τ

$J = \frac{1}{2}$

τ discovery paper was PERL 75. $e^+e^- \rightarrow \tau^+\tau^-$ cross-section threshold behavior and magnitude are consistent with pointlike spin-1/2 Dirac particle. BRANDELIK 78 ruled out pointlike spin-0 or spin-1 particle. FELDMAN 78 ruled out $J = 3/2$. KIRKBY 79 also ruled out J=integer, $J = 3/2$.

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τ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$1777.1^{+0.4}_{-0.5}$ OUR AVERAGE					
$1777.8 \pm 0.7 \pm 1.7$	35k	[1] BALEST	93	CLEO	E^{ee}_{cm}= 10.6 GeV
$1776.3 \pm 2.4 \pm 1.4$	11k	[2] ALBRECHT	92M	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
$1776.9^{+0.4}_{-0.5} \pm 0.2$	14	[3] BAI	92	BES	E^{ee}_{cm}= 3.55–3.60 GeV
1787 ± 10		BLOCKER	80	MRK2	E^{ee}_{cm}= 3.5–6.7 GeV
1783^{+3}_{-4}	692	[4] BACINO	78B	DLCO	E^{ee}_{cm}= 3.1–7.4 GeV
1787^{+10}_{-18}	299	[5] BARTEL	78	SPEC	E^{ee}_{cm}= 3.6–4.4 GeV
1807 ± 20		BRANDELIK	78	DASP	E^{ee}_{cm}= 3.1–5.2 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1803 ± 16	1138	BLOCKER	82D	MRK2	Incl. in BLOCKER 80

[1] BALEST 93 fit spectra of minimum kinematically allowed τ mass in events of the type $e^+e^- \rightarrow \tau^+\tau^- \rightarrow (\pi^+ n\pi^0 \nu_\tau)(\pi^- m\pi^0 \nu_\tau)$ $n \leq 2$, $m \leq 2$, $1 \leq n+m \leq 3$. If $m_{\nu_\tau} \neq 0$, result increases by ($m^2_{\nu_\tau}$/1100 MeV).

[2] ALBRECHT 92M fit τ pseudomass spectrum in $\tau^- \rightarrow 2\pi^-\pi^+\nu_\tau$ decays. Result assumes m_{ν_τ}=0.

[3] BAI 92 fit $\sigma(e^+e^- \rightarrow \tau^+\tau^-)$ near threshold using $e\mu$ events.

[4] BACINO 78B value comes from $e^\pm X^\mp$ threshold. Published mass 1782 MeV increased by 1 MeV using the high precision $\psi(2S)$ mass measurement of ZHOLENTZ 80 to eliminate the absolute SPEAR energy calibration uncertainty.

[5] BARTEL 78 fits energy dependence of cross section for $e^\pm$ and $\mu^\pm$ events. Mass value not dependent on whether $V-A$ or $V+A$ decay assumed.

τ MEAN LIFE

The downward revision of the τ mass to 1777.1 MeV (see the τ mass above) results in a downward correction of some of the older lifetime measurements, with the net result that the average should be reduced by 0.2 fs. WASSERBAECH 93 shows that additional systematic biases are not consistently taken into account by the experimenters. When the appropriate corrections are applied, the average is decreased by an additional 0.8 fs. "OUR EVALUATION" reflects these changes.

VALUE (10^{-15} s)	EVTS	DOCUMENT ID		TECN	COMMENT
292.0 ± 2.1 OUR AVERAGE					
$288.8 \pm 2.2 \pm 1.4$	105k	AKERS	94M	OPAL	1990–93 LEP runs
298 ± 7		ABREU	93E	DLPH	E^{ee}_{cm}= 88.5–93.7 GeV
$293 \pm 9 \pm 12$	5743	ADRIANI	93M	L3	1991 LEP run
$304 \pm 14 \pm 7$	4100	BATTLE	92	CLEO	E^{ee}_{cm}= 10.6 GeV
$294.7 \pm 5.4 \pm 3.0$	11.8k	BUSKULIC	92H	ALEP	E^{ee}_{cm}= 88.5–93.7 GeV
$314 \pm 23 \pm 9$		ABREU	91D	DLPH	E^{ee}_{cm}= 88–94 GeV
$309 \pm 23 \pm 30$	2817	ADEVA	91F	L3	1990 LEP run
301 ± 29	3780	KLEINWORT	89	JADE	E^{ee}_{cm}= 35–46 GeV
$288 \pm 16 \pm 17$	807	AMIDEI	88	MRK2	E^{ee}_{cm}= 29 GeV
$306 \pm 20 \pm 14$	695	BRAUNSCH...	88C	TASS	E^{ee}_{cm}= 36 GeV
$299 \pm 15 \pm 10$	1311	ABACHI	87C	HRS	E^{ee}_{cm}= 29 GeV
$295 \pm 14 \pm 11$	5696	ALBRECHT	87P	ARG	E^{ee}_{cm}= 9.3–10.6 GeV
$309 \pm 17 \pm 7$	3788	BAND	87B	MAC	E^{ee}_{cm}= 29 GeV
$325 \pm 14 \pm 18$	8470	BEBEK	87C	CLEO	E^{ee}_{cm}= 10.5 GeV

*CITATION: L. Montanet et al., Physical Review D50, 1173 (1994) and 1995 off-year partial update for the 1996 edition (URL: http://pdg.lbl.gov/)

• • • We do not use the following data for averages, fits, limits, etc. • • •

291.9± 5.1± 3.1	28k	ACTON	93J	OPAL	Repl. by AKERS 94M
291 ±13 ± 6	6621	DECAMP	92E	ALEP	Repl. by BUSKULIC 92H
308 ±13		ACTON	91C	OPAL	Repl. by ACTON 93J
315 ±36 ±40	10k	FERNANDEZ	85	MAC	E^{ee}_{cm}= 29 GeV
318 $^{+81}_{-94}$	50	ALTHOFF	84D	TASS	Repl. by BRAUNSCHWEIG 88C
320 ±54	156	JAROS	83	MRK2	Repl. by AMIDEI 88

τ MAGNETIC MOMENT ANOMALY

$\mu_\tau/(e\hbar/2m_\tau)-1 = (g_\tau-2)/2$

For a theoretical calculation $[(g_\tau-2)/2 = 11773(3) \times 10^{-7}]$, see SAMUEL 91B.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	[6] ESCRIBANO	93	RVUE	$Z \to \tau^+\tau^-$ at LEP
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.12	90	GRIFOLS	91	RVUE	$Z \to \tau\tau\gamma$ at LEP
<0.023	95	[7] SILVERMAN	83	RVUE	$e^+e^- \to \tau^+\tau^-$ at PETRA

[6] ESCRIBANO 93 limit derived from $\Gamma(Z \to \tau^+\tau^-)$, and is on the absolute value of the magnetic moment anomaly.

[7] SILVERMAN 83 limit is derived from $e^+e^- \to \tau^+\tau^-$ total cross-section measurements for q^2 up to $(37 \text{ GeV})^2$.

τ ELECTRIC DIPOLE MOMENT

A nonzero value is forbidden by both T invariance and P invariance.

VALUE (e cm)	CL%	DOCUMENT ID		TECN	COMMENT
<5 × 10^{-17}	95	[8] ESCRIBANO	93	RVUE	$Z \to \tau^+\tau^-$ at LEP
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<7 \times 10^{-16}$	90	GRIFOLS	91	RVUE	$Z \to \tau\tau\gamma$ at LEP
$<1.6 \times 10^{-16}$	90	DELAGUILA	90	RVUE	$e^+e^- \to \tau^+\tau^-$ E^{ee}_{cm}= 35 GeV

[8] ESCRIBANO 93 limit derived from $\Gamma(Z \to \tau^+\tau^-)$, and is on the absolute value of the electric dipole moment.

τ WEAK DIPOLE MOMENT

A nonzero value is forbidden by CP invariance.

VALUE (e cm)	CL%	DOCUMENT ID		TECN	COMMENT
<3.7 × 10^{-17}	95	[9] BUSKULIC	92J	ALEP	$Z \to \tau^+\tau^-$ at LEP
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<7.0 \times 10^{-17}$	95	[9] ACTON	92F	OPAL	$Z \to \tau^+\tau^-$ at LEP

[9] Limit is on the absolute value of the weak dipole moment, and applies for $q^2 = m^2_Z$.

τ^- DECAY MODES

τ^+ modes are charge conjugates of the modes below. "$h^\pm$" stands for $\pi^\pm$ or $K^\pm$. "ℓ" stands for e or μ. "Neutral" means neutral hadron whose decay products include γ's and/or π^0's.

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level

Modes with one charged particle

Γ_1	particle$^-$ ≥ 0 neutrals ν_τ ("1-prong")	(84.2 ± 0.6) %	S=1.2
Γ_2	$\mu^- \overline{\nu}_\mu \nu_\tau$	(17.46 ± 0.25) %	S=1.1
Γ_3	$\mu^- \overline{\nu}_\mu \nu_\tau \gamma$ ($E_\gamma > 37$ MeV)	$(2.3 \pm 1.0) \times 10^{-3}$	
Γ_4	$e^- \overline{\nu}_e \nu_\tau$	(17.88 ± 0.18) %	S=1.1
Γ_5	$h^- \geq 0$ neutrals ν_τ	(48.9 ± 0.6) %	S=1.3
Γ_6	$h^- \nu_\tau$	(12.5 ± 0.4) %	S=1.2
Γ_7	$\pi^- \nu_\tau$	(11.3 ± 0.4) %	S=1.2
Γ_8	$K^- \geq 0$ neutrals ν_τ	(1.60 ± 0.10) %	
Γ_9	$K^- \nu_\tau$	$(6.7 \pm 0.5) \times 10^{-3}$	
Γ_{10}	$K^- \geq 1$ neutrals ν_τ	$(6.9 \pm 2.5) \times 10^{-3}$	
Γ_{11}	$K^- \pi^0 \nu_\tau$	$(5.2 \pm 0.7) \times 10^{-3}$	
Γ_{12}	$K^- \pi^0 \pi^0 \nu_\tau$	$(4.5 \pm 3.4) \times 10^{-4}$	
Γ_{13}	$K^- \geq 3\pi^0 \nu_\tau$	$(5 \pm 13) \times 10^{-4}$	
Γ_{14}	$h^- \geq 1$ neutrals ν_τ	(36.4 ± 0.5) %	S=1.3
Γ_{15}	$h^- \pi^0 \nu_\tau$	(25.5 ± 0.4) %	S=1.5
Γ_{16}	$\pi^- \pi^0 \nu_\tau$	(25.0 ± 0.4) %	S=1.5
Γ_{17}	$\pi^- \pi^0$ non-$\rho(770) \nu_\tau$		
Γ_{18}	$h^- \geq 2\pi^0 \nu_\tau$	(10.9 ± 0.4) %	S=1.2
Γ_{19}	$h^- 2\pi^0 \nu_\tau$	(9.31 ± 0.34) %	S=1.2
Γ_{20}	$h^- \geq 3\pi^0 \nu_\tau$	(1.42 ± 0.16) %	S=1.1
Γ_{21}	$h^- 3\pi^0 \nu_\tau$	(1.24 ± 0.15) %	S=1.1
Γ_{22}	$h^- 4\pi^0 \nu_\tau$	$(1.9 \pm 0.7) \times 10^{-3}$	
Γ_{23}	$h^- K^0 \geq 0$ neutrals ν_τ	(1.30 ± 0.30) %	
Γ_{24}	$\pi^- K^0 \nu_\tau$	$(8.8 \pm 1.7) \times 10^{-3}$	
Γ_{25}	$\pi^- K^0 \pi^0 \nu_\tau$	$(3.3 \pm 1.6) \times 10^{-3}$	
Γ_{26}	$K^- K^0 \geq 0$ neutrals ν_τ	$< 8 \times 10^{-3}$	CL=90%
Γ_{27}	$K^- K^0 \nu_\tau$	$(2.9 \pm 1.2) \times 10^{-3}$	
Γ_{28}	$K^- K^0 \geq 1$ neutrals ν_τ	$< 2.6 \times 10^{-3}$	CL=95%
Γ_{29}	$K^- K^0 \pi^0 \nu_\tau$	$(5 \pm 5) \times 10^{-4}$	

Modes with three charged particles

Γ_{30}	$2h^- h^+ \geq 0$ neutrals ν_τ ("3-prong")	(14.25 ± 0.25) %	S=1.5
Γ_{31}	$h^- h^- h^+ \nu_\tau$	(8.39 ± 0.31) %	S=1.3
Γ_{32}	$h^- h^- h^+ \geq 1$ neutrals ν_τ	(5.53 ± 0.30) %	S=1.2
Γ_{33}	$\pi^- \pi^+ \pi^- \geq 0$ neutrals ν_τ	(13.5 ± 0.4) %	
Γ_{34}	$\pi^- \pi^- \pi^+ \pi^0 \nu_\tau$		
Γ_{35}	$(a_1(1260)\pi)^- \nu_\tau$		
Γ_{36}	$(\rho\pi)^0 \pi^- \nu_\tau$		
Γ_{37}	$\rho^0 \pi^0 \pi^- \nu_\tau$		
Γ_{38}	$\rho^+ \pi^- \pi^- \nu_\tau$		
Γ_{39}	$\rho^- \pi^+ \pi^- \nu_\tau$		
Γ_{40}	$h^- h^- h^+ 2\pi^0 \nu_\tau$	$(4.8 \pm 0.5) \times 10^{-3}$	
Γ_{41}	$\omega \pi^- \geq 0$ neutrals ν_τ	(1.6 ± 0.4) %	
Γ_{42}	$\omega \pi^- \nu_\tau$	(1.6 ± 0.5) %	
Γ_{43}	$h^- \omega \pi^0 \nu_\tau$	$(3.9 \pm 0.6) \times 10^{-3}$	
Γ_{44}	$K^- h^+ h^- \geq 0$ neutrals ν_τ	$< 6 \times 10^{-3}$	CL=90%
Γ_{45}	$K^- \pi^+ \pi^- \geq 0$ neut. ν_τ	$(3.8 {}^{+1.9}_{-1.6}) \times 10^{-3}$	S=1.5
Γ_{46}	$K^- \pi^+ K^- \geq 0$ neut. ν_τ	$< 9 \times 10^{-4}$	CL=95%
Γ_{47}	$K^- K^+ \pi^- \geq 0$ neut. ν_τ	$(1.5 {}^{+0.9}_{-0.8}) \times 10^{-3}$	
Γ_{48}	$K^- K^+ \pi^- \nu_\tau$	$(2.2 {}^{+1.7}_{-1.1}) \times 10^{-3}$	
Γ_{49}	$K^- K^+ K^- \geq 0$ neut. ν_τ	$< 2.1 \times 10^{-3}$	CL=95%
Γ_{50}	$\pi^- K^+ \pi^- \geq 0$ neut. ν_τ	$< 2.5 \times 10^{-3}$	CL=95%
Γ_{51}	$K^0 h^+ h^- h^- \geq 0$ neut. ν_τ	$< 1.7 \times 10^{-3}$	CL=95%

Modes with five charged particles

Γ_{52}	$3h^- 2h^+ \geq 0$ neutrals ν_τ ("5-prong")	$(1.03\pm 0.11) \times 10^{-3}$	
Γ_{53}	$3h^- 2h^+ \nu_\tau$	$(7.1 \pm 0.9) \times 10^{-4}$	
Γ_{54}	$3h^- 2h^+ \pi^0 \nu_\tau$	$(2.1 \pm 0.8) \times 10^{-4}$	S=1.4
Γ_{55}	$3h^- 2h^+ 2\pi^0 \nu_\tau$	$< 1.1 \times 10^{-4}$	CL=90%
Γ_{56}	$(5\pi)^- \nu_\tau$	$(6.1 \pm 1.0) \times 10^{-3}$	

Miscellaneous other allowed modes

Γ_{57}	$4h^- 3h^+ \geq 0$ neutrals ν_τ ("7-prong")	$< 1.9 \times 10^{-4}$	CL=90%
Γ_{58}	$K^*(892)^- \geq 0(h^0 \neq K^0_S)\nu_\tau$	(1.94 ± 0.31) %	
Γ_{59}	$K^*(892)^- \geq 0$ neutrals ν_τ	(1.43 ± 0.17) %	
Γ_{60}	$K^*(892)^- \nu_\tau$	(1.45 ± 0.12) %	
Γ_{61}	$K^*(892)^0 K^- \geq 0$ neutrals ν_τ	$(3.2 \pm 1.4) \times 10^{-3}$	
Γ_{62}	$\overline{K}^*(892)^0 \pi^- \geq 0$ neutrals ν_τ	$(3.8 \pm 1.7) \times 10^{-3}$	
Γ_{63}	$K^0(\text{particles})^- \nu_\tau$	(1.94 ± 0.22) %	
Γ_{64}	$K_1(1270)^- \nu_\tau$	$(4 \pm 4) \times 10^{-3}$	
Γ_{65}	$K_1(1400)^- \nu_\tau$	$(8 \pm 4) \times 10^{-3}$	
Γ_{66}	$K^*_2(1430)^- \nu_\tau$	$< 3 \times 10^{-3}$	CL=95%
Γ_{67}	$a_0(980)^- \geq 0$ neutrals ν_τ		
Γ_{68}	$\eta\pi^- \geq 0$ neutrals ν_τ	< 1.3 %	CL=95%
Γ_{69}	$\eta\pi^- \nu_\tau$	$< 3.4 \times 10^{-4}$	CL=95%
Γ_{70}	$\eta\pi^- \pi^0 \nu_\tau$	$(1.70\pm 0.28) \times 10^{-3}$	
Γ_{71}	$\eta\pi^- \pi^0 \pi^0 \nu_\tau$	$< 4.3 \times 10^{-4}$	CL=95%
Γ_{72}	$\eta K^- \nu_\tau$	$< 4.7 \times 10^{-4}$	CL=95%
Γ_{73}	$\eta\pi^+ \pi^- \pi^- \geq 0$ neutrals ν_τ	$< 3 \times 10^{-3}$	CL=90%
Γ_{74}	$\eta\eta\pi^- \geq 0$ neutrals ν_τ	$< 5 \times 10^{-3}$	CL=90%
Γ_{75}	$\eta\eta\pi^- \nu_\tau$	$< 1.1 \times 10^{-4}$	CL=95%
Γ_{76}	$\eta\eta\pi^- \pi^0 \nu_\tau$	$< 2.0 \times 10^{-4}$	CL=95%

Lepton Family number (*LF*), Lepton number (*L*), or Baryon number (*B*) violating modes (In the modes below, ℓ means a sum over e and μ modes)

L means lepton number violation (*e.g.* $\tau^- \rightarrow e^+\pi^-\pi^-$). Following common usage, *LF* means lepton family violation *and not* lepton number violation (*e.g.* $\tau^- \rightarrow e^-\pi^+\pi^-$).

