Selected Abstracts from Physical Review D

Abstracts of papers published in **Physical Review D** *which may be of interest to our readers are printed here.*

Cosmic ray composition from multiple muon data with the KGF underground detector. H. R. Adarkar, S. R. Dugad, M. R. Krishnaswamy, M. G. K. Menon, N. K. Mondal, V. S. Narasimham, and B. V. Sreekantan, *Tata Institute of Fundamental Research, Homi Bhabha Road, Bombay, India 400 005;* Y. Hayashi, N. Ito, S. Kawakami, S. Miyake, and Y. Uchihori, *Osaka City University, Osaka 558, Japan.* (Received 27 August 1997; published 6 February 1998)

The Kolar Gold Field (KGF) experiment was operated for about 6 years at a depth of about 6045 hg/cm^2 using a calorimetric, fine-grain detector and recorded 307 multiple muon events in addition to about 23000 single muons. The mean sea level energy of muons arriving vertically at this depth being around 7 TeV, one has a sensitive probe for the chemical composition of primary cosmic rays at energies around the *knee* in the energy spectrum. Predictions based on several rigidity dependent composition models are compared with observed multiplicity spectrum. The data strongly support a mixed chemical composition with medium to heavy primaries contributing substantially beyond 10^{15} eV. The proposed model explains all the features of the data and is consistent with the results from direct measurements as well as the all particle energy spectrum. [S0556-2821(98)00207-0] [Phys. Rev. D **57**, 2653 (1998)]

Hadronic couplings via QCD sum rules using three-point functions: Vacuum susceptibilities. Mikkel B. Johnson, *Los Alamos National Laboratory, Los Alamos, New Mexico 87545;* Leonard S. Kisslinger, *Department of Physics, Carnegie Mellon University, Pittsburgh, Pennsylvania 15213.* (Received 8 July 1996; published 2 February 1998)

We develop a three-point formalism to treat vacuum susceptibilities used for the coupling of currents to hadrons within the method of QCD sum rules. By introducing nonlocal condensates, with the space-time structure taken from fits to experimental parton distrbutions, we show that one can treat hadronic coupling at zero or low momentum transfer as well as medium and asymptotic momentum transfers and obtain a general expression for the vacuum susceptibilities of the two-point formalism. The pion susceptibility, for which there has been a major uncertainty, is evaluated successfully with no new parameters. [S0556-2821(98)00107-6] [Phys. Rev. D **57**, 2847 (1998)]

Hybrid stars: Spin-polarized nuclear matter and density-dependent quark masses. V. S. Uma Maheswari, *Variable Energy Cyclotron Centre, 1/AF, Bidhan Nagar, Calcutta 700 064, India and Institut für Theoretische Physik der Universität Tübingen, Auf der Morgenstelle 14, D-72076 Tübingen, Germany;* J. N. De, *Variable Energy Cyclotron Centre, 1/AF, Bidhan Nagar, Calcutta 700 064, India;* S. K. Samaddar, *Saha Institute of Nuclear Physics, 1/AF, Bidhan Nagar, Calcutta 700 064, India.* (Received 18 December 1996; published 10 February 1998)

The possibility of the formation of a droplet phase (DP) inside a star and its consequences on the structural properties of the star are investigated. For nuclear matter, an equation of state (EOS) based on a finite-range, momentum- and density-dependent (FRMDD) interaction, which predicts that neutron matter undergoes a ferromagnetic transition at densities realizable inside the neutron star, is employed. An EOS for quark matter with density-dependent quark masses, the so-called effective mass model, is constructed by correctly treating the quark chemical potentials. A comparative study of hybrid star properties as obtained within the usual bag model and the effective mass model shows that both these models yield similar results. Then the effect of spin polarization on the formation of the DP is investigated. Using the EOS based on the FRMDD interaction along with the usual bag model, it is also found that a droplet phase consisting of strange quark matter and unpolarized nuclear matter sandwiched between a core of polarized nuclear matter and a crust containing unpolarized nuclear matter exists. Moreover, one could, in principle, explain the mass and surface magnetic field satisfactorily and also allow, due to the presence of a droplet phase, the direct URCA process to happen. [S0556-2821(98)04804-8] [Phys. Rev. D **57**, 3242 (1998)]

