CPT INVARIANCE

$(m_{W^+} - m_{W^-}) / m_{\rm average}$		-0.002 ± 0.007
$(m_{e^+} - m_{e^-}) / m_{\rm average}$		$<4 \times 10^{-8}$, CL = 90%
$\lvert q_{e^+} + q_{e^-}\rvert/e$		$<4 \times 10^{-8}$
$(g_{e^+} - g_{e^-}) / g_{\rm average}$		$(-0.5 \pm 2.1) \times 10^{-12}$
$\tau_{\mu^+}/\tau_{\mu^-}$ mean life ratio		1.00002 ± 0.00008
$(\tau_{\mu^+} - \tau_{\mu^-}) / \tau_{\rm average}$		$(2 \pm 8) \times 10^{-5}$
$(g_{\mu^+} - g_{\mu^-}) / g_{\rm average}$		$(-2.6 \pm 1.6) \times 10^{-8}$
$(m_{\pi^+} - m_{\pi^-}) / m_{\rm average}$		$(2 \pm 5) \times 10^{-4}$
$(\tau_{\pi^+} - \tau_{\pi^-}) / \tau_{\rm average}$		$(6 \pm 7) \times 10^{-4}$
$(m_{K^+} - m_{K^-}) / m_{\rm average}$		$(-0.6 \pm 1.8) \times 10^{-4}$
$(\tau_{K^+} - \tau_{K^-}) / \tau_{\rm average}$		$(0.11 \pm 0.09)\%$ (S = 1.2)
$K^\pm \to \mu^\pm \nu_\mu$ rate difference/average		$(-0.5 \pm 0.4)\%$
$K^\pm \to \pi^\pm \pi^0$ rate difference/average	[g]	$(0.8 \pm 1.2)\%$
$\lvert m_{K^0} - m_{\overline{K}^0}\rvert / m_{\rm average}$	[h]	$<9 \times 10^{-19}$
phase difference $\phi_{00} - \phi_{+-}$		$(-1.0 \pm 1.0)^\circ$
$(m_p - m_{\overline{p}}) / m_{\rm average}$		$(2 \pm 4) \times 10^{-8}$
$\lvert q_p + q_{\overline{p}}\rvert/e$		$<2 \times 10^{-5}$
$(\mu_p - \lvert\mu_{\overline{p}}\rvert) / \lvert\mu_{\rm average}\rvert$		$(-2.6 \pm 2.9) \times 10^{-3}$
$(m_n - m_{\overline{n}}) / m_{\rm average}$		$(9 \pm 5) \times 10^{-5}$
$(m_\Lambda - m_{\overline{\Lambda}}) / m_\Lambda$		$(-1.0 \pm 0.9) \times 10^{-5}$
$(\tau_\Lambda - \tau_{\overline{\Lambda}}) / \tau_{\rm average}$		0.04 ± 0.09
$(\mu_{\Sigma^+} - \lvert\mu_{\overline{\Sigma}^-}\rvert) / \lvert\mu\rvert_{\rm average}$		0.014 ± 0.015
$(m_{\Xi^-} - m_{\overline{\Xi}^+}) / m_{\rm average}$		$(1.1 \pm 2.7) \times 10^{-4}$
$(\tau_{\Xi^-} - \tau_{\overline{\Xi}^+}) / \tau_{\rm average}$		0.02 ± 0.18
$(m_{\Omega^-} - m_{\overline{\Omega}^+}) / m_{\rm average}$		$(0 \pm 5) \times 10^{-4}$

TESTS OF NUMBER CONSERVATION LAWS

LEPTON FAMILY NUMBER

Lepton family number conservation means separate conservation of each of L_e, L_μ, L_τ.