Γ_{77}	$e^-\gamma$	*LF*		$< 1.2 \times 10^{-4}$	CL=90%
Γ_{78}	$\mu^-\gamma$	*LF*		$< 4.2 \times 10^{-6}$	CL=90%
Γ_{79}	$e^-\pi^0$	*LF*		$< 1.4 \times 10^{-4}$	CL=90%
Γ_{80}	$\mu^-\pi^0$	*LF*		$< 4.4 \times 10^{-5}$	CL=90%
Γ_{81}	$e^- K^0$	*LF*		$< 1.3 \times 10^{-3}$	CL=90%
Γ_{82}	$\mu^- K^0$	*LF*		$< 1.0 \times 10^{-3}$	CL=90%
Γ_{83}	$e^-\eta$	*LF*		$< 6.3 \times 10^{-5}$	CL=90%
Γ_{84}	$\mu^-\eta$	*LF*		$< 7.3 \times 10^{-5}$	CL=90%
Γ_{85}	$e^-\rho^0$	*LF*		$< 4.2 \times 10^{-6}$	CL=90%
Γ_{86}	$\mu^-\rho^0$	*LF*		$< 5.7 \times 10^{-6}$	CL=90%
Γ_{87}	$e^- K^*(892)^0$	*LF*		$< 6.3 \times 10^{-6}$	CL=90%
Γ_{88}	$\mu^- K^*(892)^0$	*LF*		$< 9.4 \times 10^{-6}$	CL=90%
Γ_{89}	$\pi^-\gamma$	*L*		$< 2.8 \times 10^{-4}$	CL=90%
Γ_{90}	$\pi^-\pi^0$	*L*		$< 3.7 \times 10^{-4}$	CL=90%
Γ_{91}	$\ell^-\ell^-\ell^+$	*LF*	[a]	$< 3.4 \times 10^{-5}$	CL=90%
Γ_{92}	$e^-e^+e^-$	*LF*		$< 3.3 \times 10^{-6}$	CL=90%
Γ_{93}	$(e\mu\mu)^-$	*LF*		$< 2.7 \times 10^{-5}$	CL=90%
Γ_{94}	$e^-\mu^+\mu^-$	*LF*		$< 3.6 \times 10^{-6}$	CL=90%
Γ_{95}	$e^+\mu^-\mu^-$	*LF*		$< 3.5 \times 10^{-6}$	CL=90%
Γ_{96}	$(\mu ee)^-$	*LF*		$< 2.7 \times 10^{-5}$	CL=90%
Γ_{97}	$\mu^-e^+e^-$	*LF*		$< 3.4 \times 10^{-6}$	CL=90%
Γ_{98}	$\mu^+e^-e^-$	*L*		$< 3.4 \times 10^{-6}$	CL=90%
Γ_{99}	$\mu^-\mu^+\mu^-$	*LF*		$< 4.3 \times 10^{-6}$	CL=90%

Γ_{100}	$\ell^{\pm}\pi^{\mp}\pi^{-}$	*LF,L* [a,b]	$<$ 6.3	$\times 10^{-5}$	CL=90%
Γ_{101}	$e^{\mp}\pi^{\pm}\pi^{-}$	*LF,L* [b]	$<$ 6.0	$\times 10^{-5}$	CL=90%
Γ_{102}	$e^{-}\pi^{+}\pi^{-}$	*LF*	$<$ 4.4	$\times 10^{-6}$	CL=90%
Γ_{103}	$e^{+}\pi^{-}\pi^{-}$	*L*	$<$ 4.4	$\times 10^{-6}$	CL=90%
Γ_{104}	$\mu^{\mp}\pi^{\pm}\pi^{-}$	*LF,L* [b]	$<$ 3.9	$\times 10^{-5}$	CL=90%
Γ_{105}	$\mu^{-}\pi^{+}\pi^{-}$	*LF*	$<$ 7.4	$\times 10^{-6}$	CL=90%
Γ_{106}	$\mu^{+}\pi^{-}\pi^{-}$	*L*	$<$ 6.9	$\times 10^{-6}$	CL=90%
Γ_{107}	$\ell^{\pm}\pi^{\mp}K^{-}$	*LF,L* [a,b]	$<$ 1.2	$\times 10^{-4}$	CL=90%
Γ_{108}	$(e\pi K)^{-}$, all charged	*LF,L*	$<$ 7.7	$\times 10^{-5}$	CL=90%
Γ_{109}	$e^{-}\pi^{\pm}K^{\mp}$	*LF* [b]	$<$ 5.8	$\times 10^{-5}$	CL=90%
Γ_{110}	$e^{-}\pi^{+}K^{-}$	*LF*	$<$ 7.7	$\times 10^{-6}$	CL=90%
Γ_{111}	$e^{-}\pi^{-}K^{+}$	*LF*	$<$ 4.6	$\times 10^{-6}$	CL=90%
Γ_{112}	$e^{+}\pi^{-}K^{-}$	*L*	$<$ 4.5	$\times 10^{-6}$	CL=90%
Γ_{113}	$(\mu\pi K)^{-}$, all charged	*LF,L*	$<$ 7.7	$\times 10^{-5}$	CL=90%
Γ_{114}	$\mu^{-}\pi^{\pm}K^{\mp}$	*LF* [b]	$<$ 7.7	$\times 10^{-5}$	CL=90%
Γ_{115}	$\mu^{-}\pi^{+}K^{-}$	*LF*	$<$ 8.7	$\times 10^{-6}$	CL=90%
Γ_{116}	$\mu^{-}\pi^{-}K^{+}$	*LF*	$<$ 1.5	$\times 10^{-5}$	CL=90%
Γ_{117}	$\mu^{+}\pi^{-}K^{-}$	*L*	$<$ 2.0	$\times 10^{-5}$	CL=90%
Γ_{118}	$\overline{p}\gamma$	*L,B*	$<$ 2.9	$\times 10^{-4}$	CL=90%
Γ_{119}	$\overline{p}\pi^{0}$	*L,B*	$<$ 6.6	$\times 10^{-4}$	CL=90%
Γ_{120}	$\overline{p}\eta$	*L,B*	$<$ 1.30	$\times 10^{-3}$	CL=90%
Γ_{121}	$e^{-}\overline{K}^{*}(892)^{0}$		$<$ 1.1	$\times 10^{-5}$	CL=90%
Γ_{122}	$\mu^{-}\overline{K}^{*}(892)^{0}$		$<$ 8.7	$\times 10^{-6}$	CL=90%
Γ_{123}	e^{-} light spinless boson	*LF*	$<$ 3.2	$\times 10^{-3}$	CL=95%
Γ_{124}	μ^{-} light spinless boson	*LF*	$<$ 6	$\times 10^{-3}$	CL=95%
Γ_{125}	dummy mode used by the fit		(1.4 $\pm$ 0.7) %		S=1.3

[a] ℓ means a sum over e and μ modes.

[b] The value is for the sum of the charge states indicated.

CONSTRAINED FIT INFORMATION

An overall fit to 30 branching ratios uses 121 measurements and one constraint to determine 13 parameters. The overall fit has a $\chi^2 = 129.5$ for 109 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i\cdot\delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_2	x_4	x_7	x_9	x_{16}	x_{19}	x_{21}	x_{22}	x_{31}	x_{32}
x_4	−9									
x_7	−3	−2								
x_9	0	0	−15							
x_{16}	−3	−2	−3	0						
x_{19}	−2	−2	−4	0	−16					
x_{21}	−1	−1	−1	0	−3	−14				
x_{22}	0	0	0	0	−7	−5	−2			
x_{31}	−1	0	−1	0	0	−1	0	0		
x_{32}	0	0	1	0	1	0	0	0	−65	
x_{52}	0	0	0	0	0	0	0	0	1	−1
x_{60}	0	0	−11	0	−12	−1	0	0	−3	−4
x_{125}	−29	−20	−46	0	−42	−34	−12	−3	−15	−16

	x_{52}	x_{60}
x_{60}	0	
x_{125}	−1	−1

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τ^- BRANCHING RATIOS

Γ(particle$^-$ $\geq$ 0 neutrals ν_τ ("1-prong"))/Γ_{total}

$$\Gamma_1/\Gamma = (\Gamma_2+\Gamma_4+\Gamma_7+\Gamma_9+\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.771\Gamma_{60})/\Gamma$$

The charged particle here can be e, μ, or hadron. In many analyses, the sum of the topological branching fractions (1, 3, and 5 prongs) is constrained to be unity. Since the 5-prong fraction is very small, the measured 1-prong and 3-prong fractions are highly correlated and cannot be treated as independent quantities in our overall fit. We arbitrarily choose to use the 3-prong fraction in our fit, and leave the 1-prong fraction out. We do, however, use these 1-prong measurements in our average below. The measurements used only for the average are marked "avg," whereas "f&a" marks a result used for the fit and the average.

VALUE (%)		EVTS	DOCUMENT ID		TECN	COMMENT
84.2 ±0.6 OUR FIT Error includes scale factor of 1.2.						
85.46±0.30 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.						
84.48±0.27±0.23	avg		ACTON	92H	OPAL	E^{ee}_{cm}= 88.2–94.2 GeV
$85.45^{+0.69}_{-0.73}$±0.65	f&a		DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
85.6 ±0.6 ±0.3	avg	3300	[10] ADEVA	91F	L3	E^{ee}_{cm}= 88.3–94.3 GeV
86.4 ±0.3 ±0.3	avg		ABACHI	89B	HRS	E^{ee}_{cm}= 29 GeV
84.9 ±0.4 ±0.3	avg		BEHREND	89B	CELL	E^{ee}_{cm}= 14–47 GeV
84.7 ±0.8 ±0.6	avg		[11] AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV
87.2 ±0.5 ±0.8	avg		SCHMIDKE	86	MRK2	E^{ee}_{cm}= 29 GeV
84.7 ±1.1 $^{+1.6}_{-1.3}$	avg	169	[12] ALTHOFF	85	TASS	E^{ee}_{cm}= 34.5 GeV
86.1 ±0.5 ±0.9	avg		BARTEL	85F	JADE	E^{ee}_{cm}= 34.6 GeV
87.8 ±1.3 ±3.9	avg		[13] BERGER	85	PLUT	E^{ee}_{cm}= 34.6 GeV
86.7 ±0.3 ±0.6	avg		FERNANDEZ	85	MAC	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
87.1 ±1.0 ±0.7			[14] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
86.9 ±0.2 ±0.3		4098	AKERLOF	85B	HRS	Repl. by ABACHI 89B
85.2 ±0.9 ±1.5		660	AIHARA	84C	TPC	Repl. by AIHARA 87B
85.2 ±2.6 ±1.3		178	BEHREND	84	CELL	Repl. by BEHREND 89B
85.1 ±2.8 ±1.3		182	BEHREND	84	CELL	Repl. by BEHREND 89B
84.0 ±2.0		672	BEHREND	82	CELL	Repl. by BEHREND 89B
86 ±2 ±1		764	BLOCKER	82C	MRK2	Repl. by SCHMIDKE 86

[10] Not independent of ADEVA 91F $\Gamma(2h^- h^+ \geq 0$ neutrals ν_τ ("3-prong"))/Γ_{total} value.

[11] Not independent of AIHARA 87B $\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)/\Gamma_{total}$, $\Gamma(e^- \overline{\nu}_e \nu_\tau)/\Gamma_{total}$, and $\Gamma(h^- \geq$ 0 neutrals $\nu_\tau)/\Gamma_{total}$ values.

[12] Not independent of ALTHOFF 85 $\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)/\Gamma_{total}$, $\Gamma(e^- \overline{\nu}_e \nu_\tau)/\Gamma_{total}$, $\Gamma(h^- \geq 0$ neutrals $\nu_\tau)/\Gamma_{total}$, and $\Gamma(2h^- h^+ \geq 0$ neutrals ν_τ ("3-prong"))/Γ_{total} values.

[13] Not independent of (1-prong + $0\pi^0$) and (1-prong + $\geq 1\pi^0$) values.

[14] Not independent of SCHMIDKE 86 value (also not independent of BURCHAT 87 value for $\Gamma(2h^- h^+ \geq 0$ neutrals ν_τ ("3-prong"))/Γ_{total}.

$\Gamma\big(\text{particle}^- \geq 0 \text{ neutrals } \nu_\tau (\text{“1-prong”})\big)/\Gamma_{\text{total}}$ (%)

$\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)/\Gamma_{\text{total}}$ Γ_2/Γ

Data marked “avg” are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. “f&a” marks results used for the fit and the average.

VALUE (%)		*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
17.46±0.25 OUR FIT	Error includes scale factor of 1.1.					
17.44±0.23 OUR AVERAGE						
17.6 ±0.4 ±0.4	f&a	2148	ADRIANI	93M	L3	E^{ee}_{cm}= 88–94 GeV
17.4 ±0.7 ±0.6	f&a	687	ABREU	92N	DLPH	E^{ee}_{cm}= 88.2–94.2 GeV
17.2 ±0.4 ±0.5	avg		[15] ALBRECHT	92D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
17.35±0.41±0.37	f&a		DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
16.8 ±0.5 ±0.4	f&a	903	ALEXANDER	91D	OPAL	E^{ee}_{cm}= 88.3–94.3 GeV
17.7 ±0.8 ±0.4	f&a	568	BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
17.4 ±1.0	f&a	2197	ADEVA	88	MRKJ	E^{ee}_{cm}= 14–16 GeV
17.7 ±1.2 ±0.7	f&a		AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV
18.3 ±0.9 ±0.8	f&a		BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
18.6 ±0.8 ±0.7	avg	558	[16] BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV
12.9 ±1.7 $^{+0.7}_{-0.5}$	f&a		ALTHOFF	85	TASS	E^{ee}_{cm}= 34.5 GeV
18.0 ±0.9 ±0.5	avg	473	[16] ASH	85B	MAC	E^{ee}_{cm}= 29 GeV
18.0 ±1.0 ±0.6	f&a		[17] BALTRUSAIT...	85	MRK3	E^{ee}_{cm}= 3.77 GeV
19.4 ±1.6 ±1.7	f&a	153	BERGER	85	PLUT	E^{ee}_{cm}= 34.6 GeV
17.6 ±2.6 ±2.1	f&a	47	BEHREND	83C	CELL	E^{ee}_{cm}= 34 GeV
17.8 ±2.0 ±1.8	f&a		BERGER	81B	PLUT	E^{ee}_{cm}= 9–32 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
17.5 ±0.8 ±0.5		624	ADEVA	91F	L3	Repl. by ADRIANI 93M
17.4 ±0.6 ±0.8		1201	ADEVA	86B	MRKJ	Repl. by ADEVA 88

[15] Not independent of ALBRECHT 92D $\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)/\Gamma(e^- \overline{\nu}_e \nu_\tau)$ and $\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau) \times \Gamma(e^- \overline{\nu}_e \nu_\tau)/\Gamma_{\text{total}}$.

[16] Modified using B($e^- \overline{\nu}_e \nu_\tau$)/B(“1 prong”) and B(“1 prong”) ,= 0.855.

[17] Error correlated with BALTRUSAITIS 85 $e\nu\overline{\nu}$ value.

