Technicolor

See the related review(s):

Dynamical Electroweak Symmetry Breaking: Implications of the H^0

The latest unpublished results are described in "Dynamical Electroweak Symmetry Breaking" review.

MASS LIMITS for Resonances in Models of Dynamical Electroweak Symmetry Breaking

VALUE (GeV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
		[1] AAD	16W	ATLS	color octet vector resonance
>2400	95	[2] KHACHATRY...	16E	CMS	top-color Z'
		[3] AAD	15AB	ATLS	$h \rightarrow \pi_V \pi_V$
>1800	95	[4] AAD	15AO	ATLS	top-color Z'
		[5] AAD	15BB	ATLS	$p p \rightarrow \rho_T / a_{1T} \rightarrow W h$ or $Z h$
		[6] AAD	15Q	ATLS	$h \rightarrow \pi_V \pi_V$
		[7] AAIJ	15AN	LHCB	$h \rightarrow \pi_V \pi_V$
>1140	95	[8] KHACHATRY...	15C	CMS	$\rho_T \rightarrow W Z$
		[9] KHACHATRY...	15W	CMS	$H \rightarrow \pi_V \pi_V$
none 200–700, 750–890	95	[10] AAD	14AT	ATLS	$p p \rightarrow \omega_T \rightarrow Z \gamma$
none 275–960	95	[10] AAD	14AT	ATLS	$p p \rightarrow a_T \rightarrow W \gamma$
		[11] AAD	14V	ATLS	color singlet techni-vector
> 703		[12] AAD	13AN	ATLS	$p p \rightarrow a_T \rightarrow W \gamma$
> 494		[13] AAD	13AN	ATLS	$p p \rightarrow \omega_T \rightarrow Z \gamma$
none 500–1740	95	[14] AAD	13AQ	ATLS	top-color Z'
>1300	95	[15] CHATRCHYAN	13AP	CMS	top-color Z'
>2100	95	[14] CHATRCHYAN	13BM	CMS	top-color Z'
		[16] BAAK	12	RVUE	QCD-like technicolor
none 167–687	95	[17] CHATRCHYAN	12AF	CMS	$\rho_T \rightarrow W Z$
> 805	95	[14] AALTONEN	11AD	CDF	top-color Z'
> 805	95	[14] AALTONEN	11AE	CDF	top-color Z'
		[18] CHIVUKULA	11	RVUE	top-Higgs
		[19] CHIVUKULA	11A	RVUE	techini-π
		[20] AALTONEN	10I	CDF	$p \overline{p} \rightarrow \rho_T / \omega_T \rightarrow W \pi_T$
none 208–408	95	[21] ABAZOV	10A	D0	$\rho_T \rightarrow W Z$
		[22] ABAZOV	07I	D0	$p \overline{p} \rightarrow \rho_T / \omega_T \rightarrow W \pi_T$
> 280	95	[23] ABULENCIA	05A	CDF	$\rho_T \rightarrow e^+ e^-$, $\mu^+ \mu^-$
		[24] CHEKANOV	02B	ZEUS	color octet techni-π
> 207	95	[25] ABAZOV	01B	D0	$\rho_T \rightarrow e^+ e^-$
none 90–206.7	95	[26] ABDALLAH	01	DLPH	$e^+ e^- \rightarrow \rho_T$
		[27] AFFOLDER	00F	CDF	color-singlet techni-ρ, $\rho_T \rightarrow W \pi_T$, $2\pi_T$

> 600	95	[28] AFFOLDER	00K	CDF	color-octet techni-ρ, $\rho_{T8} \rightarrow 2\pi_{LQ}$
none 350–440	95	[29] ABE	99F	CDF	color-octet techni-ρ, $\rho_{T8} \rightarrow \overline{b}b$
		[30] ABE	99N	CDF	techni-ω, $\omega_T \rightarrow \gamma \overline{b}b$
none 260–480	95	[31] ABE	97G	CDF	color-octet techni-ρ, $\rho_{T8} \rightarrow$ 2jets

[1] AAD 16W search for color octet vector resonance decaying to bB in pp collisions at $\sqrt{s}$ = 8 TeV. The vector like quark B is assumed to decay to bH. See their Fig.3 and Fig.4 for limits on $\sigma \cdot B$.