Nonequilibrium evolution of a ''tsunami,'' a high multiplicity initial quantum state: Dynamical symmetry breaking. Daniel Boyanovsky,[1] Hector J. de Vega,[2] Richard Holman,[3] S. Prem Kumar,[3] and Robert D. Pisarski,[4] [1]*Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania 15260* [2]*LPTHE, Université Pierre et Marie Curie (Paris VI) et Denis Diderot (Paris VII), Tour 16, 1 er. étage, 4, Place Jussieu 75252 Paris, Cedex 05, France* [3]*Department of Physics, Carnegie Mellon University, Pittsburgh, Pennsylvania 15213* [4]*Department of Physics, Brookhaven National Laboratory, Upton, New York 11973.* (Received 7 November 1997; published 4 February 1998)

We propose to study the nonequilibrium features of heavy-ion collisions by following the evolution of an initial state with a large number of quanta with a distribution around a momentum $|\vec{k}_0|$ corresponding to a *thin spherical shell* in momentum space, a ''tsunami.'' An $O(N)(\vec{\Phi}^2)^2$ model field theory in the large N limit is used as a framework to study the nonperturbative aspects of the nonequilibrium dynamics including a resummation of the effects of the medium (the initial particle distribution). In a theory where the symmetry is spontaneously broken in the absence of the medium, when the initial number of particles per correlation volume is chosen to be larger than a critical value the medium effects can restore the symmetry of the initial state. We show that if one begins with such a symmetry-restored, nonthermal, initial state, nonperturbative effects automatically induce spinodal instabilities leading to a *dynamical* breaking of the symmetry. As a result there is explosive

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particle production and a redistribution of the particles towards low momentum due to the nonlinearity of the dynamics. The asymptotic behavior displays the onset of Bose condensation of pions and the equation of state at long times is that of an ultrarelativistic gas although the momentum distribution is *nonthermal*. [S0556-2821(98)05906-2] [Phys. Rev. D **57**, 3653 (1998)]

Ultrahigh energy neutrino-nucleon cross section and radiative corrections. Günter Sigl, *Department of Astronomy and Astrophysics, The University of Chicago, Chicago, Illinois 60637-1433.* (Received 21 August 1997; published 4 February 1998)

Several proposals exist to detect cosmic neutrinos of energy from tens of GeV up to the highest energies observed for cosmic rays, $\sim 10^{20}$ eV, or possibly even beyond. Detection efficiencies depend crucially on the neutrino-nucleon cross section at these energies at which radiative corrections beyond the lowest order approximation could become non-negligible. The differential cross sections can be modified by more than 50% in some regions of phase space. Estimates of corrections to the quantities most relevant for neutrino detection at these energies give, however, less dramatic effects: The average inelasticity in the outgoing lepton is increased from $\simeq 0.19$ to $\simeq 0.24$. The inclusive cross section is reduced by roughly half a percent. The dominant uncertainty of the standard model ultrahigh energy neutrino-nucleon cross section therefore still comes from uncertainties of the parton distributions in the nucleon at very low momentum fractions. [S0556-2821(98)01906-7] [Phys. Rev. D **57**, 3786 (1998)]

Energy and zenith angle distribution of upward going muons and neutrino oscillations. Paolo Lipari and Maurizio Lusignoli, *Dipartimento di Fisica, Università di Roma ''la Sapienza'' and I.N.F.N., Sezione di Roma, Piazzale A. Moro 2, I-00185 Roma, Italy.* (Received 10 December 1997; published 11 March 1998)

The energy and zenith angle distribution of neutrino induced, upward going muons can give direct information on the presence of ν oscillations in precisely the range of parameters suggested as a solution of the atmospheric neutrino problem. We show that the shape of the zenith angle distribution of the muon flux is quite insensitive to modifications of the theoretical input and is therefore an excellent probe for neutrino oscillations. We conclude that the existing data sample on ν-induced muons has the statistical power to confirm or refute the ν-oscillation solution of the atmospheric neutrino problem. [S0556-2821(98)50807-7] [Phys. Rev. D **57**, 3842 (1998)]

Scaling study of the two-flavor chiral phase transition with the Kogut-Susskind quark action in lattice QCD. S. Aoki,[1] M. Fukugita,[2] S. Hashimoto,[3] N. Ishizuka,[1,4] Y. Iwasaki,[1,4] K. Kanaya,[1,4] Y. Kuramashi,[5] H. Mino[6], M. Okawa,[5] A. Ukawa,[1] and T. Yoshié[1,4] (JLQCD Collaboration) [1]*Institute of Physics, University of Tsukuba, Tsukuba, Ibaraki 305, Japan* [2]*Institute for Cosmic Ray Research, University of Tokyo, Tanashi, Tokyo 188, Japan* [3]*Computing Research Center, High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305, Japan* [4]*Center for Computational Physics, University of Tsukuba, Tsukuba, Ibaraki 305, Japan* [5]*Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305, Japan* [6]*Faculty of Engineering, Yamanashi University, Kofu 400, Japan.* (Received 14 October 1997; published 9 March 1998)