$\Gamma(\mu^-\overline{\nu}_\mu\nu_\tau)/\Gamma(\text{particle}^- \geq 0\text{ neutrals } \nu_\tau\,(\text{"1-prong"}))$ — $\Gamma_2/\Gamma_1 = \Gamma_2/(\Gamma_2+\Gamma_4+\Gamma_7+\Gamma_9+\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.771\Gamma_{60})$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.2073±0.0028 OUR FIT Error includes scale factor of 1.2.					
0.214 ±0.008 OUR AVERAGE					
0.217 ±0.009 ±0.008		BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV
0.211 ±0.010 ±0.006	390	ASH	85B	MAC	E^{ee}_{cm}= 29 GeV

$\Gamma(\mu^-\overline{\nu}_\mu\nu_\tau\gamma)/\Gamma(\mu^-\overline{\nu}_\mu\nu_\tau)$ — Γ_3/Γ_2

E_γ > 37 MeV.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.013±0.006	10	[18] WU	90	MRK2	E^{ee}_{cm}= 29 GeV

[18] Requirements on detected γ_s correspond to a τ rest frame energy cutoff E_γ > 37 MeV.

$\Gamma(e^-\overline{\nu}_e\nu_\tau)/\Gamma_{total}$ — Γ_4/Γ

Data marked "avg" are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. "f&a" marks results used for the fit and the average.

VALUE (%)		EVTS	DOCUMENT ID		TECN	COMMENT
17.88±0.18 OUR FIT Error includes scale factor of 1.1.						
17.90±0.17 OUR AVERAGE						
17.9 ±0.4 ±0.4	f&a	2892	ADRIANI	93M	L3	E^{ee}_{cm}= 88–94 GeV
18.6 ±0.8 ±0.6	f&a	554	ABREU	92N	DLPH	E^{ee}_{cm}= 88.2–94.2 GeV
17.97±0.14±0.23	f&a	3970	AKERIB	92	CLEO	E^{ee}_{cm}= 10.6 GeV
17.3 ±0.4 ±0.5	avg		[19] ALBRECHT	92D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
19.1 ±0.4 ±0.6	avg	2960	[20] AMMAR	92	CLEO	E^{ee}_{cm}= 10.5–10.9 GeV
18.09±0.45±0.45	f&a		DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
17.4 ±0.5 ±0.4	f&a	964	ALEXANDER	91D	OPAL	E^{ee}_{cm}= 88.3–94.3 GeV
17.0 ±0.5 ±0.6	f&a	1.7k	ABACHI	90	HRS	E^{ee}_{cm}= 29 GeV
18.4 ±0.8 ±0.4	f&a	644	BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
16.3 ±0.3 ±3.2	f&a		JANSSEN	89	CBAL	E^{ee}_{cm}= 9.4–10.6 GeV
18.4 ±1.2 ±1.0	f&a		AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV
19.1 ±0.8 ±1.1	f&a		BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
16.8 ±0.7 ±0.9	avg	515	[20] BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV
20.4 ±3.0 $^{+1.4}_{-0.9}$	f&a		ALTHOFF	85	TASS	E^{ee}_{cm}= 34.5 GeV
17.8 ±0.9 ±0.6	avg	390	[20] ASH	85B	MAC	E^{ee}_{cm}= 29 GeV
18.2 ±0.7 ±0.5	f&a		[21] BALTRUSAIT...	85	MRK3	E^{ee}_{cm}= 3.77 GeV
13.0 ±1.9 ±2.9	f&a		BERGER	85	PLUT	E^{ee}_{cm}= 34.6 GeV
18.3 ±2.4 ±1.9	f&a	60	BEHREND	83C	CELL	E^{ee}_{cm}= 34 GeV
16.0 ±1.3	f&a	459	[22] BACINO	78B	DLCO	E^{ee}_{cm}= 3.1–7.4 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
17.7 ±0.7 ±0.6		686	ADEVA	91F	L3	Repl. by ADRIANI 93M
18.3 ±0.7 ±0.5			[23] AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV

[19] Not independent of ALBRECHT 92D $\Gamma(\mu^-\overline{\nu}_\mu\nu_\tau)/\Gamma(e^-\overline{\nu}_e\nu_\tau)$ and $\Gamma(\mu^-\overline{\nu}_\mu\nu_\tau)\times\Gamma(e^-\overline{\nu}_e\nu_\tau)/\Gamma_{total}$.

[20] Modified using B($e^-\overline{\nu}_e\nu_\tau$)/B("1 prong") and B("1 prong") ,= 0.855.

[21] Error correlated with BALTRUSAITIS 85 $\Gamma(\mu^-\overline{\nu}_\mu\nu_\tau)/\Gamma_{total}$.

[22] BACINO 78B value comes from fit to events with $e^\pm$ and one other nonelectron charged prong.

[23] Combined result of AIHARA 87B $e\nu\overline{\nu}$ and $\mu\nu\overline{\nu}$ measurements assuming B($\mu\nu\overline{\nu}$)/B($e\nu\overline{\nu}$) = 0.973.

$\Gamma(e^-\overline{\nu}_e\nu_\tau)/\Gamma(\text{particle}^- \geq 0\text{ neutrals } \nu_\tau\,(\text{"1-prong"}))$ — $\Gamma_4/\Gamma_1 = \Gamma_4/(\Gamma_2+\Gamma_4+\Gamma_7+\Gamma_9+\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.771\Gamma_{60})$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.2123±0.0024 OUR FIT Error includes scale factor of 1.2.					
0.213 ±0.008 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
0.2231±0.0044±0.0073	2856	AMMAR	92	CLEO	E^{ee}_{cm}= 10.5–10.9 GeV
0.196 ±0.008 ±0.010		BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV
0.208 ±0.010 ±0.007	390	ASH	85B	MAC	E^{ee}_{cm}= 29 GeV

$\Gamma\left(e^- \overline{\nu}_e \nu_\tau\right)/\Gamma\left(\text{particle}^- \geq 0 \text{ neutrals } \nu_\tau \text{ ("1-prong")}\right)$

$\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau) \times \Gamma(e^- \overline{\nu}_e \nu_\tau)/\Gamma^2_{\text{total}}$ — $\Gamma_2\Gamma_4/\Gamma^2$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0312±0.0005 OUR FIT Error includes scale factor of 1.1.				
0.0302±0.0012 OUR AVERAGE				
0.0306±0.0005±0.0013	3230	ALBRECHT	93G ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.0288±0.0017±0.0019		ASH	85B MAC	E^{ee}_{cm}= 29 GeV
0.030 ±0.005	257	BLOCKER	82D MRK2	E^{ee}_{cm}= 3.5–6.7 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0298±0.0007±0.0013	1756	ALBRECHT	92D ARG	Repl. by ALBRECHT 93G

$\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)/\Gamma(e^- \overline{\nu}_e \nu_\tau)$ — Γ_2/Γ_4

Predicted to be 1 for sequential lepton, 1/2 for para-electron, and 2 for para-muon. Para-electron also ruled out by HEILE 78.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.976±0.018 OUR FIT Error includes scale factor of 1.1.				
1.00 ±0.05 OUR AVERAGE				
0.997±0.035±0.040		ALBRECHT	92D ARG	E^{ee}_{cm}= 9.4–10.6 GeV
1.33 ±0.18 ±0.36	154	BLOCKER	82D MRK2	E^{ee}_{cm}= 3.5–6.7 GeV

$\Gamma(h^- \geq 0 \text{ neutrals } \nu_\tau)/\Gamma_{\text{total}}$

$$\Gamma_5/\Gamma = (\Gamma_7+\Gamma_9+\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.771\Gamma_{60})/\Gamma$$

VALUE (%)		DOCUMENT ID	TECN	COMMENT
48.9±0.6 OUR FIT Error includes scale factor of 1.3.				
49.0±1.4 OUR AVERAGE				
48.6±1.2±0.9	avg	[24] AIHARA	87B TPC	E^{ee}_{cm}= 29 GeV
$51.5\pm2.9^{+1.6}_{-2.6}$	f&a	ALTHOFF	85 TASS	E^{ee}_{cm}= 34.5 GeV

[24] Not independent of AIHARA 87B $e\nu\overline{\nu}$, $\mu\nu\overline{\nu}$, and $\pi^+ 2\pi^- (\geq 0\pi^0)\nu$ values.

$\Gamma(h^- \nu_\tau)/\Gamma_{\text{total}}$ — $\Gamma_6/\Gamma = (\Gamma_7+\Gamma_9+\frac{1}{3}\Gamma_{60})/\Gamma$

Inclusion of the $\frac{1}{3}$B($\tau^- \rightarrow K^*(892)^- \nu_\tau$) corrects, at <0.26% level, for undetected K^0_L's, which are predominately from $K^*(892)^-$ decay.

Data marked "avg" are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. "f&a" marks results used for the fit and the average.

VALUE (%)		EVTS	DOCUMENT ID		TECN	COMMENT
12.5 ±0.4 OUR FIT Error includes scale factor of 1.2.						
12.47±0.33 OUR AVERAGE						
12.4 ±0.7 ±0.7	f&a	283	[25] ABREU	92N	DLPH	E^{ee}_{cm}= 88.2–94.2 GeV
13.32±0.44±0.33	f&a		[26] DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
12.1 ±0.7 ±0.5	f&a	309	ALEXANDER	91D	OPAL	E^{ee}_{cm}= 88.3–94.3 GeV
12.3 ±0.9 ±0.5	f&a	1338	BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
11.1 ±1.1 ±1.4	f&a		[27] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
11.3 ±0.5 ±0.8	avg	798	[28] FORD	87	MAC	E^{ee}_{cm}= 29 GeV
12.3 ±0.6 ±1.1	avg	328	[29] BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV
13.0 ±2.0 ±4.0	f&a		BERGER	85	PLUT	E^{ee}_{cm}= 34.6 GeV
11.2 ±1.7 ±1.2	f&a	34	[30] BEHREND	83C	CELL	E^{ee}_{cm}= 34 GeV

[25] ABREU 92 with 0.5% added to remove their correction for $K^*(892)^-$ backgrounds.
[26] DECAMP 92C consider $\tau^- \rightarrow h^-(K^0_S \rightarrow \pi^+\pi^-)\nu$ to be a 1-prong mode, which affects their 1-prong topological branching ratio relative to other experiments.
[27] BURCHAT 87 with 1.1% added to remove their correction for K^- and $K^*(892)^-$ backgrounds.
[28] FORD 87 result for B($\pi^-\nu_\tau$) with 0.67% added to remove their K^- correction and adjusted for 1992 B("1 prong").
[29] BARTEL 86D result for B($\pi^-\nu_\tau$) with 0.59% added to remove their K^- correction and adjusted for 1992 B("1 prong").
[30] BEHREND 83C quote B($\pi^-\nu_\tau$) = 9.9 ± 1.7 ± 1.3 after subtracting 1.3 ± 0.5 to correct for B($K^-\nu_\tau$).

$\Gamma(h^-\nu_\tau)/\Gamma(\text{particle}^- \geq 0\text{ neutrals }\nu_\tau(\text{"1-prong"}))$

$\Gamma_6/\Gamma_1 = (\Gamma_7+\Gamma_9+\frac{1}{3}\Gamma_{60})/(\Gamma_2+\Gamma_4+\Gamma_7+\Gamma_9+\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.771\Gamma_{60})$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.148±0.004 OUR FIT Error includes scale factor of 1.2.					
0.135±0.009 OUR AVERAGE					
0.131±0.006±0.009	798	[31] FORD	87	MAC	E^{ee}_{cm}= 29 GeV
0.143±0.007±0.013	328	[32] BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV

[31] FORD 87 result divided by 0.865, their assumed value for B("1 prong").
[32] BARTEL 86D result with 0.6% added to remove their K^- correction and then divided by 0.866, their assumed value for B("1 prong").

$\Gamma(h^-\nu_\tau)/\Gamma(e^-\overline{\nu}_e\nu_\tau)$ $\qquad\Gamma_6/\Gamma_4 = (\Gamma_7+\Gamma_9+\frac{1}{3}\Gamma_{60})/\Gamma_4$

VALUE	DOCUMENT ID		TECN	COMMENT
0.699±0.021 OUR FIT Error includes scale factor of 1.2.				
0.678±0.037±0.044	ALBRECHT	92D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.647±0.039±0.061	[33] BARTEL	86D	JADE	E^{ee}_{cm}= 34.6 GeV

[33] Combined result of BARTEL 86D $e\nu\overline{\nu}$, $\mu\nu\overline{\nu}$, and $\pi^-\nu$ assuming B($\mu\nu\overline{\nu}$)/B($e\nu\overline{\nu}$) = 0.973.

$\Gamma(\pi^-\nu_\tau)/\Gamma_{\text{total}}$ $\qquad\Gamma_7/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
11.3±0.4 OUR FIT Error includes scale factor of 1.2.					
11.7±0.4±1.8	1138	BLOCKER	82D	MRK2	E^{ee}_{cm}= 3.5–6.7 GeV

$\Gamma(K^- \geq 0\text{ neutrals }\nu_\tau)/\Gamma_{\text{total}}$ $\qquad\Gamma_8/\Gamma = (\Gamma_9+\Gamma_{10})/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.60±0.10 OUR AVERAGE					
1.54±0.24		ABREU	94K	DLPH	LEP 1992 Z data
1.60±0.12±0.19	202	BATTLE	94	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
1.60±0.07±0.12	967	[34] BUSKULIC	94E	ALEP	E^{ee}_{cm}= 88–94 GeV
1.6 ±0.4 ±0.2	35	AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV
1.71±0.29	53	MILLS	84	DLCO	E^{ee}_{cm}= 29 GeV

[34] Not independent of BUSKULIC 94E B($K^-\nu_\tau$), B($K^-\pi^0\nu_\tau$), B($K^-2\pi^0\nu_\tau$), B($K^-K^0\nu_\tau$), and B($K^-K^0\pi^0\nu_\tau$) values.

$\Gamma(K^- \nu_\tau)/\Gamma_{total}$ Γ_9/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.67±0.05 OUR FIT					
0.67±0.05 OUR AVERAGE					
0.85±0.18	27	ABREU	94K	DLPH	LEP 1992 Z data
0.66±0.07±0.09	99	BATTLE	94	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
0.64±0.05±0.05	336	BUSKULIC	94E	ALEP	E^{ee}_{cm}= 88–94 GeV
0.59±0.18	16	MILLS	84	DLCO	E^{ee}_{cm}= 29 GeV
1.3 ±0.5	15	BLOCKER	82B	MRK2	E^{ee}_{cm}= 3.9–6.7 GeV

$\Gamma(K^- \geq 1\ \text{neutrals}\ \nu_\tau)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.69±0.25		[35] ABREU	94K	DLPH	LEP 1992 Z data
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2 ±0.5 $^{+0.2}_{-0.4}$	9	AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV

[35] Not independent of ABREU 94K B($\tau^- \to K^- \nu_\tau$) and B($\tau- \to K^- \geq 0$ neutrals ν_τ) measurements.

$\Gamma(K^- \pi^0 \nu_\tau)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.07 OUR AVERAGE					
0.51±0.10±0.07	37	BATTLE	94	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
0.53±0.05±0.07	220	BUSKULIC	94E	ALEP	E^{ee}_{cm}= 88–94 GeV

$\Gamma(K^- \pi^0 \pi^0 \nu_\tau)/\Gamma_{total}$ Γ_{12}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.045±0.034 OUR AVERAGE					
0.09 ±0.10 ±0.03	3	[36] BATTLE	94	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
0.04 ±0.03 ±0.02	11	BUSKULIC	94E	ALEP	E^{ee}_{cm}= 88–94 GeV

[36] BATTLE 94 quote 0.14±0.10±0.03 or < 0.3% at 90% CL. We subtract (0.05±0.02)% to account for $\tau^- \to K^-(K^0 \to \pi^0\pi^0)\nu_\tau$ background.

$\Gamma(K^- \geq 3\pi^0 \nu_\tau)/\Gamma_{total}$ Γ_{13}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.05±0.13	[37] BUSKULIC	94E	ALEP	E^{ee}_{cm}= 88–94 GeV

[37] BUSKULIC 94E quote B($K^- \geq 0\pi^0 \geq 0K^0\nu_\tau$) − [B($K^-\nu_\tau$) + B($K^-\pi^0\nu_\tau$) + B($K^-K^0\nu_\tau$) + B($K^-\pi^0\pi^0\nu_\tau$) + B($K^-\pi^0K^0\nu_\tau$)] = 0.05 ± 0.13% accounting for common systematic errors in BUSKULIC 94E and BUSKULIC 94F measurements of these modes. We assume B($3K^- \geq 2K^0\nu_\tau$) is negligible.