$\Gamma(Z \to e^\pm \mu^\mp)/\Gamma_{\rm total}$	[i]	$<6 \times 10^{-6}$, CL = 95%
$\Gamma(Z \to e^\pm \tau^\mp)/\Gamma_{\rm total}$	[i]	$<1.3 \times 10^{-5}$, CL = 95%
$\Gamma(Z \to \mu^\pm \tau^\mp)/\Gamma_{\rm total}$	[i]	$<1.9 \times 10^{-5}$, CL = 95%
limit on $\mu^- \to e^-$ conversion		
$\sigma(\mu^- {}^{32}\mathrm{S} \to e^- {}^{32}\mathrm{S})$ / $\sigma(\mu^- {}^{32}\mathrm{S} \to \nu_\mu {}^{32}\mathrm{P}^*)$		$<7 \times 10^{-11}$, CL = 90%
$\sigma(\mu^- \mathrm{Ti} \to e^- \mathrm{Ti})$ / $\sigma(\mu^- \mathrm{Ti} \to$ capture)		$<4.3 \times 10^{-12}$, CL = 90%
limit on muonium $\to$ antimuonium conversion $R_g = G_C / G_F$		<0.13, CL = 90%
$\Gamma(\mu^- \to e^- \nu_e \overline{\nu}_\mu)/\Gamma_{\rm total}$	[j]	$<1.2 \times 10^{-2}$, CL = 90%
$\Gamma(\mu^- \to e^- \gamma)/\Gamma_{\rm total}$		$<4.9 \times 10^{-11}$, CL = 90%
$\Gamma(\mu^- \to e^- e^+ e^-)/\Gamma_{\rm total}$		$<1.0 \times 10^{-12}$, CL = 90%
$\Gamma(\mu^- \to e^- 2\gamma)/\Gamma_{\rm total}$		$<7.2 \times 10^{-11}$, CL = 90%
$\Gamma(\tau^- \to e^- \gamma)/\Gamma_{\rm total}$		$<1.2 \times 10^{-4}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \gamma)/\Gamma_{\rm total}$		$<4.2 \times 10^{-6}$, CL = 90%
$\Gamma(\tau^- \to e^- \pi^0)/\Gamma_{\rm total}$		$<1.4 \times 10^{-4}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \pi^0)/\Gamma_{\rm total}$		$<4.4 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- K^0)/\Gamma_{\rm total}$		$<1.3 \times 10^{-3}$, CL = 90%
$\Gamma(\tau^- \to \mu^- K^0)/\Gamma_{\rm total}$		$<1.0 \times 10^{-3}$, CL = 90%
$\Gamma(\tau^- \to e^- \eta)/\Gamma_{\rm total}$		$<6.3 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \eta)/\Gamma_{\rm total}$		$<7.3 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- \rho^0)/\Gamma_{\rm total}$		$<1.9 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \rho^0)/\Gamma_{\rm total}$		$<2.9 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- K^*(892)^0)/\Gamma_{\rm total}$		$<3.8 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- K^*(892)^0)/\Gamma_{\rm total}$		$<4.5 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \ell^- \ell^- \ell^+)/\Gamma_{\rm total}$	[k]	$<3.4 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- e^+ e^-)/\Gamma_{\rm total}$		$<1.3 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to (e\mu\mu)^-)/\Gamma_{\rm total}$		$<2.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- \mu^+ \mu^-)/\Gamma_{\rm total}$		$<1.9 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^+ \mu^- \mu^-)/\Gamma_{\rm total}$		$<1.6 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to (\mu e e)^-)/\Gamma_{\rm total}$		$<2.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- e^+ e^-)/\Gamma_{\rm total}$		$<1.4 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \mu^+ \mu^-)/\Gamma_{\rm total}$		$<1.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \ell^\pm \pi^\mp \pi^-)/\Gamma_{\rm total}$	[i,k]	$<6.3 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^\mp \pi^\pm \pi^-)/\Gamma_{\rm total}$	[i]	$<6.0 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- \pi^+ \pi^-)/\Gamma_{\rm total}$		$<2.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^\mp \pi^\pm \pi^-)/\Gamma_{\rm total}$	[i]	$<3.9 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \pi^+ \pi^-)/\Gamma_{\rm total}$		$<3.6 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \ell^\pm \pi^\mp K^-)/\Gamma_{\rm total}$	[i,k]	$<1.2 \times 10^{-4}$, CL = 90%
$\Gamma(\tau^- \to (e\pi K)^-$, all charged$)/\Gamma_{\rm total}$		$<7.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- \pi^\pm K^\mp)/\Gamma_{\rm total}$	[i]	$<5.8 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- \pi^+ K^-)/\Gamma_{\rm total}$		$<2.9 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^- \pi^- K^+)/\Gamma_{\rm total}$		$<5.8 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to (\mu\pi K)^-$, all charged$)/\Gamma_{\rm total}$		$<7.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \pi^\pm K^\mp)/\Gamma_{\rm total}$	[i]	$<7.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \pi^+ K^-)/\Gamma_{\rm total}$		$<7.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to \mu^- \pi^- K^+)/\Gamma_{\rm total}$		$<7.7 \times 10^{-5}$, CL = 90%
$\Gamma(\tau^- \to e^-$ light spinless boson$)/\Gamma_{\rm total}$		$<3.2 \times 10^{-3}$, CL = 95%
$\Gamma(\tau^- \to \mu^-$ light spinless boson$)/\Gamma_{\rm total}$		$<6 \times 10^{-3}$, CL = 95%

ν oscillations. (For other lepton mixing effects in particle decays, see the Full Listings.)

