($\Delta S = -\Delta Q$) contains only the J_λ^V contribution and the phase δ_1. The interpretation of the experimental data depends strongly on the $\pi\pi$-scattering phase shifts and on the J_λ^V contribution. For an analysis of the K_{e4} amplitudes see[6].

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III

CONSERVATION OF LEPTONS AND BARYONS AND THE NEUTRINO MASS

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Idea of experiment	Experimental procedure	Results (confidence level of limits about 70% unless otherwise stipulated	Remarks
		1. Lepton conservation	
$\nu_e \neq \bar{\nu}_e$; searches for neutrinoless double Beta decay	Magnetic spark chambers	$T_{ee\nu\nu}^{Ca^{48}} > 3 \cdot 10^{19}$ yrs [4]	Theoretical half-lives (years) for double β-decay processes[1-3]
	Semiconductor Ge counter as source and detector	$T_{ee}^{Ca^{48}} > 1.6 \cdot 10^{21}$ yrs [4] $T_{ee}^{Ge^{76}} > 3 \cdot 10^{20}$ yrs [5]	$T_{ee\nu\nu}^{Ca^{48}} = 10^{21 \pm 2,5}$ $T_{ee}^{Ca^{48}} = 5 \cdot 10^{15 \pm 2}$ $T_{ee\nu\nu}^{Ge^{76}} = 10^{23 \pm 2,5}$ $T_{ee}^{Ge^{76}} = 8 \cdot 10^{16 \pm 2}$
	Mass spectrometric analysis of Xe and Kr in the minerals Te and Se of known age. T^A determined from the relation $\frac{1}{T^A} = \frac{1}{T_{ee\nu\nu}^A} + \frac{1}{T_{ee}^A}$	$T^{Te^{128}} \geq 3 \cdot 10^{22}$ yrs [6] $T^{Tc^{130}} = (8 \pm 0,6) \cdot 10^{20}$ yrs [6] $T^{Te^{130}} = (3 \pm 0.4) \cdot 10^{20}$ yrs [7] $T^{Te^{130}} = 6 \cdot 10^{20 \pm 0,3}$ yrs [3]	$T_{ee\nu\nu}^{Te^{128}} = 10^{27 \pm 2,5}$ $T_{ee}^{Te^{128}} = 2 \cdot 10^{19 \pm 2}$ $T_{ee\nu\nu}^{Te^{130}} = 10^{22 \pm 2.5}$ $T_{ee}^{Te^{130}} = 2 \cdot 10^{16 \pm 2}$ $T_{ee\nu\nu}^{Se^{82}} = 10^{22 \pm 2,5}$ $T_{ee}^{Se^{82}} = 1 \cdot 10^{16 \pm 2}$
		$T^{Se^{82}} = 6 \cdot 10^{19 \pm 0,3}$ yrs [3]	"Neutrinoless" half-lives calculated in the case of maximum violation of the lepton conservation law for unpolarized neutrinos
$\nu_\mu \neq \bar{\nu}_\mu$; investigation of sign of charged muons produced in collision with nuclei of high energy ν_μ: $\nu_\mu + \begin{cases} n \to \mu^- + \ldots \\ p \to \mu^+ + \ldots \end{cases}$	Spark chambers [8]	$\sigma_{\mu^+} < 0,02\sigma_{\mu^-}$ (~ 1000 neutrino events)	Accuracy limited by the fact that the ν_μ beam contains a ν_μ admixture

Idea of experiment	Experimental procedure	Results (confidence level of limits about 70% unless otherwise stipulated	Remarks
$\nu_\mu \neq \nu_e$; investigation of the type of charged leptons produced in collisions of high-energy ν_μ with neutrons: $\nu_\mu + n \rightarrow \rightarrow \begin{cases} \mu^- + \dots \\ e^- + \dots \end{cases}$	Spark chambers [8] Bubble chamber [9]	$\sigma_e = (0.011 \pm 0.010)\,\sigma_\mu$ ($\sim$ 5000 neutrino events), $\sigma_e < 0.01\sigma_\mu$ (450 events	Accuracy limited by the fact that the ν_μ beam contains a ν_e admixture
$\nu_\mu \neq \nu_e$; searches for the process $\mu^+ \rightarrow e^+ + \gamma$	Spark chamber[10]	$R = \frac{W(\mu^+ \rightarrow e^+ + \gamma)}{W(\mu^+ \rightarrow e^+ + \nu_e + \bar{\nu}_\mu)} < 2 \cdot 10^{-8}$ (confidence level 90%)	"Theoretical value" $R \sim \frac{\alpha}{2\pi}\epsilon^2$, where ϵ is the relative amplitude of the interaction that does not conserve the μ charge
		2. Baryon conservation	
Searches for nucleon decays into high-energy particles via channels allowed by known conservation laws (other than the byron and lepton conservation laws)	Registration of particles in a system of liquid scintillation detectors located 3200m underground ($162m^2$ sr)[11]	Half-life of nucleon $T > 2 \times 10^{28}$ years for "unfavorable" decay $p \rightarrow K^+ + \nu$ and $T > 8 > 10^{29}$ years for the most "favorable" decay $p \rightarrow \mu^+ + \gamma$	This result pertains to conservation of baryon charge only, since the virtual transitions $n \rightarrow \bar{n}$, forbidden only by the baryon conservation law, may cause decays of nuclei with pion emission[12]
		3. Neutrino mass	
ν_e mass; study of tritium β spectrum	Electrostatic integral spectrometer [13]	$m_{\nu_e} < 250$ eV	
ν_μ mass; measurement of muon momentum in $\pi^+ \rightarrow \mu^+$ decay (stopped pions)	Magnetic spectrometer [14]	$m_{\nu_\mu} < 1.2$ MeV	More accurate determination of the pion mass will greatly decrease the upper limit of the ν_μ mass; cosmological but likely hypothesis leads to a ν_μ mass limit $m_{\nu_\mu} < 1000$ eV.

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