$\Gamma(h^- \geq 1\ \text{neutrals}\ \nu_\tau)/\Gamma_{total}$ $\Gamma_{14}/\Gamma = (\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.438\Gamma_{60})/\Gamma$

VALUE (%)	DOCUMENT ID		TECN	COMMENT
36.4 ±0.5 OUR FIT Error includes scale factor of 1.3.				
36.7 ±0.8 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.				
36.14±0.33±0.58	AKERS	94E	OPAL	1991–1992 LEP runs
38.4 ±1.2 ±1.0	[38] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
42.7 ±2.0 ±2.9	BERGER	85	PLUT	E^{ee}_{cm}= 34.6 GeV

[38] BURCHAT 87 quote for B($\pi^\pm \geq 1$ neutral ν_τ) = 0.378 ± 0.012 ± 0.010. We add 0.006 to account for contribution from ($K^{*-}\nu_\tau$) which they fixed at BR = 0.013.

$\Gamma\left(h^- \geq 1 \text{ neutrals } \nu_\tau\right)/\Gamma_{\text{total}}$ (%)

$\Gamma\left(h^- \pi^0 \nu_\tau\right)/\Gamma_{\text{total}}$ **$\Gamma_{15}/\Gamma = (\Gamma_{16}+\frac{1}{3}\Gamma_{60})/\Gamma$**

Inclusion of the $\frac{1}{3}$B($\tau^- \rightarrow K^*(892)^- \nu_\tau$) corrects, at <0.26% level, for $K^- \pi^0$ from $K^*(892)$ decays.

VALUE (%)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
25.5 ±0.4 OUR FIT	Error includes scale factor of 1.5.				
25.4 ±0.5 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
26.25±0.36±0.52		AKERS	94E	OPAL	1991–1992 LEP runs
26.22±0.12±0.42	51k	[39] ARTUSO	94	CLEO	E^{ee}_{cm}= 10.6 GeV
22.9 ±0.8 ±1.3	283	[40] ABREU	92N	DLPH	E^{ee}_{cm}= 88.2–94.2 GeV
23.1 ±0.4 ±0.9	1249	[41] ALBRECHT	92Q	ARG	E^{ee}_{cm}= 10 GeV
25.02±0.64±0.88	1849	DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
22.0 ±0.8 ±1.9	779	ANTREASYAN	91	CBAL	E^{ee}_{cm}= 9.4–10.6 GeV
22.6 ±1.5 ±0.7	1101	BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
23.1 ±1.9 ±1.6		BEHREND	84	CELL	E^{ee}_{cm}= 14,22 GeV

[39] ARTUSO 94 reports the combined result from three independent methods, one of which (23% of the $\tau^- \rightarrow h^- \pi^0 \nu_\tau$) is normalized to the inclusive one-prong branching fraction, taken as 0.854 ± 0.004. Renormalization to the present value causes negligible change. We add 0.35% to the published result to include $\tau^- \rightarrow h^- \pi^0 K_L \nu_\tau$.

[40] ABREU 92 with 0.5% added to remove their correction for $K^*(892)^-$ backgrounds.

[41] ALBRECHT 92Q with 0.5% added to remove their correction for $\tau^- \rightarrow K^*(892)^- \nu_\tau$ background.

$\Gamma\left(h^-\pi^0\nu_\tau\right)/\Gamma_{\text{total}}$ (%)

$\Gamma\left(\pi^-\pi^0\nu_\tau\right)/\Gamma_{\text{total}}$ — Γ_{16}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
25.0±0.4 OUR FIT Error includes scale factor of 1.5.					
22.2±1.0 OUR AVERAGE					
21.5±0.4±1.9	4400	[42,43] ALBRECHT	88L	ARG	E^{ee}_{cm}= 10 GeV
23.0±1.3±1.7	582	ADLER	87B	MRK3	E^{ee}_{cm}= 3.77 GeV
22.3±0.6±1.4	629	[43] YELTON	86	MRK2	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
25.8±1.7±2.5		[44] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV

[42] The authors divide by ($\Gamma_2 + \Gamma_4 + \Gamma_7 + \Gamma_9$)/Γ = 0.467 to obtain this result.

[43] Experiment had no hadron identification. Kaon corrections were made, but insufficient information is given to permit their removal.

[44] BURCHAT 87 value is not independent of YELTON 86 value. Nonresonant decays included.

$\Gamma\left(\pi^-\pi^0\,\text{non-}\rho(770)\nu_\tau\right)/\Gamma_{\text{total}}$ — Γ_{17}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.3±0.1±0.3	[45] BEHREND	84	CELL	E^{ee}_{cm}= 14,22 GeV

[45] BEHREND 84 assume a flat nonresonant mass distribution down to the $\rho(770)$ mass, using events with mass above 1300 to set the level.

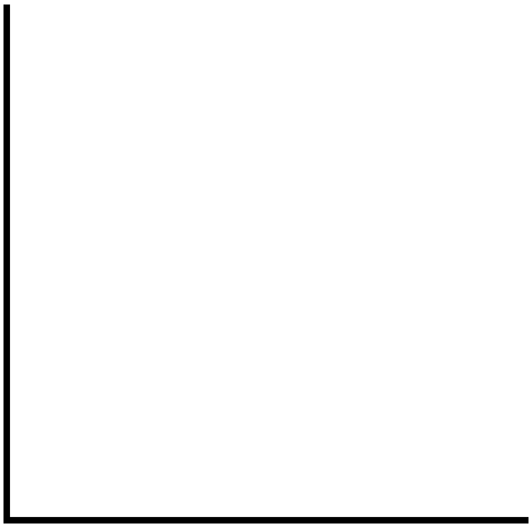
$\Gamma\left(h^- \geq 2\pi^0\nu_\tau\right)/\Gamma_{\text{total}}$ — $\Gamma_{18}/\Gamma = (\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.105\Gamma_{60})/\Gamma$

Data marked "avg" are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. "f&a" marks results used for the fit and the average.

VALUE (%)		EVTS	DOCUMENT ID		TECN	COMMENT
10.9 ±0.4 OUR FIT Error includes scale factor of 1.2.						
10.7 ±1.1 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.						
9.89±0.34±0.55	avg		AKERS	94E	OPAL	1991–1992 LEP runs
14.0 ±1.2 ±0.6	f&a	938	BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
12.0 ±1.4 ±2.5	f&a		[46] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
13.9 ±2.0 $^{+1.9}_{-2.2}$			[47] AIHARA	86E	TPC	E^{ee}_{cm}= 29 GeV

[46] Error correlated with BURCHAT 87 $\Gamma(\rho^-\nu_e)/\Gamma$(total) value.

[47] AIHARA 86E (TPC) quote $B(2\pi^0\pi^-\nu_\tau) + 1.6B(3\pi^0\pi^-\nu_\tau) + 1.1B(\pi^0\eta\pi^-\nu_\tau)$.



$\Gamma\left(h^- \geq 2\pi^0 \nu_\tau\right)/\Gamma_{\rm total}$ (%)

$\Gamma\left(h^- 2\pi^0 \nu_\tau\right)/\Gamma_{\rm total}$ — Γ_{19}/Γ

Entries are corrected for $K^*(892)^- \nu_\tau$ contributions.

Data marked "avg" are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. f&a marks results used for the fit and the average.

VALUE (%)		EVTS	DOCUMENT ID		TECN	COMMENT
9.31±0.34 OUR FIT	Error includes scale factor of 1.2.					
9.0 ±0.4 OUR AVERAGE	Error includes scale factor of 1.2.					
8.96±0.16±0.44	avg		[48] PROCARIO	93	CLEO	$E^{ee}_{\rm cm} \approx$ 10.6 GeV
10.38±0.66±0.82	f&a	809	[49] DECAMP	92C	ALEP	$E^{ee}_{\rm cm}$= 88–95 GeV
5.7 ±0.5 $^{+1.7}_{-1.0}$	f&a	133	[50] ANTREASYAN	91	CBAL	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
10.0 ±1.5 ±1.1	f&a	333	[51] BEHREND	90	CELL	$E^{ee}_{\rm cm}$= 35 GeV
8.7 ±0.4 ±1.1	f&a	815	[52] BAND	87	MAC	$E^{ee}_{\rm cm}$= 29 GeV
6.0 ±3.0 ±1.8	f&a		BEHREND	84	CELL	$E^{ee}_{\rm cm}$= 14,22 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
6.2 ±0.6 ±1.2			[53] GAN	87	MRK2	$E^{ee}_{\rm cm}$= 29 GeV

[48] PROCARIO 93 entry is obtained from B($h^- 2\pi^0 \nu_\tau$)/B($h^- \pi^0 \nu_\tau$) using ARTUSO 94 result for B($h^- \pi^0 \nu_\tau$).

[49] We subtract 0.0015 to account for $\tau^- \to K^*(892)^- \nu_\tau$ contribution.

[50] ANTREASYAN 91 subtract 0.001 to account for the $\tau^- \to K^*(892)^- \nu_\tau$ contribution.

[51] BEHREND 90 subtract 0.002 to account for the $\tau^- \to K^*(892)^- \nu_\tau$ contribution.

[52] BAND 87 assume B($\pi^- 3\pi^0 \nu_\tau$) = 0.01 and B($\pi^- \pi^0 \eta \nu_\tau$) = 0.005.

[53] GAN 87 analysis use photon multiplicity distribution.

$\Gamma\left(h^- 2\pi^0 \nu_\tau\right)/\Gamma\left(h^- \pi^0 \nu_\tau\right)$ — $\Gamma_{19}/\Gamma_{15} = \Gamma_{19}/(\Gamma_{16}+\frac{1}{3}\Gamma_{60})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.365±0.015 OUR FIT	Error includes scale factor of 1.2.			
0.342±0.006±0.016	[54] PROCARIO	93	CLEO	$E^{ee}_{\rm cm} \approx$ 10.6 GeV

[54] PROCARIO 93 quote 0.345 ± 0.006 ± 0.016 after correction for 2 kaon backgrounds assuming B($K^{*-} \nu_\tau$)=1.42 ± 0.18% and B($h^- K^0 \pi^0 \nu_\tau$)=0.48 ± 0.48%. We multiply by 0.990 ± 0.010 to remove these corrections to B($h^- \pi^0 \nu_\tau$).

*CITATION: L. Montanet et al., Physical Review D50, 1173 (1994) and 1995 off-year partial update for the 1996 edition (URL: http://pdg.lbl.gov/)

$\Gamma(h^- \geq 3\pi^0 \nu_\tau)/\Gamma_{total}$ — $\Gamma_{20}/\Gamma = (\Gamma_{21}+\Gamma_{22})/\Gamma$

In defining $B(h^- \geq 3\pi^0 \nu_\tau) = B(h^- 3\pi^0 \nu_\tau) + B(h^- 4\pi^0 \nu_\tau)$ we have assumed $B(h^- \geq 5\pi^0 \nu_\tau)$ is negligible.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.16 OUR FIT Error includes scale factor of 1.1.					
1.8 ±0.5 OUR AVERAGE					
1.53±0.40±0.46	186	DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
3.2 ±1.0 ±1.0		[55] BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
3.0 ±2.2 ±1.5		BEHREND	84	CELL	E^{ee}_{cm}= 14,22 GeV

[55] Not independent of BEHREND 90 $\Gamma(\text{hadron}^- \geq 2\pi^0 \nu_\tau)/\Gamma_{total}$ and $\Gamma(\pi^- 2\pi^0 \nu_\tau)/\Gamma_{total}$ values.

$\Gamma(h^- 3\pi^0 \nu_\tau)/\Gamma_{total}$ — Γ_{21}/Γ

Data marked "avg" are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. "f&a" marks results used for the fit and the average.

VALUE (%)		DOCUMENT ID		TECN	COMMENT
1.24±0.15 OUR FIT Error includes scale factor of 1.1.					
1.15±0.08±0.13	**avg**	[56] PROCARIO	93	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.0 \ {}^{+1.4}_{-0.1} \ {}^{+1.1}_{-0.1}$		[57] GAN	87	MRK2	E^{ee}_{cm}= 29 GeV

[56] PROCARIO 93 entry is obtained from $B(h^- 3\pi^0 \nu_\tau)/B(h^- \pi^0 \nu_\tau)$ using ARTUSO 94 result for $B(h^- \pi^0 \nu_\tau)$.

[57] Highly correlated with GAN 87 $\Gamma(\eta\pi^- \pi^0 \nu_\tau)/\Gamma_{total}$ value. Authors quote $B(\pi^\pm 3\pi^0 \nu_\tau) + 0.67B(\pi^\pm \eta\pi^0 \nu_\tau) = 0.047 \pm 0.010 \pm 0.011$.

$\Gamma(h^- 3\pi^0 \nu_\tau)/\Gamma(h^- \pi^0 \nu_\tau)$ — $\Gamma_{21}/\Gamma_{15} = \Gamma_{21}/(\Gamma_{16}+\frac{1}{3}\Gamma_{60})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.048±0.006 OUR FIT Error includes scale factor of 1.1.				
0.044±0.003±0.005	[58] PROCARIO	93	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV

[58] PROCARIO 93 quote $0.041 \pm 0.003 \pm 0.005$ after correction for 2 kaon backgrounds assuming $B(K^{*-} \nu_\tau)$=1.42 ± 0.18% and $B(h^- K^0 \pi^0 \nu_\tau)$=0.48 ± 0.48%. We add 0.003 ± 0.003 and multiply the sum by 0.990 ± 0.010 to remove these corrections.

$\Gamma(h^- 4\pi^0 \nu_\tau)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.19±0.07 OUR FIT				
0.16±0.05±0.05	[59] PROCARIO	93	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV

[59] PROCARIO 93 quotes $B(h^- 4\pi^0 \nu_\tau)/B(h^- \pi^0 \nu_\tau) = 0.006 \pm 0.002 \pm 0.002$. We multiply by the ARTUSO 94 result for $B(h^- \pi^0 \nu_\tau)$ to obtain $B(h^- 4\pi^0 \nu_\tau)$.

$\Gamma(h^- K^0 \geq 0 \text{ neutrals } \nu_\tau)/\Gamma_{total}$ — Γ_{23}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.3 ±0.3	44	TSCHIRHART	88	HRS	E^{ee}_{cm}= 29 GeV

$\Gamma(\pi^- K^0 \nu_\tau)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.88±0.14±0.09	53	BUSKULIC	94F	ALEP	E^{ee}_{cm}= 88–94 GeV

$\Gamma(\pi^- K^0 \pi^0 \nu_\tau)/\Gamma_{total}$ — Γ_{25}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.33±0.14±0.07	9	BUSKULIC	94F	ALEP	E^{ee}_{cm}= 88–94 GeV

$\Gamma(K^- K^0 \geq 0 \text{ neutrals } \nu_\tau)/\Gamma_{total}$ — Γ_{26}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	GOLDBERG	90	CLEO	E^{ee}_{cm}= 9.4–10.9 GeV

$\Gamma(K^- K^0 \nu_\tau)/\Gamma_{total}$ — Γ_{27}/Γ

VALUE (%)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.12±0.03		8	BUSKULIC	94F	ALEP	E^{ee}_{cm}= 88–94 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.26	95		AIHARA	87C	TPC	E^{ee}_{cm}= 29 GeV

$\Gamma(K^- K^0 \geq 1 \text{ neutrals } \nu_\tau)/\Gamma_{\text{total}}$ Γ_{28}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.26	95	AIHARA	87C	TPC	E^{ee}_{cm}= 29 GeV

$\Gamma(K^- K^0 \pi^0 \nu_\tau)/\Gamma_{\text{total}}$ Γ_{29}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.05±0.05±0.01	1	BUSKULIC	94F	ALEP	E^{ee}_{cm}= 88–94 GeV

$\Gamma(2h^- h^+ \geq 0 \text{ neutrals } \nu_\tau (\text{“3-prong”}))/\Gamma_{\text{total}}$
$\Gamma_{30}/\Gamma = (\Gamma_{31}+\Gamma_{32}+0.229\Gamma_{60})/\Gamma$

Some inconsistency exists for this mode since experiments differ in how they treat $B(\tau^- \to h^- (K^0_S \to \pi^+\pi^-))$ decays.

