

Selected Abstracts from Other Physical Review Journals

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Constraints on mixing angles of Majorana neutrinos. Rathin Adhikari and G. Rajasekaran, *The Institute of Mathematical Sciences, C.I.T Campus, Taramani, Chennai-600 113, India*. (Received 14 December 1998; revised manuscript received 28 May 1999; published 21 December 1999)

By combining the inputs from the neutrinoless double beta decay and the fits of cosmological models of dark matter with solar and atmospheric neutrino data, we obtain constraints on two of the mixing angles of Majorana neutrinos, which become stronger when coupled with the reactor neutrino data. These constraints are strong enough to rule out Majorana neutrinos if the small angle solution of solar neutrino puzzle is borne out. [S0556-2821(00)50501-3] [Phys. Rev. D **61**, 031301 (1990)]

Neutrino oscillations and the effect of the finite lifetime of the neutrino source. W. Grimus, *Institute for Theoretical Physics, University of Vienna, Boltzmanngasse 5, A-1090 Vienna, Austria*; S. Mohanty and P. Stockinger, *Theory Group, Physical Research Laboratory, Ahmedabad - 380 009, India*. (Received 9 April 1999; published 23 December 1999)

We consider a neutrino source at rest and discuss a condition for the existence of neutrino oscillations which derives from the finite lifetime τ_S of the neutrino source particle. This condition is present if the neutrino source is a free particle such that its wave function is nonstationary. For a Gaussian wave function and with some simplifying assumptions, we study the modification of the usual oscillation probability stemming from τ_S . In the present accelerator experiments the effect of τ_S can be neglected. We discuss some experimental situations where the source lifetime becomes relevant in the oscillation formula. [S0556-2821(00)01501-0] [Phys. Rev. D **61**, 033001 (1990)]

Permutation symmetry for neutrino and charged-lepton mass matrices. Ernest Ma, *Physics Department, University of California, Riverside, California 92521*. (Received 3 September 1999; published 11 January 2000)

Permutation symmetry S_3 is applied to obtain two equal Majorana neutrino masses, while maintaining three different charged-lepton masses and suppressing neutrinoless double beta decay. The resulting radiative splitting of the two neutrinos is shown to be suitable for solar neutrino vacuum oscillations. [S0556-2821(00)06603-0] [Phys. Rev. D **61**, 033012 (1990)]

Generalized polarizabilities of the pion in chiral perturbation theory. C. Unkmeir and S. Scherer, *Institut für Kernphysik, Johannes Gutenberg-Universität, J. J. Becher-Weg 45, D-55099 Mainz, Germany*; A. I. L'vov, *P. N. Lebedev Physical Institute, Moscow 117924, Russia*; D. Drechsel, *Institut für Kernphysik, Johannes Gutenberg-Universität, J. J. Becher-Weg 45, D-55099 Mainz, Germany*. (Received 26 April 1999; published 23 December 1999)

We present a calculation of the virtual Compton scattering amplitude for $\gamma^* + \pi \rightarrow \gamma + \pi$ in the framework of chiral perturbation theory at $\mathcal{O}(p^4)$. We explicitly derive expressions for generalized electromagnetic polarizabilities and discuss alternative definitions of these quantities. We briefly discuss the case where both photons are off shell. [S0556-2821(00)04501-X] [Phys. Rev. D **61**, 034002 (1990)]

$\Lambda \rightarrow N\pi$ process with an external diagram and the quark mass shift. S. Y. Yoo and Il-Tong Cheon, *Department of Physics, Yonsei University, Seoul, 120-749, Korea*. (Received 11 June 1999; published 30 December 1999)

The $\Lambda \rightarrow N\pi$ process is calculated in a bag model by including an external diagram. The energy shift of quarks in the propagator is considered and the weak process is described with a four point effective Lagrangian. As a result, a right relative sign between the parity conserving and parity nonconserving amplitudes is obtained. The branching ratio $\Gamma_{\Lambda \rightarrow p\pi^-} / \Gamma_{\Lambda \rightarrow N\pi}$ is also shown to agree well with experimental data. [S0556-2821(00)02801-0] [Phys. Rev. D **61**, 034006 (1990)]

Possible space-time fractality of the emitting source. O. V. Utyuzh and G. Wilk, *The Andrzej Sołtan Institute for Nuclear Studies, Hoza 69, 00-689 Warsaw, Poland*; Z. Włodarczyk, *Institute of Physics, Pedagogical University, Konopnickiej 15, 25-405 Kielce, Poland*. (Received 21 June 1999; revised manuscript received 8 September 1999; published 30 December 1999)

Using a simple space-time implementation of the random cascade model we investigate numerically a conjecture made some time ago which was to join the intermittent behavior of spectra of emitted particles with the possible fractal structure of the emitting source. We demonstrate that such details are seen, as expected, in the Bose-Einstein correlations between identical particles. [S0556-2821(00)07301-X] [Phys. Rev. D **61**, 034007 (1990)]

Multibaryons with heavy flavors in the Skyrme model. Carlos L. Schat, *Centro Brasileiro de Pesquisas Físicas, DCP, Rua Dr. Xavier Sigaud 150, 22290-180, Rio de Janeiro, RJ, Brazil*; Norberto N. Scoccola, *Physics Department, Comisión Nacional de Energía Atómica, Av. Libertador 8250, (1429) Buenos Aires, Argentina and Universidad Favaloro, Solís 453, (1078) Buenos Aires, Argentina.* (Received 22 June 1999; published 3 January 2000)