[2] KHACHATRYAN 16E search for top-color Z' decaying to $t\overline{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'}$ = 0.012. Also exclude $m_{Z'}$ < 2.9 TeV for wider topcolor Z' with $\Gamma_{Z'}/m_{Z'}$ = 0.1.

[3] AAD 15AB search for long-lived hidden valley π_V particles which are produced in pairs by the decay of a scalar boson. π_V is assumed to decay into dijets. See their Fig. 10 for the limit on σB.

[4] AAD 15AO search for top-color Z' decaying to $t\overline{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'}$ = 0.012.

[5] AAD 15BB search for minimal walking technicolor (MWT) isotriplet vector and axial-vector resonances decaying to Wh or Zh. See their Fig. 3 for the exclusion limit in the MWT parameter space.

[6] AAD 15Q search for long-lived hidden valley π_V particles which are produced in pairs by the decay of scalar boson. π_V is assumed to decay into dijets. See their Fig. 5 and Fig. 6 for the limit on σB.

[7] AAIJ 15AN search for long-lived hidden valley π_V particles which are produced in pairs by the decay of scalar boson with a mass of 120GeV. π_V is assumed to decay into dijets. See their Fig. 4 for the limit on σB.

[8] KHACHATRYAN 15C search for a vector techni-resonance decaying to WZ. The limit assumes M_{π_T} = (3/4) M_{ρ_T} − 25 GeV. See their Fig.3 for the limit in $M_{\pi_T} - M_{\rho_T}$ plane of the low scale technicolor model.

[9] KHACHATRYAN 15W search for long-lived hidden valley π_V particles which are produced in pairs in the decay of heavy higgs boson H. π_V is assumed to decay into $\ell^+\ell^-$. See their Fig. 7 and Fig. 8 for the limits on σB.

[10] AAD 14AT search for techni-ω and techni-a resonances decaying to $V\gamma$ with $V = W(\rightarrow \ell\nu)$ or $Z(\rightarrow \ell^+\ell^-)$.

[11] AAD 14V search for vector techni-resonances decaying into electron or muon pairs in pp collisions at $\sqrt{s}$ = 8 TeV. See their table IX for exclusion limits with various assumptions.

[12] AAD 13AN search for vector techni-resonance a_T decaying into $W\gamma$.

[13] AAD 13AN search for vector techni-resonance ω_T decaying into $Z\gamma$.

[14] Search for top-color Z' decaying to $t\overline{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'}$ = 0.012.

[15] CHATRCHYAN 13AP search for top-color leptophobic Z' decaying to $t\overline{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'}$ = 0.012.

[16] BAAK 12 give electroweak oblique parameter constraints on the QCD-like technicolor models. See their Fig. 28.

[17] CHATRCHYAN 12AF search for a vector techni-resonance decaying to WZ. The limit assumes M_{π_T}= (3/4) M_{ρ_T}− 25 GeV. See their Fig. 3 for the limit in $M_{\pi_T} - M_{\rho_T}$ plane of the low scale technicolor model.

[18] Using the LHC limit on the Higgs boson production cross section, CHIVUKULA 11 obtain a limit on the top-Higgs mass > 300 GeV at 95% CL assuming 150 GeV top-pion mass.

[19] Using the LHC limit on the Higgs boson production cross section, CHIVUKULA 11A obtain a limit on the techinipion mass ruling out the region 110 GeV < m_P < $2m_t$. Existence of color techni-fermions, top-color mechanism, and $N_{TC} \geq$ 3 are assumed.