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
14.25± 0.25 OUR FIT Error includes scale factor of 1.5.					
14.32± 0.27 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.					
15.26± 0.26±0.22		ACTON	92H	OPAL	E^{ee}_{cm}= 88.2–94.2 GeV
13.3 ± 0.3 ±0.8		[60] ALBRECHT	92D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
$14.35^{+0.40}_{-0.45}\pm0.24$		DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
14.4 ± 0.6 ±0.3		ADEVA	91F	L3	E^{ee}_{cm}= 88.3–94.3 GeV
13.5 ± 0.3 ±0.3		ABACHI	89B	HRS	E^{ee}_{cm}= 29 GeV
15.0 ± 0.4 ±0.3		BEHREND	89B	CELL	E^{ee}_{cm}= 14–47 GeV
15.1 ± 0.8 ±0.6		AIHARA	87B	TPC	E^{ee}_{cm}= 29 GeV
12.1 ± 0.5 ±1.2		RUCKSTUHL	86	DLCO	E^{ee}_{cm}= 29 GeV
12.8 ± 0.5 ±0.8	1420	SCHMIDKE	86	MRK2	E^{ee}_{cm}= 29 GeV
$15.3 \pm 1.1 ^{+1.3}_{-1.6}$	367	ALTHOFF	85	TASS	E^{ee}_{cm}= 34.5 GeV
13.6 ± 0.5 ±0.8		BARTEL	85F	JADE	E^{ee}_{cm}= 34.6 GeV
13.3 ± 0.3 ±0.6		FERNANDEZ	85	MAC	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12.8 ± 1.0 ±0.7		[61] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV
13.0 ± 0.2 ±0.3	4098	AKERLOF	85B	HRS	Repl. by ABACHI 89B
12.2 ± 1.3 ±3.9		[62] BERGER	85	PLUT	E^{ee}_{cm}= 34.6 GeV
14.8 ± 0.9 ±1.5	660	AIHARA	84C	TPC	Repl. by AIHARA 87B
14.8 ± 2.0 ±1.3	178	BEHREND	84	CELL	Repl. by BEHREND 89B
14.5 ± 2.2 ±1.3	182	BEHREND	84	CELL	Repl. by BEHREND 89B
15.0 ± 2.0	186	BEHREND	82	CELL	Repl. by BEHREND 89B
14 ± 2	152	BLOCKER	82C	MRK2	Repl. by SCHMIDKE 86
24 ± 6	35	BRANDELIK	80	TASS	E^{ee}_{cm}= 30 GeV
32 ± 5	692	[63] BACINO	78B	DLCO	E^{ee}_{cm}= 3.1–7.4 GeV
35 ±11		[63] BRANDELIK	78	DASP	Assumes $V-A$ decay
18 ± 6.5	33	[63] JAROS	78	MRK1	$E^{ee}_{\text{cm}} > 6$ GeV

[60] This ALBRECHT 92D value is not independent of their $\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)\Gamma(e^- \overline{\nu}_e \nu_\tau)/\Gamma^2_{\text{total}}$ value.

[61] BURCHAT 87 value is not independent of SCHMIDKE 86 value.

[62] Not independent of BERGER 85 $\Gamma(\mu^- \overline{\nu}_\mu \nu_\tau)/\Gamma_{\text{total}}$, $\Gamma(e^- \overline{\nu}_e \nu_\tau)/\Gamma_{\text{total}}$, $\Gamma(h^- \geq 1 \text{ neutrals } \nu_\tau)/\Gamma_{\text{total}}$, and $\Gamma(h^- \nu_\tau)/\Gamma_{\text{total}}$, and therefore not used in the fit.

[63] Low energy experiments are not in average or fit because the systematic errors in background subtraction are judged to be large.

$\Gamma\left(2h^- h^+ \geq 0 \text{ neutrals } \nu_\tau (\text{“3-prong”})\right)/\Gamma_{\text{total}}$ (%)

$\Gamma\left(h^- h^- h^+ \nu_\tau\right)/\Gamma_{\text{total}}$ Γ_{31}/Γ

Some inconsistency exists for this mode since experiments differ in how they treat $B(\tau^- \to h^- (K^0_S \to \pi^+ \pi^-) \nu_\tau)$ decays.

Data marked “avg” are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. “f&a” marks results used for the fit and the average.

VALUE (%)		*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.39±0.31 OUR FIT	Error includes scale factor of 1.3.					
8.0 ±0.4 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.					
7.3 ±0.1 ±0.5	avg		[64] ALBRECHT	93C	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
9.49±0.36±0.63	f&a		DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
8.7 ±0.7 ±0.3	f&a	694	[65] BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
6.4 ±0.4 ±0.9	avg		[66] RUCKSTUHL	86	DLCO	E^{ee}_{cm}= 29 GeV
7.8 ±0.5 ±0.8	f&a	890	SCHMIDKE	86	MRK2	E^{ee}_{cm}= 29 GeV
8.4 ±0.4 ±0.7	avg	1255	[66] FERNANDEZ	85	MAC	E^{ee}_{cm}= 29 GeV
9.7 ±2.0 ±1.3	f&a		BEHREND	84	CELL	E^{ee}_{cm}= 14,22 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
7.0 ±0.3 ±0.7		1566	[67] BAND	87	MAC	E^{ee}_{cm}= 29 GeV
6.7 ±0.8 ±0.9			[68] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV

[64] ALBRECHT 93C value with 0.5 ± 0.3% added to remove their corrections for charged-kaon backgrounds.

[65] BEHREND 90 subtract 0.3% to account for the $\tau^- \to K^*(892)^- \nu_\tau$ contribution to measured events.

[66] Value obtained by multiplying paper's $R = B(h^- h^- h^+ \nu_\tau)/B(\text{3-prong})$ by B(3-prong) = 0.143 and subtracting 0.3% for $K^*(892)$ background.

[67] BAND 87 subtract for charged kaon modes; not independent of FERNANDEZ 85 value.

[68] BURCHAT 87 value is not independent of SCHMIDKE 86 value.

$\Gamma\left(h^- h^- h^+ \nu_\tau\right)/\Gamma_{\rm total}$ (%)

$\Gamma\left(h^- h^- h^+ \nu_\tau\right) \times \Gamma\left(\text{particle}^- \geq 0 \text{ neutrals } \nu_\tau (\text{“1-prong”})\right)/\Gamma^2_{\rm total}$

$\Gamma_{31}\Gamma_1/\Gamma^2 = \Gamma_{31}(\Gamma_2+\Gamma_4+\Gamma_7+\Gamma_9+\Gamma_{16}+\Gamma_{19}+\Gamma_{21}+\Gamma_{22}+0.771\Gamma_{60})/\Gamma^2$

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.0707±0.0027 OUR FIT Error includes scale factor of 1.3.				
0.063 ±0.001 ±0.004	7.5k	[69] ALBRECHT 93C	ARG	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV

[69] ALBRECHT 93C quote B($\pi^- \pi^- \pi^+ \nu_\tau$) = 6.8 ± 0.1 ± 0.5%. We add 0.5 ± 0.3% to remove their correction for charged kaon backgrounds, then multiply by 0.8613, their assumed value for B(“1-prong').

$\Gamma\left(h^- h^- h^+ \nu_\tau\right)/\Gamma\left(2h^- h^+ \geq 0 \text{ neutrals } \nu_\tau (\text{“3-prong”})\right)$

$\Gamma_{31}/\Gamma_{30} = \Gamma_{31}/(\Gamma_{31}+\Gamma_{32}+0.229\Gamma_{60})$

This branching fractions is not independent of values for $\Gamma\left(h^- h^- h^+ \nu_\tau\right)/\Gamma_{\rm total}$ and $\Gamma\left(2h^- h^+ \geq 0 \text{ neutrals } \nu_\tau (\text{“3-prong”})\right)/\Gamma_{\rm total}$.

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.589±0.020 OUR FIT Error includes scale factor of 1.2.				
0.55 ±0.07 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.				
0.47 ±0.03 ±0.06		RUCKSTUHL 86	DLCO	$E^{ee}_{\rm cm}$= 29 GeV
0.37 $^{+0.35}_{-0.20}$	103	ALTHOFF 85	TASS	$E^{ee}_{\rm cm}$= 34.5 GeV
0.61 ±0.03 ±0.05		FERNANDEZ 85	MAC	$E^{ee}_{\rm cm}$= 29 GeV

$\Gamma\left(h^- h^- h^+ \nu_\tau\right)/\Gamma\left(2h^- h^+ \geq 0 \text{ neutrals } \nu_\tau \text{ (``3-prong'')}\right)$

$\Gamma(h^- h^- h^+ \geq 1 \text{ neutrals } \nu_\tau)/\Gamma_{\text{total}}$ $\qquad\Gamma_{32}/\Gamma$

Data marked "avg" are highly correlated with data appearing elsewhere in the Listings, and are therefore used for the average given below but not in the overall fits. "f&a" marks results used for the fit and the average.

VALUE (%)		EVTS	DOCUMENT ID		TECN	COMMENT
5.53±0.30 OUR FIT Error includes scale factor of 1.2.						
5.4 ±0.4 OUR AVERAGE Error includes scale factor of 1.2.						
4.95±0.29±0.65	f&a	570	DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
5.6 ±0.7 ±0.3	avg	352	[70] BEHREND	90	CELL	E^{ee}_{cm}= 35 GeV
4.2 ±0.5 ±0.9	f&a	203	[71] ALBRECHT	87L	ARG	E^{ee}_{cm}= 10 GeV
7.6 ±0.4 ±0.9	avg		[72,73] RUCKSTUHL	86	DLCO	E^{ee}_{cm}= 29 GeV
4.7 ±0.5 ±0.8	avg	530	[74] SCHMIDKE	86	MRK2	E^{ee}_{cm}= 29 GeV
5.6 ±0.4 ±0.7	avg		[73] FERNANDEZ	85	MAC	E^{ee}_{cm}= 29 GeV
6.2 ±2.3 ±1.7	f&a		BEHREND	84	CELL	E^{ee}_{cm}= 14,22 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
6.1 ±0.8 ±0.9			[75] BURCHAT	87	MRK2	E^{ee}_{cm}= 29 GeV

[70] BEHREND 90 value is not independent of BEHREND 90 B($3h\nu_\tau \geq 1$ neutrals) + B(5-prong).

[71] ALBRECHT 87L measure the product of branching ratios B($3\pi^\pm\pi^0\nu_\tau$) B(($e\overline{\nu}$ or $\mu\overline{\nu}$ or π or K or ρ)ν_τ) = 0.029 and use the PDG 86 values for the second branching ratio which sum to 0.69 ± 0.03 to get the quoted value.

[72] Contributions from kaons and from $>1\pi^0$ are subtracted. Not independent of (3-prong + $0\pi^0$) and (3-prong + $\geq 0\pi^0$) values.

[73] Value obtained using paper's R = B($h^- h^- h^+ \nu_\tau$)/B(3-prong) and current B(3-prong) = 0.143.

[74] Not independent of SCHMIDKE 86 $h^- h^- h^+ \nu_\tau$ and $h^- h^- h^+ (\geq 0\pi^0)\nu_\tau$ values.

[75] BURCHAT 87 value is not independent of SCHMIDKE 86 value.

$\Gamma((a_1(1260)\pi)^- \nu_\tau)/\Gamma(\pi^- \pi^- \pi^+ \pi^0 \nu_\tau)$ $\qquad\Gamma_{35}/\Gamma_{34}$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.44	95	[76] ALBRECHT	91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

[76] ALBRECHT 91D not independent of their $\Gamma(\omega\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, $\Gamma(\rho^0\pi^0\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, $\Gamma(\rho^+\pi^-\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, and $\Gamma(\rho^-\pi^+\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ values.

$\Gamma((\rho\pi)^0\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — $\Gamma_{36}/\Gamma_{34} = (\Gamma_{37}+\Gamma_{38}+\Gamma_{39})/\Gamma_{34}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.64±0.07±0.03	[77] ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

[77] ALBRECHT 91D not independent of their $\Gamma(\rho^+\pi^-\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, $\Gamma(\rho^-\pi^+\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, and $\Gamma(\rho^0\pi^0\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ values.

$\Gamma(\rho^0\pi^0\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — Γ_{37}/Γ_{34}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.30±0.04±0.02	393	ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

$\Gamma(\rho^+\pi^-\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — Γ_{38}/Γ_{34}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.10±0.03±0.04	142	ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

$\Gamma(\rho^-\pi^+\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — Γ_{39}/Γ_{34}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.26±0.05±0.01	370	ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

$[\Gamma(\rho^+\pi^-\pi^-\nu_\tau)+\Gamma(\rho^-\pi^+\pi^-\nu_\tau)]/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — $(\Gamma_{38}+\Gamma_{39})/\Gamma_{34}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.33±0.06±0.01	475	[78] ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

[78] ALBRECHT 91D not independent of their $\Gamma(\rho^+\pi^-\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ and $\Gamma(\rho^-\pi^+\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ values.

$\Gamma(h^-h^-h^+2\pi^0\nu_\tau)/\Gamma(2h^-h^+\geq 0\text{ neutrals }\nu_\tau\text{ ("3-prong")})$ — $\Gamma_{40}/\Gamma_{30} = \Gamma_{40}/(\Gamma_{31}+\Gamma_{32}+0.229\Gamma_{60})$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.034±0.002±0.003	668	BORTOLETTO 93	CLEO	$E^{ee}_{cm}\approx$ 10.6 GeV

$\Gamma(\omega\pi^-\geq 0\text{ neutrals }\nu_\tau)/\Gamma_{total}$ — Γ_{41}/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
1.65±0.3±0.2	1513	ALBRECHT 88M	ARG	$E^{ee}_{cm}\approx$ 10 GeV

$\Gamma(\omega\pi^-\nu_\tau)/\Gamma_{total}$ — Γ_{42}/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
1.60±0.27±0.41	139	BARINGER 87	CLEO	E^{ee}_{cm}= 10.5 GeV

$\Gamma(\omega\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — Γ_{42}/Γ_{34}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.33±0.04±0.02	458	ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

$[\Gamma(\rho^0\pi^0\pi^-\nu_\tau)+\Gamma(\rho^+\pi^-\pi^-\nu_\tau)+\Gamma(\rho^-\pi^+\pi^-\nu_\tau)+\Gamma(\omega\pi^-\nu_\tau)]/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ — $(\Gamma_{37}+\Gamma_{38}+\Gamma_{39}+\Gamma_{42})/\Gamma_{34}$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
>0.81	95	[79] ALBRECHT 91D	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

[79] ALBRECHT 91D not independent of their $\Gamma(\omega\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, $\Gamma(\rho^0\pi^0\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, $\Gamma(\rho^+\pi^-\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$, and $\Gamma(\rho^-\pi^+\pi^-\nu_\tau)/\Gamma(\pi^-\pi^-\pi^+\pi^0\nu_\tau)$ values.

$\Gamma(h^-\omega\pi^0\nu_\tau)/\Gamma(2h^-h^+\geq 0\text{ neutrals }\nu_\tau\text{ ("3-prong")})$ — $\Gamma_{43}/\Gamma_{30} = \Gamma_{43}/(\Gamma_{31}+\Gamma_{32}+0.229\Gamma_{60})$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.028±0.003±0.003	430	[80] BORTOLETTO 93	CLEO	$E^{ee}_{cm}\approx$ 10.6 GeV

[80] Not independent of BORTOLETTO 93 $\Gamma(\tau^-\to h^-\omega\pi^0\nu_\tau)/\Gamma(\tau^-\to h^-h^-h^+2\pi^0\nu_\tau)$ value.

$\Gamma(h^-\omega\pi^0\nu_\tau)/\Gamma(h^-h^-h^+2\pi^0\nu_\tau)$ — Γ_{43}/Γ_{40}

VALUE	DOCUMENT ID	TECN	COMMENT
0.81±0.06±0.06	BORTOLETTO 93	CLEO	$E^{ee}_{cm}\approx$ 10.6 GeV

$\Gamma(K^- h^+ h^- \geq 0 \text{ neutrals } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{44}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	AIHARA	84C	TPC	E^{ee}_{cm}= 29 GeV

$\Gamma(K^- \pi^+ \pi^- \geq 0 \text{ neut. } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{45}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.38^{+0.19}_{-0.16}}$ **OUR AVERAGE** Error includes scale factor of 1.5.					
$0.58^{+0.15}_{-0.13}\pm0.12$	20	[81] BAUER	94	TPC	E^{ee}_{cm}= 29 GeV
$0.22^{+0.16}_{-0.13}$	9	[82] MILLS	85	DLCO	E^{ee}_{cm}= 29 GeV

[81] We multiply 0.58% by 0.20, the relative systematic error quoted by BAUER 94, to obtain the systematic error.
[82] Error correlated with MILLS 85 ($K K \pi \nu$) value. Excludes 23% systematic error.

$\Gamma(K^- \pi^+ K^- \geq 0 \text{ neut. } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{46}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.09	95	BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

$\Gamma(K^- K^+ \pi^- \geq 0 \text{ neut. } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{47}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.15^{+0.09}_{-0.07}\pm0.03}$	4	[83] BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

[83] We multiply 0.15% by 0.20, the relative systematic error quoted by BAUER 94, to obtain the systematic error.

$\Gamma(\pi^- K^+ \pi^- \geq 0 \text{ neut. } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{50}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.25	95	BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

$\Gamma(K^- K^+ \pi^- \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{48}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.22^{+0.17}_{-0.11}}$	9	[84] MILLS	85	DLCO	E^{ee}_{cm}= 29 GeV

[84] Error correlated with MILLS 85 ($K \pi \pi \pi^0 \nu$) value. Excludes 23% systematic error.