We report on a study of the two-flavor finite-temperature chiral phase transition employing the Kogut-Susskind quark action and the plaquette gluon action in lattice QCD for a lattice with $N_t=4$ temporal size. Hybrid R simulations of 10^4 trajectories are made at quark masses of $m_q=0.075,0.0375,0.02,0.01$ in lattice units for the spatial sizes $8^3, 12^3$, and 16^3. The spatial size dependence of various susceptibilities confirm the previous conclusion of the absence of a phase transition down to $m_q=0.02$. At $m_q=0.01$ an increase of susceptibilities is observed up to the largest volume 16^3 explored in the present work. We argue, however, that this increase is likely to be due to an artifact of too small a lattice size and it cannot be taken to be the evidence for a first-order transition. Analysis of critical exponents estimated from the quark mass dependence of susceptibilities shows that they satisfy hyperscaling consistent with a second-order transition located at $m_q=0$. The exponents obtained from larger lattice, however, deviate significantly from both those of O(2), which is the exact symmetry group of the Kogut-Susskind action at finite lattice spacing, and those of O(4) expected from an effective σ model analysis in the continuum limit. [S0556-2821(98)04107-1] [Phys. Rev. D **57**, 3910 (1998)]

***CPT* and Lorentz tests in Penning traps.** Robert Bluhm, *Physics Department, Colby College, Waterville, Maine 04901;* V. Alan Kostelecký and Neil Russell, *Physics Department, Indiana University, Bloomington, Indiana 47405.* (Received 30 October 1997; published 19 February 1998)

A theoretical analysis is performed of Penning-trap experiments testing CPT and Lorentz symmetry through measurements of anomalous magnetic moments and charge-to-mass ratios. Possible CPT and Lorentz violations arising from spontaneous symmetry breaking at a fundamental level are treated in the context of a general extension of the SU(3)×SU(2)×U(1) standard model and its restriction to quantum electrodynamics. We describe signals that might appear in principle, introduce suitable figures of merit, and estimate CPT and Lorentz bounds attainable in present and future Penning-trap experiments. Experiments measuring anomaly frequencies are found to provide the sharpest tests of CPT symmetry. Bounds are attainable of approximately 10^{-20} in the electron-positron case and of 10^{-23} for a suggested experiment with protons and antiprotons. Searches for diurnal frequency variations in these experiments could also limit certain types of Lorentz violation to the level of 10^{-18} in the electron-positron system and others at the level of 10^{-21} in the proton-antiproton system. In contrast, measurements comparing cyclotron frequencies are sensitive within the present theoretical framework to different kinds of Lorentz violation that preserve CPT. Constraints could be obtained on one figure of merit in the electron-positron system at the level of 10^{-16}, on another in the proton-antiproton system at 10^{-24}, and on a third at 10^{-25} using comparisons of H^- ions with antiprotons. [S0556-2821(98)04207-6] [Phys. Rev. D **57**, 3932 (1998)]

Instantons and the chiral phase transition at nonzero baryon density. T. Schäfer, *Institute for Nuclear Theory, Department of Physics, University of Washington, Seattle, Washington 98195.* (Received 11 August 1997; revised manuscript received 18 November 1997; published 27 February 1998)

We study an interacting ensemble of instantons at a finite baryon chemical potential. We emphasize the importance of fermionic zero modes and calculate the fermion induced interaction between instantons at a nonzero chemical potential. We show that unquenched simulations of the instanton ensemble are feasible in two regimes, for a sufficiently small and for a very large chemical potential. At a very large chemical potential chiral symmetry is restored and the instanton ensemble is dominated by strongly correlated chainlike configurations. [S0556-2821(98)03407-9] [Phys. Rev. D **57**, 3950 (1998)]

Implications of 4 texture zeros mass matrices for neutrino anomalies. P. S. Gill and Manmohan Gupta, *Centre of Advanced Study, Department of Physics, Panjab University, Chandigarh-160014, India.* (Received 2 May 1997; revised manuscript received 14 October 1997; published 19 February 1998)