[20] AALTONEN 10I search for the vector techni-resonances (ρ_T, ω_T) decaying into $W\pi_T$ with $W \rightarrow \ell\nu$ and $\pi_T \rightarrow b\overline{b}$, $b\overline{c}$, or $b\overline{u}$. See their Fig. 3 for the exclusion plot in $M_{\pi_T} - M_{\rho_T}$ plane.

[21] ABAZOV 10A search for a vector techni-resonance decaying into WZ. The limit assumes $M_{\rho_T} < M_{\pi_T} + M_W$.

[22] ABAZOV 07I search for the vector techni-resonances (ρ_T, ω_T) decaying into $W\pi_T$ with $W \rightarrow e\nu$ and $\pi_T \rightarrow b\overline{b}$ or $b\overline{c}$. See their Fig. 2 for the exclusion plot in $M_{\pi_T} - M_{\rho_T}$ plane.

[23] ABULENCIA 05A search for resonances decaying to electron or muon pairs in $p\overline{p}$ collisions. at $\sqrt{s} = 1.96$ TeV. The limit assumes Technicolor-scale mass parameters $M_V = M_A = 500$ GeV.

[24] CHEKANOV 02B search for color octet techni-π P decaying into dijets in ep collisions. See their Fig. 5 for the limit on $\sigma(ep \rightarrow ePX)\cdot$B$(P \rightarrow 2j)$.

[25] ABAZOV 01B searches for vector techni-resonances (ρ_T,ω_T) decaying to e^+e^-. The limit assumes $M_{\rho_T} = M_{\omega_T} < M_{\pi_T} + M_W$.

[26] The limit is independent of the π_T mass. See their Fig. 9 and Fig. 10 for the exclusion plot in the M_{ρ_T}–M_{π_T} plane. ABDALLAH 01 limit on the techni-pion mass is $M_{\pi_T} > 79.8$ GeV for N_D=2, assuming its point-like coupling to gauge bosons.

[27] AFFOLDER 00F search for ρ_T decaying into $W\pi_T$ or $\pi_T\pi_T$ with $W \rightarrow \ell\nu$ and $\pi_T \rightarrow \overline{b}b$, $\overline{b}c$. See Fig. 1 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the exclusion plot in the M_{ρ_T}–M_{π_T} plane.

[28] AFFOLDER 00K search for the ρ_{T8} decaying into $\pi_{LQ}\pi_{LQ}$ with $\pi_{LQ} \rightarrow b\nu$. For $\pi_{LQ} \rightarrow c\nu$, the limit is $M_{\rho_{T8}} > 510$ GeV. See their Fig. 2 and Fig. 3 for the exclusion plot in the $M_{\rho_{T8}}$–$M_{\pi_{LQ}}$ plane.

[29] ABE 99F search for a new particle X decaying into $b\overline{b}$ in $p\overline{p}$ collisions at E_{cm}= 1.8 TeV. See Fig. 7 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the upper limit on $\sigma(p\overline{p} \rightarrow X)\times$B$(X \rightarrow b\overline{b})$. ABE 99F also exclude top gluons of width Γ=0.3M in the mass interval 280 $<M<$ 670 GeV, of width Γ=0.5M in the mass interval 340 $<M<$ 640 GeV, and of width Γ=0.7M in the mass interval 375 $<M<$ 560 GeV.

[30] ABE 99N search for the techni-ω decaying into $\gamma\pi_T$. The technipion is assumed to decay $\pi_T \rightarrow b\overline{b}$. See Fig. 2 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the exclusion plot in the M_{ω_T}–M_{π_T} plane.

[31] ABE 97G search for a new particle X decaying into dijets in $p\overline{p}$ collisions at E_{cm}= 1.8 TeV. See Fig. 5 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the upper limit on $\sigma(p\overline{p} \rightarrow X)\times$B$(X \rightarrow 2j)$.

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