$\Gamma(K^- K^+ K^- \geq 0 \text{ neut. } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{49}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.21	95	BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

$\Gamma(K^0 h^+ h^- h^- \geq 0 \text{ neut. } \nu_\tau)/\Gamma_{\text{total}}$ — Γ_{51}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.17	95	TSCHIRHART	88	HRS	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.27	90	BELTRAMI	85	HRS	E^{ee}_{cm}= 29 GeV

$\Gamma(3h^- 2h^+ \geq 0 \text{ neutrals } \nu_\tau \text{ ("5-prong")})/\Gamma_{\text{total}}$ — Γ_{52}/Γ

VALUE (%)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.103±0.011 OUR FIT						
0.103±0.013 OUR AVERAGE Error includes scale factor of 1.2.						
0.097±0.005±0.011		419	GIBAUT	94B	CLEO	E^{ee}_{cm}= 10.6 GeV
0.26 ±0.06 ±0.05			ACTON	92H	OPAL	E^{ee}_{cm}= 88.2–94.2 GeV
$0.10\ ^{+0.05}_{-0.04}\ \pm0.03$			DECAMP	92C	ALEP	E^{ee}_{cm}= 88–95 GeV
0.16 ±0.13 ±0.04			BEHREND	89B	CELL	E^{ee}_{cm}= 14–47 GeV
0.102±0.029		13	BYLSMA	87	HRS	E^{ee}_{cm}= 29 GeV
0.3 ±0.1 ±0.2			BARTEL	85F	JADE	E^{ee}_{cm}= 34.6 GeV
0.16 ±0.08 ±0.04		4	BURCHAT	85	MRK2	E^{ee}_{cm}= 29 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.34	95		ADEVA	91F L3	$E^{ee}_{\rm cm}$= 88.3–94.3 GeV
<0.7	95	0	ALTHOFF	85 TASS	$E^{ee}_{\rm cm}$= 34.5 GeV
0.13 ±0.04		10	BELTRAMI	85 HRS	Repl. by BYLSMA 87
<0.17	95	2	FERNANDEZ	85 MAC	$E^{ee}_{\rm cm}$= 29 GeV
<0.3	90	4	AIHARA	84C TPC	$E^{ee}_{\rm cm}$= 29 GeV
<0.9	95	1	BEHREND	84 CELL	$E^{ee}_{\rm cm}$= 14,22 GeV
1.0 ±0.4		10	BEHREND	82 CELL	Repl. by BEHREND 89B
<0.5	95	2	BLOCKER	82C MRK2	$E^{ee}_{\rm cm}$= 29 GeV
<6.0	95		BRANDELIK	80 TASS	$E^{ee}_{\rm cm}$= 30 GeV

$\left[\Gamma\left(h^- h^- h^+ \geq 1\,\text{neutrals}\,\nu_\tau\right) + \Gamma\left(3h^- 2h^+ \geq 0\,\text{neutrals}\,\nu_\tau\,(\text{“5-prong”})\right)\right] / \Gamma_{\rm total}$ $\qquad (\Gamma_{32}+\Gamma_{52})/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
5.64±0.30 OUR FIT Error includes scale factor of 1.2.				
5.4 ±0.5 OUR AVERAGE				
5.05±0.29±0.65	570	DECAMP	92C ALEP	$E^{ee}_{\rm cm}$= 88–95 GeV
5.8 ±0.7 ±0.2	352	[85] BEHREND	90 CELL	$E^{ee}_{\rm cm}$= 35 GeV

[85] BEHREND 90 not independent of their $\Gamma(h^- h^- h^+ \geq 1\,\text{neutrals}\,\nu_\tau)/\Gamma_{\rm total}$ measurement.

$\Gamma(3h^- 2h^+ \nu_\tau)/\Gamma_{\rm total}$ $\qquad \Gamma_{53}/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.071±0.009 OUR AVERAGE				
0.077±0.005±0.009	295	GIBAUT	94B CLEO	$E^{ee}_{\rm cm}$= 10.6 GeV
0.064±0.023±0.01	12	ALBRECHT	88B ARG	$E^{ee}_{\rm cm}$= 10 GeV
0.051±0.020	7	BYLSMA	87 HRS	$E^{ee}_{\rm cm}$= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.067±0.030	5	[86] BELTRAMI	85 HRS	Repl. by BYLSMA 87

[86] The error quoted is statistical only.

$\Gamma(3h^- 2h^+ \pi^0 \nu_\tau)/\Gamma_{\rm total}$ $\qquad \Gamma_{54}/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.021±0.008 OUR AVERAGE Error includes scale factor of 1.4.				
0.019±0.004±0.004	31	GIBAUT	94B CLEO	$E^{ee}_{\rm cm}$= 10.6 GeV
0.051±0.022	6	BYLSMA	87 HRS	$E^{ee}_{\rm cm}$= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.067±0.030	5	[87] BELTRAMI	85 HRS	Repl. by BYLSMA 87

[87] The error quoted is statistical only.

$\Gamma(3h^- 2h^+ 2\pi^0 \nu_\tau)/\Gamma_{\rm total}$ $\qquad \Gamma_{55}/\Gamma$

VALUE (%)	CL%	DOCUMENT ID	TECN	COMMENT
<0.011	90	GIBAUT	94B CLEO	$E^{ee}_{\rm cm}$= 10.6 GeV

$\Gamma((5\pi)^- \nu_\tau)/\Gamma_{\rm total}$ $\qquad \Gamma_{56}/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
0.61±0.06±0.08	[88] GIBAUT	94B CLEO	$E^{ee}_{\rm cm}$= 10.6 GeV

[88] Not independent of GIBAUT 94B B($3h^- 2h^+ \nu_\tau$), PROCARIO 93 B($h^- 4\pi^0 \nu_\tau$), and BORTOLETTO 93 B($2h^- h^+ 2\pi^0 \nu_\tau$)/B(“3prong”) measurements. Result is corrected for η contributions.

$\Gamma(4h^- 3h^+ \geq 0\,\text{neutrals}\,\nu_\tau\,(\text{“7-prong”}))/\Gamma_{\rm total}$ $\qquad \Gamma_{57}/\Gamma$

VALUE (%)	CL%	DOCUMENT ID	TECN	COMMENT
<0.019	90	BYLSMA	87 HRS	$E^{ee}_{\rm cm}$= 29 GeV

$\Gamma(K^*(892)^- \geq 0(h^0 \neq K^0_S)\nu_\tau)/\Gamma_{\rm total}$ $\qquad \Gamma_{58}/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
1.94±0.27±0.15	74	AKERS	94G OPAL	$E^{ee}_{\rm cm}$= 88–94 GeV

$\Gamma(K^*(892)^- \geq 0$ neutrals $\nu_\tau)/\Gamma_{total}$ — Γ_{59}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.43±0.11±0.13	475	[89] GOLDBERG	90	CLEO	E^{ee}_{cm}= 9.4–10.9 GeV

[89] GOLDBERG 90 estimates that 10% of observed $K^*(892)$ are accompanied by a π^0.

$\Gamma(K^*(892)^- \nu_\tau)/\Gamma_{total}$ — Γ_{60}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.45±0.12 OUR FIT					
1.42±0.13 OUR AVERAGE					
1.45±0.13±0.11	273	[90] BUSKULIC	94F	ALEP	E^{ee}_{cm}= 88–94 GeV
$1.23\pm0.21^{+0.11}_{-0.21}$	54	[91] ALBRECHT	88L	ARG	E^{ee}_{cm}= 10 GeV
1.9 ±0.3 ±0.4	44	[92] TSCHIRHART	88	HRS	E^{ee}_{cm}= 29 GeV
1.5 ±0.4 ±0.4	15	[93] AIHARA	87C	TPC	E^{ee}_{cm}= 29 GeV
1.3 ±0.3 ±0.3	31	YELTON	86	MRK2	E^{ee}_{cm}= 29 GeV
1.7 ±0.7	11	DORFAN	81	MRK2	E^{ee}_{cm}= 4.2–6.7 GeV

[90] BUSKULIC 94F obtain this result from BUSKULIC 94F B($K^0\pi^-\nu_\tau$) and BUSKULIC 94E B($K^-\pi^0\nu_\tau$) assuming all of those decays originate in $K^*(892)^-$ decays.
[91] The authors divide by $\Gamma_1/\Gamma = 0.865$ to obtain this result.
[92] Not independent of TSCHIRHART 88 $\Gamma(\tau^- \rightarrow h^- K^0 \geq 0$ neutrals $\nu_\tau)/\Gamma$(total).
[93] Decay π^- identified in this experiment, is assumed in the others.

$\Gamma(\pi^-\pi^+\pi^- \geq 0$ neutrals $\nu_\tau)/\Gamma(2h^-h^+ \geq 0$ neutrals ν_τ ("3-prong")) — $\Gamma_{33}/\Gamma_{30} = \Gamma_{33}/(\Gamma_{31}+\Gamma_{32}+0.229\Gamma_{60})$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.945±0.019	490	[94] BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

[94] BAUER 94 quote B($\pi^-\pi^+\pi^- \geq 0$ neutrals ν_τ) = 0.1329 ± 0.0027. We divide by 0.1406, their assumed value for B("3prong").

$\Gamma(K^*(892)^0 K^- \geq 0$ neutrals $\nu_\tau)/\Gamma_{total}$ — Γ_{61}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.08±0.12	119	GOLDBERG	90	CLEO	E^{ee}_{cm}= 9.4–10.9 GeV

$\Gamma(\overline{K}^*(892)^0 \pi^- \geq 0$ neutrals $\nu_\tau)/\Gamma_{total}$ — Γ_{62}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.38±0.11±0.13	105	GOLDBERG	90	CLEO	E^{ee}_{cm}= 9.4–10.9 GeV

$\Gamma(K^0(\text{particles})^- \nu_\tau)/\Gamma_{total}$ — Γ_{63}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.94±0.18±0.12	141	[95] AKERS	94G	OPAL	E^{ee}_{cm}= 88–94 GeV

[95] AKERS 94G measure $\Gamma(K^0_S(\text{particles})^-\nu_\tau)/\Gamma_{total} = 0.97 \pm 0.09 \pm 0.06$.

$\Gamma(K_1(1270)^- \nu_\tau)/\Gamma_{total}$ — Γ_{64}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.41^{+0.41}_{-0.35}\pm0.10}$	5	[96] BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

[96] We multiply 0.41% by 0.25, the relative systematic error quoted by BAUER 94, to obtain the systematic error.

$\Gamma(K_1(1400)^- \nu_\tau)/\Gamma_{total}$ — Γ_{65}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.76^{+0.40}_{-0.33}\pm0.20}$	11	[97] BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

[97] We multiply 0.76% by 0.25, the relative systematic error quoted by BAUER 94, to obtain the systematic error.

$[\Gamma(K_1(1270)^- \nu_\tau) + \Gamma(K_1(1400)^- \nu_\tau)]/\Gamma_{total}$ — $(\Gamma_{64}+\Gamma_{65})/\Gamma$

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.17^{+0.41}_{-0.37}\pm0.29}$	16	[98] BAUER	94	TPC	E^{ee}_{cm}= 29 GeV

[98] We multiply 1.17% by 0.25, the relative systematic error quoted by BAUER 94, to obtain the systematic error. Not independent of BAUER 94 B($\tau^- \rightarrow K_1(1270)^-\nu_\tau$) and BAUER 94 B($\tau^- \rightarrow K_1(1400)^-\nu_\tau$) measurements.

$\Gamma(K_2^*(1430)^- \nu_\tau)/\Gamma_{total}$ — Γ_{66}/Γ

VALUE (%)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.3	95		TSCHIRHART	88	HRS	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.9	95	0	DORFAN	81	MRK2	E^{ee}_{cm}= 4.2–6.7 GeV

$\Gamma(a_0(980)^- \geq 0\,\text{neutrals}\ \nu_\tau)/\Gamma_{total} \times B(a_0(980) \to K^0 K^-)$ — $\Gamma_{67}/\Gamma \times B$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.8 × 10^{-4}	90	GOLDBERG	90	CLEO	E^{ee}_{cm}= 9.4–10.9 GeV

$\Gamma(\eta\pi^- \geq 0\,\text{neutrals}\ \nu_\tau)/\Gamma_{total}$ — Γ_{68}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	95	ALBRECHT	88M	ARG	E^{ee}_{cm} ≈ 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.1	90	ABACHI	87B	HRS	E^{ee}_{cm}= 29 GeV
<2.1	95	BARINGER	87	CLEO	E^{ee}_{cm}= 10.5 GeV

$\Gamma(\eta\pi^- \nu_\tau)/\Gamma_{total}$ — Γ_{69}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 3.4	95		ARTUSO	92	CLEO	E^{ee}_{cm} ≈ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 90	95		ALBRECHT	88M	ARG	E^{ee}_{cm} ≈ 10 GeV
<140	90		BEHREND	88	CELL	E^{ee}_{cm}= 14–46.8 GeV
<180	95		BARINGER	87	CLEO	E^{ee}_{cm}= 10.5 GeV
<250	90	0	COFFMAN	87	MRK3	E^{ee}_{cm}= 3.77 GeV
510 ±100±120		65	DERRICK	87	HRS	E^{ee}_{cm}= 29 GeV
<100	95		GAN	87B	MRK2	E^{ee}_{cm}= 29 GeV

$\Gamma(\eta\pi^- \pi^0 \nu_\tau)/\Gamma_{total}$ — Γ_{70}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
17 ± 2 ± 2		125	ARTUSO	92	CLEO	E^{ee}_{cm} ≈ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<110	95		ALBRECHT	88M	ARG	E^{ee}_{cm} ≈ 10 GeV
<210	95		BARINGER	87	CLEO	E^{ee}_{cm}= 10.5 GeV
420 $^{+70}_{-120}$ ±160			[99] GAN	87	MRK2	E^{ee}_{cm}= 29 GeV

[99] Highly correlated with GAN 87 $\Gamma(\pi^- 3\pi^0 \nu_\tau)/\Gamma(\text{total})$ value.

$\Gamma(\eta\pi^- \pi^0 \pi^0 \nu_\tau)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 4.3	95	ARTUSO	92	CLEO	E^{ee}_{cm} ≈ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<120	95	ALBRECHT	88M	ARG	E^{ee}_{cm} ≈ 10 GeV

$\Gamma(\eta K^- \nu_\tau)/\Gamma_{total}$ — Γ_{72}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.7	95	ARTUSO	92	CLEO	E^{ee}_{cm} ≈ 10.6 GeV

$\Gamma(\eta\pi^+ \pi^- \pi^- \geq 0\,\text{neutrals}\ \nu_\tau)/\Gamma_{total}$ — Γ_{73}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.3	90	ABACHI	87B	HRS	E^{ee}_{cm}= 29 GeV

$\Gamma(\eta\eta\pi^- \geq 0\,\text{neutrals}\ \nu_\tau)/\Gamma_{total}$ — Γ_{74}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	ABACHI	87B	HRS	E^{ee}_{cm}= 29 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	95	BARINGER	87	CLEO	E^{ee}_{cm}= 10.5 GeV

$\Gamma(\eta\eta\pi^-\nu_\tau)/\Gamma_{total}$ — Γ_{75}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.1	95	ARTUSO	92	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<83	95	ALBRECHT	88M	ARG	$E^{ee}_{cm} \approx$ 10 GeV

$\Gamma(\eta\eta\pi^-\pi^0\nu_\tau)/\Gamma_{total}$ — Γ_{76}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.0	95	ARTUSO	92	CLEO	$E^{ee}_{cm} \approx$ 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<90	95	ALBRECHT	88M	ARG	$E^{ee}_{cm} \approx$ 10 GeV

$\Gamma(e^-\gamma)/\Gamma_{total}$ — Γ_{77}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10⁻⁴	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.0 \times 10^{-4}$	90	KEH	88	CBAL	E^{ee}_{cm}= 10 GeV
$<6.4 \times 10^{-4}$	90	HAYES	82	MRK2	E^{ee}_{cm}= 3.8–6.8 GeV

$\Gamma(\mu^-\gamma)/\Gamma_{total}$ — Γ_{78}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 0.42 \times 10^{-5}$	90	BEAN	93	CLEO	E^{ee}_{cm}= 10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 3.4 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
$<55 \times 10^{-5}$	90	HAYES	82	MRK2	E^{ee}_{cm}= 3.8–6.8 GeV

$\Gamma(e^-\pi^0)/\Gamma_{total}$ — Γ_{79}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 14 \times 10^{-5}$	90	KEH	88	CBAL	E^{ee}_{cm}= 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 17 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
$<210 \times 10^{-5}$	90	HAYES	82	MRK2	E^{ee}_{cm}= 3.8–6.8 GeV

$\Gamma(\mu^-\pi^0)/\Gamma_{total}$ — Γ_{80}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 4.4 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<82 \times 10^{-5}$	90	HAYES	82	MRK2	E^{ee}_{cm}= 3.8–6.8 GeV

$\Gamma(e^-K^0)/\Gamma_{total}$ — Γ_{81}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-3}$	90	HAYES	82	MRK2	E^{ee}_{cm}= 3.8–6.8 GeV

$\Gamma(\mu^-K^0)/\Gamma_{total}$ — Γ_{82}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.0 \times 10^{-3}$	90	HAYES	82	MRK2	E^{ee}_{cm}= 3.8–6.8 GeV

$\Gamma(e^-\eta)/\Gamma_{total}$ — Γ_{83}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 6.3 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<24 \times 10^{-5}$	90	KEH	88	CBAL	E^{ee}_{cm}= 10 GeV

$\Gamma(\mu^-\eta)/\Gamma_{total}$ — Γ_{84}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.3 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV

$\Gamma(e^- \rho^0)/\Gamma_{\text{total}}$ Γ_{85}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 0.42 \times 10^{-5}$	90	[100] BARTELT	94	CLEO	E_{cm}^{ee}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 1.9 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E_{cm}^{ee}= 10 GeV
$< 3.9 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K
$<37 \times 10^{-5}$	90	HAYES	82	MRK2	E_{cm}^{ee}= 3.8–6.8 GeV

[100] BARTELT 94 assume phase space decays.

