Selected Abstracts from Other Physical Review Journals

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Results from the Palo Verde neutrino oscillation experiment. F. Boehm,[3] J. Busenitz,[1] B. Cook,[3] G. Gratta,[4] H. Henrikson,[3] J. Kornis,[1] D. Lawrence,[2] K. B. Lee,[3] K. McKinny,[1] L. Miller,[4] V. Novikov,[3] A. Piepke,[1,3] B. Ritchie,[2] D. Tracy,[4] P. Vogel,[3] Y-F. Wang,[4] and J. Wolf[1] [1]*Department of Physics and Astronomy, University of Alabama, Tuscaloosa, Alabama 35487* [2]*Department of Physics and Astronomy, Arizona State University, Tempe, Arizona 85287* [3]*Division of Physics, Mathematics and Astronomy, Caltech, Pasadena, California 91125* [4]*Physics Department, Stanford University, Stanford, California 94305.* (Received 16 March 2000; published 7 September 2000)

The $\overline{\nu}_e$ flux and spectrum have been measured at a distance of about 800 m from the reactors of the Palo Verde Nuclear Generating Station using a segmented Gd-loaded liquid scintillator detector. Correlated positron-neutron events from the reaction $\overline{\nu}_e p \rightarrow e^+ n$ were recorded for a period of 200 d including 55 d with one of the three reactors off for refueling. Backgrounds were accounted for by making use of the reactor-on and reactor-off cycles, and also with a novel technique based on the difference between signal and background under reversal of the e^+ and n portions of the events. A detailed description of the detector calibration, background subtraction, and data analysis is presented here. Results from the experiment show no evidence for neutrino oscillations. $\overline{\nu}_e \rightarrow \overline{\nu}_x$ oscillations were excluded at 90% C.L. for $\Delta m^2 > 1.12 \times 10^{-3}$ eV^2 for full mixing and $\sin^2 2\theta > 0.21$ for large Δm^2. These results support the conclusion that the observed atmospheric neutrino oscillations do not involve ν_e. [Phys. Rev. D **62**, 072002 (2000)]

Neutrino oscillations at an entry-level neutrino factory and beyond. V. Barger,[1] S. Geer,[2] R. Raja,[2] and K. Whisnant[3] [1]*Department of Physics, University of Wisconsin, Madison, Wisconsin 53706* [2]*Fermi National Accelerator Laboratory, P.O. Box 500, Batavia, Illinois 60510* [3]*Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011.* (Received 20 March 2000; published 21 August 2000)

We consider the parameters of an entry-level neutrino factory designed to make the first observation of $\nu_e \rightarrow \nu_\mu$ oscillations, measure the corresponding amplitude $\sin^2 2\theta_{13}$, and determine the sign of the atmospheric-scale δm^2_{32} via matter effects. A 50 kt detector, a stored muon energy $E_\mu \geqslant 20$ GeV and 10^{19} muon decays would enable these goals to be met provided $\sin^2 2\theta_{13} > 0.01$. The determination of the sign of δm^2_{32} also requires a baseline $L \geqslant 2000$ km. An upgraded neutrino factory with O(10^{20}) decays would enable the first observation of $\nu_e \rightarrow \nu_\tau$ oscillations. With O(10^{21}) decays the effects of a large CP phase could be measured in the case of the large angle matter oscillation solution to the solar neutrino anomaly. Our analysis includes a family of three-neutrino models that can account for the atmospheric and solar neutrino oscillation indications. [Phys. Rev. D **62**, 073002 (2000)]

Large neutrino mixing with the universal strength of the Yukawa couplings. G. C. Branco and M. N. Rebelo, *Centro de Física das Interacções Fundamentais (CFIF), Instituto Superior Técnico, Av. Rovisco Pais, P-1096 Lisboa-Codex, Portugal;* J. I. Silva-Marcos, *NIKHEF, Kruislaan 409, 1098 SJ Amsterdam, The Netherlands.* (Received 18 June 1999; published 5 September 2000)

We analyze, within the framework of universal strength for Yukawa couplings (USY), various structures for the Dirac and Majorana neutrino mass matrices giving rise, through the seesaw mechanism, to a degenerate mass spectrum. A specific USY *Ansatz* is presented for the charged lepton and neutrino effective mass matrix, leading to quasi-degenerate neutrinos and a leptonic mixing matrix which provides a large angle solution for both the atmospheric and solar neutrino problems.
[Phys. Rev. D **62**, 073004 (2000)]

***T*-violation search with very long baseline neutrino oscillation experiments.** Masafumi Koike, *Institute for Cosmic Ray Research, University of Tokyo, Midori-cho, Tanashi, Tokyo 188-8502, Japan;* Joe Sato, *Research Center for Higher Education, Kyushu University, Ropponmatsu, Chuo-ku, Fukuoka 810-8560, Japan.* (Received 5 November 1999; published 6 September 2000)

We consider possibilities of observing T-violation effects in neutrino oscillation experiments with a very long baseline ($\sim$10000 km) using a low energy neutrino ($\sim$ several hundreds MeV). We show that the matter effect effectively changes only the first-second generation mixing angle, respecting solar neutrino deficits and atmospheric neutrino anomalies. The effective mixing of the first-second generation in the Earth grows up to maximum by resonance. This effect enables one to search T-violation in case the first-second mixing angle is small. We discuss its implications to the observations of T-violation effects in long baseline experiments. [Phys. Rev. D **62**, 073006 (2000)]

Neutrino masses and mixing angles from leptoquark interactions. Uma Mahanta, *Mehta Research Institute, Chhatnag Road, Jhusi, Allahabad-211019, India.* (Received 13 March 2000; published 7 September 2000)