$\overline{\nu}_e \not\to \overline{\nu}_e$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<0.0083 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		<0.14, CL = 68%
$\nu_e \to \nu_\tau$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<9 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		<0.12, CL = 90%
$\overline{\nu}_e \to \overline{\nu}_\tau$		
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		<0.7, CL = 90%
$\nu_\mu \to \nu_e$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<0.09 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		$<2.5 \times 10^{-3}$, CL = 90%
$\overline{\nu}_\mu \to \overline{\nu}_e$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<0.14 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		<0.004, CL = 95%
$\nu_\mu(\overline{\nu}_\mu) \to \nu_e(\overline{\nu}_e)$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<0.075 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		$< 3 \times 10^{-3}$, CL = 90%
$\nu_\mu \to \nu_\tau$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<0.9 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		<0.004, CL = 90%
$\overline{\nu}_\mu \to \overline{\nu}_\tau$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<2.2 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		$<4.4 \times 10^{-2}$, CL = 90%
$\nu_\mu(\overline{\nu}_\mu) \to \nu_\tau(\overline{\nu}_\tau)$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<1.5 eV^2, CL = 90%
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		$<8 \times 10^{-3}$, CL = 90%
$\nu_e \not\to \nu_e$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<2.3 eV^2
$\sin^2(2\theta)$ for "Large" $\Delta(m^2)$		$<7 \times 10^{-2}$, CL = 90%
$\nu_\mu \not\to \nu_\mu$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<0.23 or >1500 eV^2
$\sin^2(2\theta)$ for $\Delta(m^2) = 100$eV^2	[l]	<0.02, CL = 90%
$\overline{\nu}_\mu \not\to \overline{\nu}_\mu$		
$\Delta(m^2)$ for $\sin^2(2\theta) = 1$		<7 or >1200 eV^2
$\sin^2(2\theta)$ for 190 eV^2 $< \Delta(m^2) <$ 320 eV^2	[m]	<0.02, CL = 90%
$\Gamma(\pi^+ \to \mu^+ \nu_e)/\Gamma_{\rm total}$	[n]	$<8.0 \times 10^{-3}$, CL = 90%
$\Gamma(\pi^+ \to \mu^- e^+ e^+ \nu)/\Gamma_{\rm total}$		$<1.6 \times 10^{-6}$, CL = 90%
$\Gamma(\pi^0 \to \mu^+ e^- + e^- \mu^+)/\Gamma_{\rm total}$		$<1.72 \times 10^{-8}$, CL = 90%
$\Gamma(K^+ \to \mu^- \nu e^+ e^+)/\Gamma_{\rm total}$		$<2.0 \times 10^{-8}$, CL = 90%
$\Gamma(K^+ \to \mu^+ \nu_e)/\Gamma_{\rm total}$	[n]	$<4 \times 10^{-3}$, CL = 90%
$\Gamma(K^+ \to \pi^+ \mu^+ e^-)/\Gamma_{\rm total}$		$<2.1 \times 10^{-10}$, CL = 90%
$\Gamma(K^+ \to \pi^+ \mu^- e^+)/\Gamma_{\rm total}$		$<7 \times 10^{-9}$, CL = 90%
$\Gamma(K^0_L \to e^\pm \mu^\mp)/\Gamma_{\rm total}$	[i]	$<3.3 \times 10^{-11}$, CL = 90%
$\Gamma(D^+ \to \pi^+ e^\pm \mu^\mp)/\Gamma_{\rm total}$	[i]	$<3.8 \times 10^{-3}$, CL = 90%
$\Gamma(D^+ \to \pi^+ e^+ \mu^-)/\Gamma_{\rm total}$		$<3.3 \times 10^{-3}$, CL = 90%
$\Gamma(D^+ \to \pi^+ e^- \mu^+)/\Gamma_{\rm total}$		$<3.3 \times 10^{-3}$, CL = 90%
$\Gamma(D^+ \to K^+ e^+ \mu^-)/\Gamma_{\rm total}$		$<3.4 \times 10^{-3}$, CL = 90%
$\Gamma(D^+ \to K^+ e^- \mu^+)/\Gamma_{\rm total}$		$<3.4 \times 10^{-3}$, CL = 90%
$\Gamma(D^0 \to \mu^\pm e^\mp)/\Gamma_{\rm total}$	[i]	$<1.0 \times 10^{-4}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^+ \mu^-)/\Gamma_{\rm total}$		$<6.4 \times 10^{-3}$, CL = 90%
$\Gamma(B^+ \to \pi^+ e^- \mu^+)/\Gamma_{\rm total}$		$<6.4 \times 10^{-3}$, CL = 90%
$\Gamma(B^+ \to K^+ e^+ \mu^-)/\Gamma_{\rm total}$		$<6.4 \times 10^{-3}$, CL = 90%

Limits are given at the 90% confidence level, while errors are given as ±1 standard deviation.