$\Gamma(\mu^- \rho^0)/\Gamma_{\text{total}}$ Γ_{86}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 0.57 \times 10^{-5}$	90	[101] BARTELT	94	CLEO	E_{cm}^{ee}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 2.9 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E_{cm}^{ee}= 10 GeV
$< 3.8 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K
$<44 \times 10^{-5}$	90	HAYES	82	MRK2	E_{cm}^{ee}= 3.8–6.8 GeV

[101] BARTELT 94 assume phase space decays.

$\Gamma(e^- K^*(892)^0)/\Gamma_{\text{total}}$ Γ_{87}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.63 \times 10^{-5}$	90	[102] BARTELT	94	CLEO	E_{cm}^{ee}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.8 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E_{cm}^{ee}= 10 GeV
$<5.4 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[102] BARTELT 94 assume phase space decays.

$\Gamma(\mu^- K^*(892)^0)/\Gamma_{\text{total}}$ Γ_{88}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.94 \times 10^{-5}$	90	[103] BARTELT	94	CLEO	E_{cm}^{ee}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.5 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E_{cm}^{ee}= 10 GeV
$<5.9 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[103] BARTELT 94 assume phase space decays.

$\Gamma(\pi^- \gamma)/\Gamma_{\text{total}}$ Γ_{89}/Γ

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<28 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E_{cm}^{ee}= 10 GeV

$\Gamma(\pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{90}/Γ

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<37 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E_{cm}^{ee}= 10 GeV

$\Gamma(\ell^- \ell^- \ell^+)/\Gamma_{\text{total}}$ $\Gamma_{91}/\Gamma = (\Gamma_{92}+\Gamma_{94}+\Gamma_{95}+\Gamma_{97}+\Gamma_{98}+\Gamma_{99})/\Gamma$

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.4 \times 10^{-5}$	90	[104] BOWCOCK	90	CLEO	E_{cm}^{ee}= 10.4–10.9 GeV
$<3.8 \times 10^{-5}$	90	ALBRECHT	87M	ARG	E_{cm}^{ee}= 10 GeV

[104] Inclusion of a potentially model-dependent cut on decay track opening angles reduces BOWCOCK 90 limit to 2.6×10^{-5}.

$\Gamma(e^- e^+ e^-)/\Gamma_{\rm total}$ — Γ_{92}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 0.33 × 10^−5	90	[105] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 1.3 × 10^−5	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
< 2.7 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
< 3.8 × 10^−5	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K
<40 × 10^−5	90	HAYES	82	MRK2	$E^{ee}_{\rm cm}$= 3.8–6.8 GeV

[105] BARTELT 94 assume phase space decays.

$\Gamma((e\mu\mu)^-)/\Gamma_{\rm total}$ — $\Gamma_{93}/\Gamma = (\Gamma_{94}+\Gamma_{95})/\Gamma$

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.7 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9

$\Gamma(e^- \mu^+ \mu^-)/\Gamma_{\rm total}$ — Γ_{94}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 0.36 × 10^−5	90	[106] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 1.9 × 10^−5	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
< 2.7 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
< 3.3 × 10^−5	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K
<33 × 10^−5	90	HAYES	82	MRK2	$E^{ee}_{\rm cm}$= 3.8–6.8 GeV

[106] BARTELT 94 assume phase space decays.

$\Gamma(e^+ \mu^- \mu^-)/\Gamma_{\rm total}$ — Γ_{95}/Γ

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.35 × 10^−5	90	[107] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.8 × 10^−5	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
<1.6 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
<3.8 × 10^−5	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[107] BARTELT 94 assume phase space decays.

$\Gamma((\mu ee)^-)/\Gamma_{\rm total}$ — $\Gamma_{96}/\Gamma = (\Gamma_{97}+\Gamma_{98})/\Gamma$

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.7 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9

$\Gamma(\mu^- e^+ e^-)/\Gamma_{\rm total}$ — Γ_{97}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 0.34 × 10^−5	90	[108] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 1.4 × 10^−5	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
< 2.7 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
< 3.3 × 10^−5	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K
<44 × 10^−5	90	HAYES	82	MRK2	$E^{ee}_{\rm cm}$= 3.8–6.8 GeV

[108] BARTELT 94 assume phase space decays.

$\Gamma(\mu^+ e^- e^-)/\Gamma_{\rm total}$ — Γ_{98}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.34 × 10^−5	90	[109] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.4 × 10^−5	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
<1.6 × 10^−5	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
<3.8 × 10^−5	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[109] BARTELT 94 assume phase space decays.

$\Gamma(\mu^-\mu^+\mu^-)/\Gamma_{\rm total}$ Γ_{99}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.43\times10^{-5}$	90	[110] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<0.19\times10^{-5}$	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
$<1.7\times10^{-5}$	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
$<2.9\times10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K
$<49\times10^{-5}$	90	HAYES	82	MRK2	$E^{ee}_{\rm cm}$= 3.8–6.8 GeV

[110] BARTELT 94 assume phase space decays.

$\Gamma(\ell^\pm\pi^\mp\pi^-)/\Gamma_{\rm total}$ $\Gamma_{100}/\Gamma=(\Gamma_{102}+\Gamma_{103}+\Gamma_{105}+\Gamma_{106})/\Gamma$

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.3\times10^{-5}$	90	ALBRECHT	87M	ARG	$E^{ee}_{\rm cm}$= 10 GeV

$\Gamma(e^\mp\pi^\pm\pi^-)/\Gamma_{\rm total}$ $\Gamma_{101}/\Gamma=(\Gamma_{102}+\Gamma_{103})/\Gamma$

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.0\times10^{-5}$	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9

$\Gamma(e^-\pi^+\pi^-)/\Gamma_{\rm total}$ Γ_{102}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.44\times10^{-5}$	90	[111] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.7\times10^{-5}$	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
$<6.0\times10^{-5}$	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
$<4.2\times10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[111] BARTELT 94 assume phase space decays.

$\Gamma(e^+\pi^-\pi^-)/\Gamma_{\rm total}$ Γ_{103}/Γ

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.44\times10^{-5}$	90	[112] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.8\times10^{-5}$	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
$<1.7\times10^{-5}$	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
$<6.3\times10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[112] BARTELT 94 assume phase space decays.

$\Gamma(\mu^\mp\pi^\pm\pi^-)/\Gamma_{\rm total}$ $\Gamma_{104}/\Gamma=(\Gamma_{105}+\Gamma_{106})/\Gamma$

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.9\times10^{-5}$	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9

$\Gamma(\mu^-\pi^+\pi^-)/\Gamma_{\rm total}$ Γ_{105}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.74\times10^{-5}$	90	[113] BARTELT	94	CLEO	$E^{ee}_{\rm cm}$= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.6\times10^{-5}$	90	ALBRECHT	92K	ARG	$E^{ee}_{\rm cm}$= 10 GeV
$<3.9\times10^{-5}$	90	BOWCOCK	90	CLEO	$E^{ee}_{\rm cm}$= 10.4–10.9
$<4.0\times10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[113] BARTELT 94 assume phase space decays.

$\Gamma(\mu^+\pi^-\pi^-)/\Gamma_{total}$ **Γ_{106}/Γ**

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.69 × 10⁻⁵	90	[114] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.3 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
$<3.9 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9
$<6.3 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[114] BARTELT 94 assume phase space decays.

$\Gamma(\ell^\pm\pi^\mp K^-)/\Gamma_{total}$ **$\Gamma_{107}/\Gamma = (\Gamma_{110}+\Gamma_{111}+\Gamma_{115}+\Gamma_{116})/\Gamma$**

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.2 \times 10^{-4}$	90	ALBRECHT	87M	ARG	E^{ee}_{cm}= 10 GeV

$\Gamma((e\pi K)^-$, all charged$)/\Gamma_{total}$ **$\Gamma_{108}/\Gamma = (\Gamma_{110}+\Gamma_{111}+\Gamma_{112})/\Gamma$**

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.7 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9

$\Gamma(e^-\pi^\pm K^\mp)/\Gamma_{total}$ **$\Gamma_{109}/\Gamma = (\Gamma_{110}+\Gamma_{111})/\Gamma$**

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.8 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9

$\Gamma(e^-\pi^+K^-)/\Gamma_{total}$ **Γ_{110}/Γ**

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.77 \times 10^{-5}$	90	[115] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.9 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
$<5.8 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9
$<4.2 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[115] BARTELT 94 assume phase space decays.

$\Gamma(e^-\pi^-K^+)/\Gamma_{total}$ **Γ_{111}/Γ**

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.46 \times 10^{-5}$	90	[116] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<5.8 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9

[116] BARTELT 94 assume phase space decays.

$\Gamma(e^+\pi^-K^-)/\Gamma_{total}$ **Γ_{112}/Γ**

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 0.45 \times 10^{-5}$	90	[117] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$< 2.0 \times 10^{-5}$	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
$< 4.9 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9
$<12 \times 10^{-5}$	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[117] BARTELT 94 assume phase space decays.

$\Gamma((\mu\pi K)^-$, all charged$)/\Gamma_{total}$ **$\Gamma_{113}/\Gamma = (\Gamma_{115}+\Gamma_{116}+\Gamma_{117})/\Gamma$**

Test of lepton number or lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.7 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9

$\Gamma(\mu^-\pi^\pm K^\mp)/\Gamma_{total}$ **$\Gamma_{114}/\Gamma = (\Gamma_{115}+\Gamma_{116})/\Gamma$**

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.7 \times 10^{-5}$	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9

$\Gamma(\mu^- \pi^+ K^-)/\Gamma_{total}$ — Γ_{115}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 0.87 x 10^{-5}	90	[118] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11 × 10^{-5}	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
< 7.7 × 10^{-5}	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9
<12 × 10^{-5}	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[118] BARTELT 94 assume phase space decays.

$\Gamma(\mu^- \pi^- K^+)/\Gamma_{total}$ — Γ_{116}/Γ

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.5 x 10^{-5}	90	[119] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<7.7 × 10^{-5}	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9

[119] BARTELT 94 assume phase space decays.

$\Gamma(\mu^+ \pi^- K^-)/\Gamma_{total}$ — Γ_{117}/Γ

Test of lepton number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 2.0 x 10^{-5}	90	[120] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.8 × 10^{-5}	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV
< 4.0 × 10^{-5}	90	BOWCOCK	90	CLEO	E^{ee}_{cm}= 10.4–10.9
<12 × 10^{-5}	90	ALBRECHT	87M	ARG	Repl. by ALBRECHT 92K

[120] BARTELT 94 assume phase space decays.

$\Gamma(\overline{p}\gamma)/\Gamma_{total}$ — Γ_{118}/Γ

Test of lepton number and baryon number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<29 x 10^{-5}	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV

$\Gamma(\overline{p}\pi^0)/\Gamma_{total}$ — Γ_{119}/Γ

Test of lepton number and baryon number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<66 x 10^{-5}	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV

$\Gamma(\overline{p}\eta)/\Gamma_{total}$ — Γ_{120}/Γ

Test of lepton number and baryon number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<130 x 10^{-5}	90	ALBRECHT	92K	ARG	E^{ee}_{cm}= 10 GeV

$\Gamma(e^-$ light spinless boson$)/\Gamma(e^- \overline{\nu}_e \nu_\tau)$ — Γ_{123}/Γ_4

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.018	95	[121] ALBRECHT	90E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
<0.040	95	[122] BALTRUSAIT...	85	MRK3	E^{ee}_{cm}= 3.77 GeV

[121] ALBRECHT 90E limit holds for mass < 100 MeV, and rises to 0.050 for mass = 500 MeV.
[122] BALTRUSAITIS 85 limit holds for mass < 100 MeV.

$\Gamma(\mu^-$ light spinless boson$)/\Gamma(e^- \overline{\nu}_e \nu_\tau)$ — Γ_{124}/Γ_4

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.033	95	[123] ALBRECHT	90E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
<0.125	95	[124] BALTRUSAIT...	85	MRK3	E^{ee}_{cm}= 3.77 GeV

[123] ALBRECHT 90E limit holds for mass < 100 MeV, and rises to 0.071 for mass = 500 MeV.
[124] BALTRUSAITIS 85 limit holds for mass < 100 MeV.

$\Gamma(e^- \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{121}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.1 x 10^{-5}	90	[125] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV

[125] BARTELT 94 assume phase space decays.

$\Gamma(\mu^- \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{122}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.87 \times 10^{-5}$	90	[126] BARTELT	94	CLEO	E^{ee}_{cm}= 9.4–10.6 GeV

[126] BARTELT 94 assume phase space decays.

$\Gamma(K^*(892)^- \nu_\tau)/\Gamma(\pi^- \pi^0 \nu_\tau)$ — Γ_{60}/Γ_{16}

VALUE	DOCUMENT ID		TECN	COMMENT
0.075±0.027	[127] ABREU	94K	DLPH	LEP 1992 Z data

[127] ABREU 94K quote $B(\tau^- \rightarrow K^*(892)^- \nu_\tau) B(K^*(892)^- \rightarrow h^- \pi^0)/B(\tau^- \rightarrow \rho^- \nu_\tau) = 0.025 \pm 0.009$. We divide by $B(K^*(892)^- \rightarrow K^- \pi^0) = 0.333$ to obtain this result.

τ-DECAY PARAMETERS

MINIREVIEW GOES HERE

$\rho^\tau(e \text{ or } \mu)$ PARAMETER

$(V-A)$ theory predicts $\rho = 0.75$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.74 ±0.04 OUR AVERAGE					
0.742±0.035±0.020	8000	ALBRECHT	90E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.79 ±0.10 ±0.10	3732	FORD	87B	MAC	E^{ee}_{cm}= 29 GeV
0.71 ±0.09 ±0.03	1426	BEHRENDS	85	CLEO	$e^+ e^-$ near $\Upsilon(4S)$

$\rho^\tau(e)$ PARAMETER

$(V-A)$ theory predicts $\rho = 0.75$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.72 ±0.04 OUR AVERAGE					
0.79 ±0.08 ±0.06	3230	ALBRECHT	93G	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.747±0.045±0.028	5106	ALBRECHT	90E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.64 ±0.06 ±0.07	2753	JANSSEN	89	CBAL	E^{ee}_{cm}= 9.4–10.6 GeV
0.62 ±0.17 ±0.14	1823	FORD	87B	MAC	E^{ee}_{cm}= 29 GeV
0.60 ±0.13	699	BEHRENDS	85	CLEO	$e^+ e^-$ near $\Upsilon(4S)$
0.72 ±0.10 ±0.11	594	BACINO	79B	DLCO	E^{ee}_{cm}= 3.5–7.4 GeV

$\rho^\tau(\mu)$ PARAMETER

$(V-A)$ theory predicts $\rho = 0.75$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.76 ±0.05 OUR AVERAGE					
0.76 ±0.07 ±0.08	3230	ALBRECHT	93G	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.734±0.055±0.027	3041	ALBRECHT	90E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.89 ±0.14 ±0.08	1909	FORD	87B	MAC	E^{ee}_{cm}= 29 GeV
0.81 ±0.13	727	BEHRENDS	85	CLEO	$e^+ e^-$ near $\Upsilon(4S)$

$\xi^\tau(e \text{ or } \mu)$ PARAMETER

$(V-A)$ theory predicts $\xi = 1$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.90±0.15±0.10	3230	[128] ALBRECHT	93G	ARG	E^{ee}_{cm}= 9.4–10.6 GeV

[128] ALBRECHT 93G measurement determines $|\xi^\tau|$ for the case $\xi^\tau(e) = \xi^\tau(\mu)$, but the authors point out that other LEP experiments determine the sign to be positive.

$\xi^\tau(\pi)$ PARAMETER

$(V-A)$ theory predicts $\xi^\tau(\pi) = 1$.

VALUE	DOCUMENT ID		TECN	COMMENT
0.95±0.11±0.05	BUSKULIC	94D	ALEP	1990+1991 LEP run

$\xi^\tau(\rho)$ PARAMETER

$(V-A)$ theory predicts $\xi^\tau(\rho) = 1$.

VALUE	DOCUMENT ID		TECN	COMMENT
1.03±0.11±0.05	BUSKULIC	94D	ALEP	1990+1991 LEP run

$\xi^\tau(a_1)$ PARAMETER

$(V-A)$ theory predicts $\xi^\tau(a_1) = 1$.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
1.022±0.028±0.030	1.7k	[129] ALBRECHT 94E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.25 ±0.23 $^{+0.15}_{-0.08}$	7.5k	ALBRECHT 93C	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
1.14 ±0.34 $^{+0.34}_{-0.17}$	3.9k	ALBRECHT 90I	ARG	Repl. by ALBRECHT 93C

[129] ALBRECHT 94E measure the square of this quantity and use the sign determined by ALBRECHT 90I to obtain the quoted result.