We investigate the possible existence of multibaryons with heavy flavor quantum numbers using the bound state approach to the topological soliton model and the recently proposed approximation for multi-Skymion fields based on rational maps. We use an effective interaction Lagrangian which consistently incorporates both chiral symmetry and heavy quark symmetry, including the corrections up to order $\mathcal{O}(1/m_Q)$. The model predicts some narrow heavy flavored multibaryon states with baryon number four and seven. [S0556-2821(99)03723-6] [Phys. Rev. D **61**, 034008 (1999)]

$SU(2)_L \times U(1)_Y \times S_3 \times D$ model for atmospheric and solar neutrino deficits. Asim K. Ray and Saswati Sarkar, *Department of Physics, Visva-Bharati University, Santiniketan-731235, India.* (Received 5 April 1999; published 11 January 2000)

Motivated by the recent Super-Kamiokande experiment on atmospheric and solar neutrinos we propose a see-saw model of three generations of neutrinos based on the gauge group $SU(2)_L \times U(1)_Y$ with the discrete symmetries ($S_3 \times D$) and three right handed singlet neutrinos so that this model can accommodate the recent Super-Kamiokande data on atmospheric and solar neutrino oscillations. The model predicts maximal mixing between ν_μ and ν_τ with $\sin^2 2\theta_{\mu\tau}=1$ as required by the atmospheric neutrino data and small mixing between ν_e and ν_μ with $\sin^2 2\theta_{e\mu} \sim (10^{-2} - 10^{-3})$ as a possible explanation of the solar neutrino deficit through the MSW mechanism. The model admits two mass scales of which one breaks the electroweak symmetry and the other is responsible for the breaking of the lepton number symmetry at GUT scale leading to a small Majorana mass of the left handed doublet neutrinos. [S0556-2821(00)00801-8] [Phys. Rev. D **61**, 035007 (1990)]

Neutrinoless double- β decay with three or four neutrino mixing. Carlo Giunti, *INFN, Sezione di Torino, and Dipartimento di Fisica Teorica, Università di Torino, Via P. Giuria 1, I-10125 Torino, Italy.* (Received 8 June 1999; published 3 January 2000)

Considering the scheme with mixing of three neutrinos and a mass hierarchy that can accommodate the results of solar and atmospheric neutrino experiments, it is shown that the results of solar neutrino experiments imply a lower bound for the effective Majorana mass in neutrinoless double- β decay, under the natural assumptions that massive neutrinos are Majorana particles and there are no unlikely fine-tuned cancellations among the contributions of the different neutrino masses. Considering the four-neutrino schemes that can accommodate also the results of the LSND experi-

ment, it is shown that one of them is favored by the results of neutrinoless double- β decay experiments and the measurement of the abundances of primordial elements produced in big-bang nucleosynthesis. It is shown that in this scheme, under the assumptions that massive neutrinos are Majorana particles and there are no cancellations among the contributions of the different neutrino masses, the results of the LSND experiment imply a lower bound for the effective Majorana mass in neutrinoless double- β decay. [S0556-2821(00)05601-0] [Phys. Rev. D **61**, 036002 (1990)]

Remarks on “New experimental limit on the electric dipole moment of the neutron”. S. K. Lamoreaux, *Physics Division P-23, M.S. H803, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545*; R. Golub, *Hahn-Meitner Institut, Glienicke Str. 100, D-14109 Berlin, Germany.* (Received 26 July 1999; published 19 January 2000)

A new limit for the neutron electric dipole moment has been recently reported. This new limit is obtained by combining the result from a previous experiment with the result from a more recent experiment that has much worse statistical accuracy. We show that the old result has a systematic error possibly four times greater than the new limit, and under the circumstances, averaging of the old and new results is statistically invalid. The conclusion is that it would be more appropriate to quote two independent but mutually supportive limits as obtained from each experiment separately. [S0556-2821(00)50103-9] [Phys. Rev. D **61**, 051301 (1990)]

Schwinger-Dyson approach to color superconductivity in dense QCD. Deog Ki Hong, *Department of Physics, Pusan National University, Pusan 609-735, Korea and Physics Department, Boston University, Boston, Massachusetts 02215*; V. A. Miransky, *Bogolyubov Institute for Theoretical Physics, 252143 Kiev, Ukraine and Department of Applied Mathematics, University of Western Ontario, London, Ontario, Canada N6A 5B9*; I. A. Shovkovy and L. C. R. Wijewardhana, *Physics Department, University of Cincinnati, Cincinnati, Ohio 45221-0011.* (Received 7 July 1999; revised manuscript received 17 September 1999; published 25 January 2000)

The problem of color superconductivity in dense QCD is reconsidered in the improved rainbow approximation to the Schwinger-Dyson equation. The effect of the unscreened magnetic modes of gluons on the value of the color condensate is studied. In particular, it is shown that, at sufficiently large values of the chemical potential, these modes lead to the enhancement of the superconducting order parameter. The interplay between the instanton-induced interaction and the one-gluon-induced one in color superconductivity is discussed. [S0556-2821(00)05603-4] [Phys. Rev. D **61**, 056001 (1990)]