In this paper we show that the mixing between leptoquarks (LQ's) from different $SU(2)_l$ multiplets can generate a nontrivial

Majorana mass matrix for neutrinos through one loop self-energy diagrams. Such mixing can arise from gauge invariant and renormalizable LQ-Higgs interaction terms after electroweak symmetry breaking. We use the experimental indication on neutrino oscillations to find constraints on specific combinations of LQ couplings to quark-lepton pairs and to the SM Higgs boson. These constraints are compared with the ones from $\pi \to e \overline{\nu_e}$. [Phys. Rev. D **62**, 073009 (2000)]

Multibaryons in the collective coordinate approach to the SU(3) Skyrme model. C. L. Schat, *Instituto de Física, DFNAE, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier 524, Maracanã, 20559-900 Rio de Janeiro, RJ, Brazil;* N. N. Scoccola, *Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina, Departamento de Física, CNEA, Avda. Libertador 8250, (1429) Buenos Aires, Argentina, and Universidad Favaloro, Solís 453, (1078) Buenos Aires, Argentina.* (Received 24 March 2000; published 7 September 2000)

We obtain the rotational spectrum of strange multibaryon states by performing the SU(3) collective coordinate quantization of the static multi-Skyrmions. These background configurations are given in terms of rational maps, which are very good approximations and share the same symmetries as the exact solutions. Thus, the allowed quantum numbers in the spectra and the structure of the collective Hamiltonians we obtain are also valid in the exact case. We find that the predicted spectra are in overall agreement with those corresponding to the alternative bound-state soliton model. [Phys. Rev. D **62**, 074010 (2000)]

Nonlinear sigma model approach for chiral fluctuations and symmetry breakdown in the Nambu–Jona-Lasinio model. Egor Babaev, *Institute for Theoretical Physics, Uppsala University, Box 803, S-75108 Uppsala, Sweden.* (Received 8 February 2000; revised manuscript received 1 May 2000; published 12 September 2000)

This paper is organized in two parts. We start with the observation that the recent claim that the chiral symmetry in the Nambu–Jona-Lasinio (NJL) model is necessarily restored by violent chiral fluctuations at $N_c = 3$ [H. Kleinert and B. Van den Bossche, Phys. Lett. B **474**, 336 (2000)] appears to be incorrect since the critical stiffness of the effective nonlinear sigma model used in the above reference is not a universal quantity in $3+1$ dimensions. In the second part we discuss a modified NJL model, where the critical stiffness is expressed via an additional cutoff parameter. This model displays a symmetry breakdown, and also under certain conditions the chiral fluctuations give rise to a phase analogous to pseudogap phase of superconductors with strong coupling or low carrier density. [Phys. Rev. D **62**, 074020 (2000)]

Lattice QCD analysis of the strangeness magnetic moment of the nucleon. Derek B. Leinweber and Anthony W. Thomas, *Department of Physics and Mathematical Physics and Special Research Centre for the Subatomic Structure of Matter, University of Adelaide, Australia 5005.* (Received 30 December 1999; published 8 September 2000)

The outcome of the SAMPLE experiment suggests that the strange-quark contribution to the nucleon magnetic moment, $G_M^s(0)$, may be greater than zero. This result is very difficult to reconcile with expectations based on the successful baryon magnetic-moment phenomenology of the constituent quark model. We show that careful consideration of chiral symmetry reveals some rather unexpected properties of QCD. In particular, it is found that the valence *u*-quark contribution to the magnetic moment of the neutron can differ by more than 50% from its contribution to the Ξ^0 magnetic moment. This hitherto unforeseen result leads to the value $G_M^s(0) = -0.16 \pm 0.18$ with a systematic error, arising from the relatively large strange quark mass used in existing lattice calculations, that would tend to shift $G_M^s(0)$ towards small positive values. [Phys. Rev. D **62**, 074505 (2000)]

Solar neutrino oscillations in extensions of the standard model. O. M. Boyarkin and T. I. Bakanova, *Department of Physics, Byelorussian State Pedagogical University, Soviet Street 18, Minsk, 220050, Belarus.* (Received 27 March 2000; published 12 September 2000)

The solar neutrino oscillations are considered within the left right model and the general two Higgs doublet model. The study makes it apparent that the interactions between leptons and the physical Higgs bosons could significantly influence the oscillations pattern. To estimate the corrections to the solar matter potential compared to the standard model the constraints on the Yukawa couplings constants and the Higgs boson masses are found. [Phys. Rev. D **62**, 075008 (2000)]

***CP* violations in lepton number violation processes and neutrino oscillations.** K. Matsuda, N. Takeda, and T. Fukuyama, *Department of Physics, Ritsumeikan University, Kusatsu, Shiga 525-8577, Japan;* H. Nishiura, *Department of General Education, Junior College of Osaka Institute of Technology, Asahi-ku, Osaka 535-8585, Japan.* (Received 6 March 2000; published 14 September 2000)

We examine the constraints on the Maki-Nakagawa-Sakata (MNS) lepton mixing matrix from present and future experimental data of the neutrino oscillation and lepton number violation processes. We introduce a graphical representation of the *CP* violation phases which appear in the lepton number violation processes such as neutrinoless double beta decay, the $\mu^- - e^+$ conversion, and the *K* decay, $K^- \to \pi^+ \mu^- \mu^-$. Using this graphical representation, we derive the constraints on the *CP* violation phases in the lepton sector. [Phys. Rev. D **62**, 093001 (2000)]