ξ^τ(all decay modes) PARAMETER

$(V-A)$ theory predicts $\xi^\tau = 1$. ξ^τ(all decay modes) assumes $\xi^\tau(-) = \xi(0)$.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
1.02 ±0.04 OUR AVERAGE				
1.022±0.028±0.030	1.7k	[130] ALBRECHT 94E	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
0.99 ±0.07 ±0.04		[131] BUSKULIC 94D	ALEP	1990+1991 LEP run
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.25 ±0.23 $^{+0.15}_{-0.08}$	7.5k	[132] ALBRECHT 93C	ARG	E^{ee}_{cm}= 9.4–10.6 GeV
1.14 ±0.34 $^{+0.34}_{-0.17}$	3.9k	[132] ALBRECHT 90I	ARG	Repl. by ALBRECHT 93C

[130] ALBRECHT 94E measure the square of this quantity and use the sign determined by ALBRECHT 90I to obtain the quoted result. Uses $\tau \to a_1 \nu_\tau$ decays.

[131] BUSKULIC 94D use $\tau \to \pi \nu_\tau$ and $\tau \to \rho \nu_\tau$ decays.

[132] Uses $\tau \to a_1 \nu_\tau$ decays.

τ REFERENCES

ABREU	94K	PL B334 435	+Adam, Adye, Agasi+	(DELPHI Collab.)
AKERS	94E	PL B328 207	+Alexander, Allison, Anderson+	(OPAL Collab.)
AKERS	94G	PL B339 278	+Alexander, Allison, Anderson+	(OPAL Collab.)
AKERS	94M	PL B338 497	+Alexander, Allison, Anderson+	(OPAL Collab.)
ALBRECHT	94E	PL B337 383	+Hamacher, Hofmann+	(ARGUS Collab.)
ARTUSO	94	PRL 72 3762	+Goldberg, He, Horwitz+	(CLEO Collab.)
BARTELT	94	PRL 73 1890	+Csorna, Egyed, Jain+	(CLEO Collab.)
BATTLE	94	PRL 73 1079	+Ernst, Kwon, Roberts+	(CLEO Collab.)
BAUER	94	PR D50 R13	+Belcinski, Berg, Bingham+	(TPC/2gamma Collab.)
BUSKULIC	94D	PL B321 168	+DeBonis, Decamp, Ghez+	(ALEPH Collab.)
BUSKULIC	94E	PL B332 209	+Casper, DeBonis, Decamp+	(ALEPH Collab.)
BUSKULIC	94F	PL B332 219	+Casper, DeBonis, Decamp+	(ALEPH Collab.)
GIBAUT	94B	PRL 73 934	+Kinoshita, Barish, Chadha+	(CLEO Collab.)
ABREU	93E	PL B302 356	+Adam, Adye, Agasi+	(DELPHI Collab.)
ACTON	93J	ZPHY C59 183	+Alexander, Allison, Allport+	(OPAL Collab.)
ADRIANI	93M	PRPL 236 1	+Aguilar-Benitez, Ahlen, Alcaraz, Aloisio+	(L3 Collab.)
ALBRECHT	93C	ZPHY C58 61	+Ehrlichmann, Hamacher+	(ARGUS Collab.)
ALBRECHT	93G	PL B316 608	+Ehrlichmann, Hamacher+	(ARGUS Collab.)
BALEST	93	PR D47 R3671	+Daoudi, Ford, Johnson+	(CLEO Collab.)
BEAN	93	PRL 70 138	+Gronberg, Kutschke+	(CLEO Collab.)
BORTOLETTO	93	PRL 71 1791	+Brown, Fast, McIlwain+	(CLEO Collab.)
ESCRIBANO	93	PL B301 419	+Masso	(BARC)
PROCARIO	93	PRL 70 1207	+Yang, Balest, Cho+	(CLEO Collab.)
WASSERBAECH	93	PR D48 4216		(FSUSC)
ABREU	92	ZPHY C53 567	+Adam, Adami, Adye+	(DELPHI Collab.)
ABREU	92N	ZPHY C55 555	+Adam, Adye, Agasi+	(DELPHI Collab.)
ACTON	92F	PL B281 405	+Alexander, Allison, Allport+	(OPAL Collab.)
ACTON	92H	PL B288 373	+Allison, Allport+	(OPAL Collab.)
AKERIB	92	PRL 69 3610	+Barish, Chadha, Cowen+	(CLEO Collab.)
Also	93B	PRL 71 3395 (erratum)	Akerib, Barish, Chadha, Cowen+	(CLEO Collab.)
ALBRECHT	92D	ZPHY C53 367	+Ehrlichmann, Hamacher+	(ARGUS Collab.)
ALBRECHT	92K	ZPHY C55 179	+Ehrlichmann, Hamacher, Krueger+	(ARGUS Collab.)
ALBRECHT	92M	PL B292 221	+Ehrlichmann, Hamacher, Hofmann+	(ARGUS Collab.)
ALBRECHT	92Q	ZPHY C56 339	+Ehrlichmann, Hamacher+	(ARGUS Collab.)
AMMAR	92	PR D45 3976	+Baringer, Coppage, Davis+	(CLEO Collab.)
ARTUSO	92	PRL 69 3278	+Goldberg, Horwitz, Kennett+	(CLEO Collab.)
BAI	92	PRL 69 3021	+Bardon, Becker-Szendy, Burnett+	(BES Collab.)
BATTLE	92	PL B291 488	+Ernst, Kroha, Roberts+	(CLEO Collab.)
BUSKULIC	92H	PL B297 432	+Decamp, Goy, Lees, Minard+	(ALEPH Collab.)
BUSKULIC	92J	PL B297 459	+Decamp, Goy, Lees+	(ALEPH Collab.)
DECAMP	92C	ZPHY C54 211	+Deschizeaux, Goy, Lees+	(ALEPH Collab.)
DECAMP	92E	PL B279 411	+Deschizeaux, Goy, Lees+	(ALEPH Collab.)
ABREU	91D	PL B267 422	+Adam, Adami, Adye+	(DELPHI Collab.)
ACTON	91C	PL B273 355	+Alexander, Allison, Allport+	(OPAL Collab.)
ADEVA	91F	PL B265 451	+Adriani, Aguilar-Benitez, Akbari+	(L3 Collab.)
ALBRECHT	91D	PL B260 259	+Ehrlichmann, Hamacher, Krueger+	(ARGUS Collab.)
ALEXANDER	91D	PL B266 201	+Allison, Allport, Anderson+	(OPAL Collab.)
ANTREASYAN	91	PL B259 216	+Bartels, Besset, Bieler+	(Crystal Ball Collab.)
GRIFOLS	91	PL B255 611	+Mendez	(BARC)
SAMUEL	91B	PRL 67 668	+Li, Mendel	(OKSU, WONT)
Also Erratum.	92B	PRL 69 995	Samuel, Li, Mendel	(OKSU, WONT)
ABACHI	90	PR D41 1414	+Derrick, Kooijman, Musgrave+	(HRS Collab.)
ALBRECHT	90E	PL B246 278	+Ehrlichmann, Harder, Krueger+	(ARGUS Collab.)

ALBRECHT	90I	PL B250 164	+Ehrlichmann, Harder, Krueger+	(ARGUS Collab.)
BEHREND	90	ZPHY C46 537	+Criegee, Field, Franke+	(CELLO Collab.)
BOWCOCK	90	PR D41 805	+Kinoshita, Pipkin, Procario+	(CLEO Collab.)
DELAGUILA	90	PL B252 116	+Sher	(BARC, WILL)
GOLDBERG	90	PL B251 223	+Haupt, Horwitz, Jain+	(CLEO Collab.)
WU	90	PR D41 2339	+Hayes, Perl, Barklow+	(Mark II Collab.)
ABACHI	89B	PR D40 902	+Derrick, Kooijman, Musgrave+	(HRS Collab.)
BEHREND	89B	PL B222 163	+Criegee, Dainton, Field, Franke+	(CELLO Collab.)
JANSSEN	89	PL B228 273	+Antreasyan, Bartels, Besset+	(Crystal Ball Collab.)
KLEINWORT	89	ZPHY C42 7	+Allison, Ambrus, Barlow+	(JADE Collab.)
ADEVA	88	PR D38 2665	+Anderhub, Ansari, Becker+	(Mark-J Collab.)
ALBRECHT	88B	PL B202 149	+Binder, Boeckmann+	(ARGUS Collab.)
ALBRECHT	88L	ZPHY C41 1	+Boeckmann, Glaeser, Harder+	(ARGUS Collab.)
ALBRECHT	88M	ZPHY C41 405	+Boeckmann, Glaeser, Harder+	(ARGUS Collab.)
AMIDEI	88	PR D37 1750	+Trilling, Abrams, Baden+	(Mark II Collab.)
BEHREND	88	PL B200 226	+Criegee, Dainton, Field+	(CELLO Collab.)
BRAUNSCH...	88C	ZPHY C39 331	Braunschweig, Kirschfink, Martyn+	(TASSO Collab.)
KEH	88	PL B212 123	+Antreasyan, Bartels, Besset+	(Crystal Ball Collab.)
TSCHIRHART	88	PL B205 407	+Abachi, Akerlof, Baringer+	(HRS Collab.)
ABACHI	87B	PL B197 291	+Baringer, Bylsma, De Bonte+	(HRS Collab.)
ABACHI	87C	PRL 59 2519	+Akerlof, Baringer, Blockus+	(HRS Collab.)
ADLER	87B	PRL 59 1527	+Becker, Blaylock, Bolton+	(Mark III Collab.)
AIHARA	87B	PR D35 1553	+Alston-Garnjost, Avery+	(TPC Collab.)
AIHARA	87C	PRL 59 751	+Alston-Garnjost, Avery+	(TPC Collab.)
ALBRECHT	87L	PL B185 223	+Binder, Boeckmann, Glaser+	(ARGUS Collab.)
ALBRECHT	87M	PL B185 228	+Binder, Boeckmann, Glaser+	(ARGUS Collab.)
ALBRECHT	87P	PL B199 580	+Andam, Binder, Boeckmann+	(ARGUS Collab.)
BAND	87	PL B198 297	+Camporesi, Chadwick, Delfino+	(MAC Collab.)
BAND	87B	PRL 59 415	+Bosman, Camporesi, Chadwick+	(MAC Collab.)
BARINGER	87	PRL 59 1993	+McIlwain, Miller, Shibata+	(CLEO Collab.)
BEBEK	87C	PR D36 690	+Berkelman, Blucher, Cassel+	(CLEO Collab.)
BURCHAT	87	PR D35 27	+Feldman, Barklow, Boyarski+	(Mark II Collab.)
BYLSMA	87	PR D35 2269	+Abachi, Baringer, DeBonte+	(HRS Collab.)
COFFMAN	87	PR D36 2185	+Dubois, Eigen, Hauser+	(Mark III Collab.)
DERRICK	87	PL B189 260	+Kooijman, Loos, Musgrave+	(HRS Collab.)
FORD	87	PR D35 408	+Qi, Read, Smith+	(MAC Collab.)
FORD	87B	PR D36 1971	+Qi, Read, Smith+	(MAC Collab.)
GAN	87	PRL 59 411	+Abrams, Amidei, Baden+	(Mark II Collab.)
GAN	87B	PL B197 561	+Abrams, Amidei, Baden+	(Mark II Collab.)
ADEVA	86B	PL B179 177	+Ansari, Becker, Becker-Szendy+	(Mark-J Collab.)
AIHARA	86E	PRL 57 1836	+Alston-Garnjost, Avery+	(TPC Collab.)
BARTEL	86D	PL B182 216	+Becker, Felst, Haidt, Knies+	(JADE Collab.)
PDG	86	PL 170B	Aguilar-Benitez, Porter+	(CERN, CIT+)
RUCKSTUHL	86	PRL 56 2132	+Stroynowski, Atwood, Barish+	(DELCO Collab.)
SCHMIDKE	86	PRL 57 527	+Abrams, Matteuzzi, Amidei+	(Mark II Collab.)
YELTON	86	PRL 56 812	+Dorfan, Abrams, Amidei+	(Mark II Collab.)
AKERLOF	85B	PRL 55 570	+Baranko, Baringer, Beltrami+	(HRS Collab.)
ALTHOFF	85	ZPHY C26 521	+Braunschweig, Kirschfink+	(TASSO Collab.)
ASH	85B	PRL 55 2118	+Band, Blume, Camporesi+	(MAC Collab.)
BALTRUSAIT...	85	PRL 55 1842	Baltrusaitis, Becker, Blaylock, Brown+	(Mark III Collab.)
BARTEL	85F	PL 161B 188	+Becker, Cords, Felst+	(JADE Collab.)
BEHRENDS	85	PR D32 2468	+Gentile, Guida, Guida, Morrow+	(CLEO Collab.)
BELTRAMI	85	PRL 54 1775	+Bylsma, DeBonte, Gan+	(HRS Collab.)
BERGER	85	ZPHY C28 1	+Genzel, Lackas, Pielorz+	(PLUTO Collab.)
BURCHAT	85	PRL 54 2489	+Schmidke, Yelton, Abrams+	(Mark II Collab.)
FERNANDEZ	85	PRL 54 1624	+Ford, Qi, Read+	(MAC Collab.)
MILLS	85	PRL 54 624	+Pal, Atwood, Baillon+	(DELCO Collab.)
AIHARA	84C	PR D30 2436	+Alston-Garnjost, Badtke, Bakken+	(TPC Collab.)
ALTHOFF	84D	PL 141B 264	+Braunschweig, Kirschfink+	(TASSO Collab.)
BEHREND	84	ZPHY C23 103	+Fenner, Schachter, Schroder+	(CELLO Collab.)
MILLS	84	PRL 52 1944	+Ruckstuhl, Atwood, Baillon+	(DELCO Collab.)
BEHREND	83C	PL 127B 270	+Chen, Fenner, Gumpel+	(CELLO Collab.)
JAROS	83	PRL 51 955	+Amidei, Trilling, Abrams+	(Mark II Collab.)
SILVERMAN	83	PR D27 1196	+Shaw	(UCI)
BEHREND	82	PL 114B 282	+Chen, Fenner, Field+	(CELLO Collab.)
BLOCKER	82B	PRL 48 1586	+Abrams, Alam, Blondel+	(Mark II Collab.)
BLOCKER	82C	PRL 49 1369	+Levi, Abrams, Amidei+	(Mark II Collab.)
BLOCKER	82D	PL 109B 119	+Dorfan, Abrams, Alam+	(Mark II Collab.) J
HAYES	82	PR D25 2869	+Perl, Alam, Boyarski+	(Mark II Collab.)
BERGER	81B	PL 99B 489	+Genzel, Grigull, Lackas+	(PLUTO Collab.)
DORFAN	81	PRL 46 215	+Blocker, Abrams, Alam+	(Mark II Collab.)
BLOCKER	80	Thesis LBL-10801		(LBL)
BRANDELIK	80	PL 92B 199	+Braunschweig, Gather+	(TASSO Collab.)
ZHOLENTZ	80	PL 96B 214	+Kurdadze, Lelchuk, Mishnev+	(NOVO)
Also	81	SJNP 34 814	Zholentz, Kurdadze, Lelchuk+	(NOVO)
		Translated from YAF 34 1471.		
BACINO	79B	PRL 42 749	+Ferguson, Nodulman, Slater+	(DELCO Collab.)
KIRKBY	79	SLAC-PUB-2419		(SLAC) J
Batavia Lepton Photon Conference.				
BACINO	78B	PRL 41 13	+Ferguson, Nodulman, Slater+	(DELCO Collab.) J
Also	78	Tokyo Conf. 249	Kirz	(STON)
Also	80	PL 96B 214	Zholentz, Kurdadze, Lelchuk, Mishnev+	(NOVO)
BARTEL	78	PL 77B 331	+Dittmann, Duinker, Olsson, Oneill+	(DESY, HEIDP)
BRANDELIK	78	PL 73B 109	+Braunschweig, Martyn, Sander+	(DASP Collab.) J
FELDMAN	78	Tokyo Conf. 777		(SLAC) J
HEILE	78	NP B138 189	+Perl, Abrams, Alam, Boyarski+	(SLAC, LBL)
JAROS	78	PRL 40 1120	+Abrams, Alam+	(SLAC, LBL, NWES, HAWA)
PERL	75	PRL 35 1489	+Abrams, Boyarski, Breidenbach+	(LBL, SLAC)

OTHER RELATED PAPERS

WEINSTEIN	93	ARNPS 43 457	+Stroynowski	(CIT, SMU)
PERL	92	RPP 55 653		(SLAC)
PICH	90	MPL A5 1995		(VALE)
BARISH	88	PRPL 157 1	+Stroynowski	(CIT)
GAN	88	IJMP A3 531	+Perl	(SLAC)
HAYES	88	PR D38 3351	+Perl	(SLAC)
PERL	80	ARNPS 30 299		(SLAC)