Technicolor

NODE=S057

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The latest unpublished results are described in "Dynamical Electroweak Symmetry Breaking" review. NODE=S057200

MASS LIMITS for Resonances in Models of Dynamical Electroweak Symmetry Breaking

NODE=S057DSB

VALUE (GeV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
>3900	95	[1] AAD	20AM	ATLS	top-color Z'
		[2] AAD	20W	ATLS	$\rho_T \to W\pi_T \to \ell\nu q\bar{q}$
		[3] AAD	16W	ATLS	color octet vector resonance
>2400	95	[4] KHACHATRY...	16E	CMS	top-color Z'
		[5] AAD	15AB	ATLS	$h \to \pi_v\pi_v$
>1800	95	[6] AAD	15AO	ATLS	top-color Z'
		[7] AAD	15BB	ATLS	$pp \to \rho_T/a_{1T} \to WH$ or ZH
		[8] AAD	15Q	ATLS	$h \to \pi_v\pi_v$
		[9] AAIJ	15AN	LHCB	$h \to \pi_v\pi_v$
>1140	95	[10] KHACHATRY...	15C	CMS	$\rho_T \to WZ$
		[11] KHACHATRY...	15W	CMS	$H \to \pi_v\pi_v$
none 200–700, 750–890	95	[12] AAD	14AT	ATLS	$pp \to \omega_T \to Z\gamma$
none 275–960	95	[12] AAD	14AT	ATLS	$pp \to a_T \to W\gamma$ OCCUR=2
		[13] AAD	14V	ATLS	color singlet techni-vector
> 703		[14] AAD	13AN	ATLS	$pp \to a_T \to W\gamma$
> 494		[15] AAD	13AN	ATLS	$pp \to \omega_T \to Z\gamma$ OCCUR=2
none 500–1740	95	[16] AAD	13AQ	ATLS	top-color Z'
>1300	95	[17] CHATRCHYAN	13AP	CMS	top-color Z'
>2100	95	[16] CHATRCHYAN	13BM	CMS	top-color Z'
		[18] BAAK	12	RVUE	QCD-like technicolor
none 167–687	95	[19] CHATRCHYAN	12AF	CMS	$\rho_T \to WZ$
> 805	95	[16] AALTONEN	11AD	CDF	top-color Z'
> 805	95	[16] AALTONEN	11AE	CDF	top-color Z'
		[20] CHIVUKULA	11	RVUE	top-Higgs
		[21] CHIVUKULA	11A	RVUE	techini-π
		[22] AALTONEN	10I	CDF	$p\bar{p} \to \rho_T/\omega_T \to W\pi_T$
none 208–408	95	[23] ABAZOV	10A	D0	$\rho_T \to WZ$
		[24] ABAZOV	07I	D0	$p\bar{p} \to \rho_T/\omega_T \to W\pi_T$
> 280	95	[25] ABULENCIA	05A	CDF	$\rho_T \to e^+e^-, \mu^+\mu^-$
		[26] CHEKANOV	02B	ZEUS	color octet techni-π
> 207	95	[27] ABAZOV	01B	D0	$\rho_T \to e^+e^-$
none 90–206.7	95	[28] ABDALLAH	01	DLPH	$e^+e^- \to \rho_T$
		[29] AFFOLDER	00F	CDF	color-singlet techni-ρ, $\rho_T \to W\pi_T, 2\pi_T$
> 600	95	[30] AFFOLDER	00K	CDF	color-octet techni-ρ, $\rho_{T8} \to 2\pi_{LQ}$
none 350–440	95	[31] ABE	99F	CDF	color-octet techni-ρ, $\rho_{T8} \to \bar{b}b$
		[32] ABE	99N	CDF	techni-ω, $\omega_T \to \gamma\bar{b}b$
none 260–480	95	[33] ABE	97G	CDF	color-octet techni-ρ, $\rho_{T8} \to$ 2jets

[1] AAD 20AM search for a top-color Z' decaying to $t\bar{t}$ in pp collisions at $\sqrt{s} = 13$ TeV. The quoted limit is for $\Gamma_{Z'}/M_{Z'} = 0.01$. The limit becomes $M_{Z'} > 4700$ GeV for $\Gamma_{Z'}/M_{Z'} = 0.03$. NODE=S057DSB;LINKAGE=Y

[2] AAD 20W search for techni-ρ decaying to $\pi_T W$ in pp collisions at $\sqrt{s} = 13$ TeV. See their Fig. 5a for limits on $\sigma \cdot B$. NODE=S057DSB;LINKAGE=W

[3] 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 $\sigma \cdot B$. NODE=S057DSB;LINKAGE=V

[4] KHACHATRYAN 16E search for top-color Z' decaying to $t\bar{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'} = 0.012$. Also exclude $m_{Z'} < 2.9$ TeV for wider topcolor Z' with $\Gamma_{Z'}/m_{Z'} = 0.1$. NODE=S057DSB;LINKAGE=T

[5] 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. NODE=S057DSB;LINKAGE=O

[6] AAD 15AO search for top-color Z' decaying to $t\bar{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'} = 0.012$. NODE=S057DSB;LINKAGE=P

