[113] ADRIANI 92G limit improves to 44 GeV if $B(\tau\nu_\tau) > 0.4$.

[114] Studied $H^+H^- \rightarrow (\tau\nu) + (\tau\nu)$, $H^+H^- \rightarrow (\tau\nu)$ + hadrons, $H^+H^- \rightarrow$ hadrons.

[115] DECAMP 92 limit improves to 45.3 GeV for $B(\tau\nu)=1$.

[116] HEWETT 93 and BARGER 93 analyze charged Higgs contribution to $b \rightarrow s\gamma$ in two-doublet models with the CLEO limit $B(b \rightarrow s\gamma) < 8.4 \times 10^{-4}$ (90% CL) and find lower limits on $m_{H^\pm}$ in the type of model (model II) in which different Higgs are responsible for up-type and down-type quark masses. HEWETT 93 give $m_{H^+} >110$ (70) GeV for $m_t >150$ (120) GeV using $m_b = 5$ GeV. BARGER 93 give $m_{H^+} >155$ GeV for $m_t = 150$ GeV using $m_b = 4.25$ GeV. The authors employ leading logarithmic QCD corrections and emphasize that the limits are quite sensitve to m_b.

[117] BELANGER 93 make an analysis similar to BARGER 93 and HEWETT 93 with an improved CLEO limit $B(b \rightarrow s\gamma) < 5.4 \times 10^{-4}$ (95%CL). For the Type II model, the limit $m_{H^+} >540$ (300) GeV for $m_t >150$ (120) GeV is obtained. The authors employ leading logarithmic QCD corrections.

[118] ALITTI 92F search for $t \rightarrow bH^+$, $H^+ \rightarrow \tau\nu_\tau$ with τ decaying hadronically in $p\overline{p}$ collisions at $E_{cm} = 630$ GeV. m_{H^+} between 40 and 65 GeV is excluded if $m_t - m_H = m_b + (\lesssim$ a few–10 GeV). See Figs. 5, 6 for the excluded region for $B(H^+ \rightarrow \tau\nu_\tau) = 1, 0.5$.

[119] ALBAJAR 91B search for $W \rightarrow t\overline{b}$ and $t\overline{t}$ production in $p\overline{p}$ collisions with the decay chain $t \rightarrow H^+ b$, $H^+ \rightarrow \tau^+\nu$, in single muon plus jets and dimuon channels. For $m_t = 60$ GeV, $m_{H^+} < 47$ GeV is excluded at 95%CL if $\tan\beta > 2.3$. The search is restricted to small values of m_t, and no limit on m_{H^+} is obtained if $m_t > 61$ GeV. Note that existing limits on m_t are not valid if $t \rightarrow H^+ b$.

[120] YUZUKI 91 assume photon exchange. The limit is valid for any decay mode $H^+ \rightarrow e\nu$, $\mu\nu$, $\tau\nu$, $q\overline{q}$ with five flavors. For $B(\ell\nu) = 1$, the limit improves to 25.0 GeV.

[121] ABREU 90B limit improves to 36 GeV for $B(\tau\nu) = 1$.

[122] ADACHI 90B limit improves to 22 GeV for $B(\tau\nu) = 0.6$.

[123] ADEVA 90M limit improves to 42.5 GeV for $B(\tau\nu) = 1$.

[124] AKRAWY 90K limit improves to 43 GeV for $B(\tau\nu) = 1$.

[125] If $B(H^+ \rightarrow \tau^+\nu) = 100\%$, the DECAMP 90I limit improves to 43 GeV.

[126] SMITH 90B limit applies for $v_2/v_1 > 2$ in a model in which H_2 couples to u-type quarks and charged leptons.

[127] Studied $H^+H^- \rightarrow (\tau\nu) + (\tau\nu)$, $H^+H^- \rightarrow (\tau\nu)$ + hadrons. Search for muon opposite hadronic shower.

MASS LIMITS for $H^{\pm\pm}$ (doubly-charged Higgs boson)

VALUE (GeV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
>45.6	95	[128] ACTON	92M	OPAL	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>30.4	95	[128] ACTON	92M	OPAL	$T_3(H^{++}) = +1$
>25.5	95	[129] ACTON	92M	OPAL	$T_3(H^{++}) = 0$
none 6.5–36.6	95	[130] SWARTZ	90	MRK2	$T_3(H^{++}) = +1$
none 7.3–34.3	95	[130] SWARTZ	90	MRK2	$T_3(H^{++}) = 0$

[128] ACTON 92M limit assumes $H^{\pm\pm} \rightarrow \ell^\pm\ell^\pm$ or $H^{\pm\pm}$ does not decay in the detector. Thus the region $g_{\ell\ell} \approx 10^{-7}$ is not excluded.

[129] ACTON 92M from $\Delta\Gamma_Z <40$ MeV.

[130] SWARTZ 90 assume $H^{\pm\pm} \rightarrow \ell^\pm\ell^\pm$ (any flavor). The limits are valid for the Higgs-lepton coupling $g(H\ell\ell) \gtrsim 7.4 \times 10^{-7}/[m_H/\text{GeV}]^{1/2}$. The limits improve somewhat for ee and $\mu\mu$ decay modes.

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AKERS 94B PL B327 397 +Alexander, Allison, Anderson, Arcelli+ (OPAL Collab.)
ELLIS 94 PL B324 173 +Fogli, Lisi (CERN, BARI)
ADRIANI 93C PL B303 391 +Aguilar-Benitez, Ahlen, Alcaraz, Aloiso+ (L3 Collab.)
BARGER 93 PRL 70 1368 +Berger, Phillips (WISC, RAL)
BELANGER 93 PR D48 5419 +Geng, Turcotte (MONT, ISU, AMES)
BLONDEL 93 PL B311 346 +Verzegnassi (EPOL, TRSTT, TRSTI)
BRAHMACH... 93 PR D48 4224 Brahmachari, Joshipura, Rindani+ (AHMED, TATA, CERN)
BUSKULIC 93H PL B313 299 +De Bonis, Decamp, Ghez, Goy+ (ALEPH Collab.)
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ACTON 92M PL B295 347 +Alexander, Allison, Allport, Anderson+ (OPAL Collab.)
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ALITTI 92F PL B280 137 +Ambrosini, Ansari, Autiero, Bareyre+ (UA2 Collab.)
BARABASH 92 PL B295 154 +Baranov+ (JINR, CERN, SERP, BUDA, BERL)
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SCHMIEDM... 91 PRL 66 1015 Schmiedmayer, Riehs, Harvey, Hill (TUW, ORNL)
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