$\overline{p}\gamma$	L,B	< 2.9	$\times 10^{-4}$	CL=90%	641
$\overline{p}\pi^0$	L,B	< 6.6	$\times 10^{-4}$	CL=90%	632
$\overline{p}\eta$	L,B	< 1.30	$\times 10^{-3}$	CL=90%	476
e^- light spinless boson	LF	< 3.2	$\times 10^{-3}$	CL=95%	–
μ^- light spinless boson	LF	< 6	$\times 10^{-3}$	CL=95%	–

Number of Light Neutrino Types

(including ν_e, ν_μ, and ν_τ)

Number $N = 2.983 \pm 0.025$ (Standard Model fits to Z data)
Number $N = 2.97 \pm 0.17$ (Direct measurement of invisible Z width)

Heavy Lepton Searches

$L^\pm$ – charged lepton

Mass $m > 44.3$ GeV, CL = 95% $m_\nu \approx 0$

$L^\pm$ – stable charged heavy lepton

Mass $m > 42.8$ GeV, CL = 95%

L^0 – stable neutral heavy lepton

Mass $m > 45.0$ GeV, CL = 95% (Dirac)
Mass $m > 39.5$ GeV, CL = 95% (Majorana)

Neutral heavy lepton

Mass $m > 19.6$ GeV, CL = 95% (all $|U_{\ell j}|^2$) (Dirac)
Mass $m > 45.7$ GeV or $m < 25$, CL = 95% ($|U_{\ell j}|^2 > 10^{-13}$ (Dirac)

Searches for Massive Neutrinos and Lepton Mixing

For excited leptons, see Compositeness Limits below.

See the Full Listings in the *Review of Particle Properties* (Physical Review **D50** 1173 (1994)) for a Note giving details of neutrinos, masses, mixing, and the status of experimental searches.

No direct, uncontested evidence for massive neutrinos or lepton mixing has been obtained. Sample limits are:

ν oscillation: $\overline{\nu}_e \not\to \overline{\nu}_e$

$\Delta(m^2) < 0.0083$ eV^2, CL = 90% (if $\sin^2 2\theta = 1$)
$\sin^2 2\theta < 0.14$, CL = 68% (if $\Delta(m^2)$ is large)

ν oscillation: $\nu_\mu \to \nu_e$ (θ = mixing angle)

$\Delta(m^2) < 0.09$ eV^2, CL = 90% (if $\sin^2 2\theta = 1$)
$\sin^2 2\theta < 2.5 \times 10^{-3}$, CL = 90% (if $\Delta(m^2)$ is large)