[7] 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. NODE=S057DSB;LINKAGE=Q

[8] 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. NODE=S057DSB;LINKAGE=R

[9] 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. NODE=S057DSB;LINKAGE=S

[10] KHACHATRYAN 15C search for a vector techni-resonance decaying to WZ. The limit assumes $M_{\pi_T} = (3/4)\ M_{\rho_T} - 25$ GeV. See their Fig.3 for the limit in $M_{\pi_T} - M_{\rho_T}$ plane of the low scale technicolor model. NODE=S057DSB;LINKAGE=N

[11] 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. NODE=S057DSB;LINKAGE=U

[12] AAD 14AT search for techni-ω and techni-a resonances decaying to $V\gamma$ with $V = W(\to \ell\nu)$ or $Z(\to\ \ell^+\ell^-)$. NODE=S057DSB;LINKAGE=L

[13] 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. NODE=S057DSB;LINKAGE=J

[14] AAD 13AN search for vector techni-resonance a_T decaying into $W\gamma$. NODE=S057DSB;LINKAGE=M

[15] AAD 13AN search for vector techni-resonance ω_T decaying into $Z\gamma$. NODE=S057DSB;LINKAGE=AN

[16] Search for top-color Z' decaying to $t\bar{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'} = 0.012$. NODE=S057DSB;LINKAGE=LT

[17] CHATRCHYAN 13AP search for top-color leptophobic Z' decaying to $t\bar{t}$. The quoted limit is for $\Gamma_{Z'}/m_{Z'} = 0.012$. NODE=S057DSB;LINKAGE=K

[18] BAAK 12 give electroweak oblique parameter constraints on the QCD-like technicolor models. See their Fig. 28. NODE=S057DSB;LINKAGE=I

[19] CHATRCHYAN 12AF search for a vector techni-resonance decaying to WZ. The limit assumes $M_{\pi_T} = (3/4)\ M_{\rho_T} - 25$ GeV. See their Fig. 3 for the limit in $M_{\pi_T} - M_{\rho_T}$ plane of the low scale technicolor model. NODE=S057DSB;LINKAGE=CA

[20] 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. NODE=S057DSB;LINKAGE=CH

[21] 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. NODE=S057DSB;LINKAGE=CI

[22] AALTONEN 10I search for the vector techni-resonances (ρ_T, ω_T) decaying into $W\pi_T$ with $W \to\ \ell\nu$ and $\pi_T \to\ b\bar{b}$, $b\bar{c}$, or $b\bar{u}$. See their Fig. 3 for the exclusion plot in $M_{\pi_T} - M_{\rho_T}$ plane. NODE=S057DSB;LINKAGE=AA

[23] ABAZOV 10A search for a vector techni-resonance decaying into WZ. The limit assumes $M_{\rho_T} < M_{\pi_T} + M_W$. NODE=S057DSB;LINKAGE=AB

[24] ABAZOV 07I search for the vector techni-resonances (ρ_T, ω_T) decaying into $W\pi_T$ with $W \to\ e\nu$ and $\pi_T \to\ b\bar{b}$ or $b\bar{c}$. See their Fig. 2 for the exclusion plot in $M_{\pi_T} - M_{\rho_T}$ plane. NODE=S057DSB;LINKAGE=VA

[25] ABULENCIA 05A search for resonances decaying to electron or muon pairs in $p\bar{p}$ collisions. at $\sqrt{s} = 1.96$ TeV. The limit assumes Technicolor-scale mass parameters $M_V = M_A = 500$ GeV. NODE=S057DSB;LINKAGE=BU

[26] CHEKANOV 02B search for color octet techni-π P decaying into dijets in ep collisions. See their Fig. 5 for the limit on $\sigma(ep \to\ ePX)\cdot B(P \to\ 2j)$. NODE=S057DSB;LINKAGE=KV

[27] ABAZOV 01B searches for vector techni-resonances (ρ_T,ω_T) decaying to e^+e^-. The limit assumes $M_{\rho_T} = M_{\omega_T} < M_{\pi_T} + M_W$. NODE=S057DSB;LINKAGE=BZ

[28] 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. NODE=S057DSB;LINKAGE=BD

[29] AFFOLDER 00F search for ρ_T decaying into $W\pi_T$ or $\pi_T\pi_T$ with $W \to\ \ell\nu$ and $\pi_T \to\ \bar{b}b$, $\bar{b}c$. See Fig. 1 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the exclusion plot in the $M_{\rho_T} - M_{\pi_T}$ plane. NODE=S057DSB;LINKAGE=F

[30] AFFOLDER 00K search for the ρ_{T8} decaying into $\pi_{LQ}\pi_{LQ}$ with $\pi_{LQ} \to\ b\nu$. For $\pi_{LQ} \to\ c\nu$, 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. NODE=S057DSB;LINKAGE=G

