in the Z-boson propagator.
[d] This partial width takes into account Z decays into $\nu\overline{\nu}$ and any other possible undetected modes.
[e] This ratio has not been corrected for the τ mass.
[f] Here $A \equiv 2g_V g_A/(g_V^2+g_A^2)$.
[g] The value is for the sum of the charge states indicated.
[h] See the Z Full Listings for the γ energy range used in this measurement.
[i] For $m_{\gamma\gamma} = (60 \pm 5)$ GeV.
[j] The limits assume no invisible decays.