[31] ABE 99F search for a new particle X decaying into $b\bar{b}$ in $p\bar{p}$ collisions at $E_{\rm cm} = 1.8$ TeV. See Fig. 7 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the upper limit on $\sigma(p\bar{p} \to\ X)\times B(X \to\ b\bar{b})$. ABE 99F also exclude top gluons of width $\Gamma = 0.3M$ in the mass interval $280 < M < 670$ GeV, of width $\Gamma = 0.5M$ in the mass interval $340 < M < 640$ GeV, and of width $\Gamma = 0.7M$ in the mass interval $375 < M < 560$ GeV. NODE=S057DSB;LINKAGE=C

[32] ABE 99N search for the techni-ω decaying into $\gamma\pi_T$. The technipion is assumed to decay $\pi_T \to b\bar{b}$. See Fig. 2 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the exclusion plot in the $M_{\omega_T} - M_{\pi_T}$ plane. NODE=S057DSB;LINKAGE=E

[33] ABE 97G search for a new particle X decaying into dijets in $p\bar{p}$ collisions at $E_{\rm cm} = 1.8$ TeV. See Fig. 5 in the above Note on "Dynamical Electroweak Symmetry Breaking" for the upper limit on $\sigma(p\bar{p} \to X) \times B(X \to 2j)$. NODE=S057DSB;LINKAGE=B

REFERENCES FOR Technicolor

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AAD	20W	JHEP 2006 151	G. Aad *et al.*	(ATLAS Collab.)	REFID=60507
AAD	16W	PL B758 249	G. Aad *et al.*	(ATLAS Collab.)	REFID=57227
KHACHATRY...	16E	PR D93 012001	V. Khachatryan *et al.*	(CMS Collab.)	REFID=57017
AAD	15AB	PR D92 012010	G. Aad *et al.*	(ATLAS Collab.)	REFID=56600
AAD	15AO	JHEP 1508 148	G. Aad *et al.*	(ATLAS Collab.)	REFID=56645
AAD	15BB	EPJ C75 263	G. Aad *et al.*	(ATLAS Collab.)	REFID=56669
AAD	15Q	PL B743 15	G. Aad *et al.*	(ATLAS Collab.)	REFID=56498
AAIJ	15AN	EPJ C75 152	R. Aaij *et al.*	(LHCb Collab.)	REFID=56766
KHACHATRY...	15C	PL B740 83	V. Khachatryan *et al.*	(CMS Collab.)	REFID=56269
KHACHATRY...	15W	PR D91 052012	V. Khachatryan *et al.*	(CMS Collab.)	REFID=56536
AAD	14AT	PL B738 428	G. Aad *et al.*	(ATLAS Collab.)	REFID=56129
AAD	14V	PR D90 052005	G. Aad *et al.*	(ATLAS Collab.)	REFID=55884
AAD	13AN	PR D87 112003	G. Aad *et al.*	(ATLAS Collab.)	REFID=55155
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AAD	13AQ	PR D88 012004	G. Aad *et al.*	(ATLAS Collab.)	REFID=55168
CHATRCHYAN	13AP	PR D87 072002	S. Chatrchyan *et al.*	(CMS Collab.)	REFID=55139
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Also		PRL 112 119903 (errat.)	S. Chatrchyan *et al.*	(CMS Collab.)	REFID=55841
BAAK	12	EPJ C72 2003	M. Baak *et al.*	(Gfitter Group)	REFID=54138
CHATRCHYAN	12AF	PRL 109 141801	S. Chatrchyan *et al.*	(CMS Collab.)	REFID=54618
AALTONEN	11AD	PR D84 072003	T. Aaltonen *et al.*	(CDF Collab.)	REFID=53801
AALTONEN	11AE	PR D84 072004	T. Aaltonen *et al.*	(CDF Collab.)	REFID=53802
CHIVUKULA	11	PR D84 095022	R.S. Chivukula *et al.*		REFID=53924
CHIVUKULA	11A	PR D84 115025	R. S. Chivukula *et al.*		REFID=54026
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ABAZOV	10A	PRL 104 061801	V.M. Abazov *et al.*	(D0 Collab.)	REFID=53262
ABAZOV	07I	PRL 98 221801	V.M. Abazov *et al.*	(D0 Collab.)	REFID=51810
ABULENCIA	05A	PRL 95 252001	A. Abulencia *et al.*	(CDF Collab.)	REFID=51009
CHEKANOV	02B	PL B531 9	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=48937
ABAZOV	01B	PRL 87 061802	V.M. Abazov *et al.*	(D0 Collab.)	REFID=48208
ABDALLAH	01	EPJ C22 17	J. Abdallah *et al.*	(DELPHI Collab.)	REFID=48505
AFFOLDER	00F	PRL 84 1110	T. Affolder *et al.*	(CDF Collab.)	REFID=47573
AFFOLDER	00K	PRL 85 2056	T. Affolder *et al.*	(CDF Collab.)	REFID=47752
ABE	99F	PRL 82 2038	F. Abe *et al.*	(CDF Collab.)	REFID=46728
ABE	99N	PRL 83 3124	F. Abe *et al.*	(CDF Collab.)	REFID=47211
ABE	97G	PR D55 5263	F. Abe *et al.*	(CDF Collab.)	REFID=45343