Phenomenological 4 texture zeros mass matrices, successful in accommodating the CKM phenomenology, are used to simultaneously explain the three neutrino anomalies: the solar neutrino problem (SNP), the atmospheric neutrino problem (ANP), and the LSND anomaly. When the SNP is resolved through vacuum oscillations, we obtain a solution implying large mixing. In case the SNP is resolved through the MSW mechanism, the neutrino masses follow a ''natural'' hierarchy.
[S0556-2821(98)01007-8] [Phys. Rev. D **57**, 3971 (1998)]

Two loops calculation in chiral perturbation theory and the unitarization program of current algebra. J. Sá Borges, J. Soares Barbosa, and M. D. Tonasse, *Instituto de Física, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier 524, 20550-013–Rio de Janeiro, RJ Brazil.* (Received 29 August 1997; published 18 February 1998)

In this paper we compare the two loop chiral perturbation theory calculation of pion-pion scattering with the unitarity second-order correction to the current algebra soft-pion theorem. It is shown that both methods lead to the same analytic structure for the scattering amplitude. [S0556-2821(98)06105-0] [Phys. Rev. D **57**, 4108 (1998)]

Decays of $\frac{1}{2}^-$ baryons in chiral effective theory. Y. Nemoto, D. Jido, and M. Oka, *Department of Physics, Tokyo Institute of Technology, Meguro, Tokyo 152, Japan;* A. Hosaka, *Numazu College of Technology, 3600 Ooka, Numazu 410, Japan.* (Received 22 October 1997; published 20 February 1998)

We construct an $SU(3)_L \times SU(3)_R$ symmetric chiral effective model which includes parity pair baryon fields. It is assumed that the positive and negative parity baryons in the parity pair have opposite chiral transformation properties than each other. Using this model, strong decays of the negative parity baryons are studied up to the order of one-loop corrections. The results agree qualitatively with experiment in the π and K channels. We examine how the model parameters are determined from the decay widths and study their physical meaning. The possibilities to build other models and relations to the correlation function analysis are discussed. [S0556-2821(98)01907-9] [Phys. Rev. D **57**, 4124 (1998)]

Study of the resummation of chiral logarithms in the exponentiated expression for the pion form factor. Francisco Guerrero, *Departament de Física Teòrica, Universitat de València and IFIC, CSIC–Universitat de València, C/ del Dr. Moliner 50, E-46100 Burjassot (València), Spain.* (Received 20 November 1997; published 27 February 1998)

From the properties of analyticity and unitarity an exponentiated expression for the pion form factor has been recently obtained. In this work I show the validity of this expression comparing its order p^6 term with the one exactly calculated in ChPT. [S0556-2821(98)04307-0] [Phys. Rev. D **57**, 4136 (1998)]

Charmlets. Jürgen Schaffner-Bielich, *Nuclear Science Division, Lawrence Berkeley National Laboratory, University of California, Berkeley, California 94720;* Axel P. Vischer, *The Niels Bohr Institute, Blegdamsvej 17, DK-2100 Copenhagen Ø, Denmark.* (Received 29 October 1997; published 27 February 1998)

We discuss the possibility that multiply charmed exotics are produced in ultrarelativistic heavy ion collisions. Production probabilities at BNL RHIC are estimated and found to be large enough to allow for the possible detection of single and double charmed exotics. We demonstrate that charm matter is bound due to an attractive one-gluon exchange potential. Furthermore, we study the color magnetic and color electric potential separately, as well as the group structure of such exotics, and estimate their masses. [S0556-2821(98)04807-3] [Phys. Rev. D **57**, 4142 (1998)]

Physics beyond the standard model with a new reactor experiment. M. Moretti, *Department of Physics, Ferrara University and INFN sez. di Ferrara, via Paradiso 6, I44100 Ferrara, Italy;* C. Broggini, *Department of Physics, Padova University and INFN sez. di Padova, via Marzolo 8, 35131 Padova, Italy;* G. Fiorentini, *Department of Physics, Ferrara University and INFN sez. di Ferrara, via Paradiso 6, I44100 Ferrara, Italy.* (Received 23 May 1997; published 2 March 1998)

We discuss the sensitivity to new physics of a measurement of the $\overline{\nu}_e e^- \to \overline{\nu}_e e^-$ cross section at a nuclear reactor, with an accuracy as that foreseen for the MUNU experiment. In particular we consider the anomalous contribution to $\overline{\nu}_e e^-$ scattering arising from extra doublet scalars fields, additional Z bosons, and more exotic particles, such as leptonic photons. [S0556-2821(98)03603-0] [Phys. Rev. D **57**, 4160 (1998)]

Inelastic photoproduction of polarized J/ψ. M. Beneke, *Theory Division, CERN, CH-1211 Geneva 23, Switzerland* M. Krämer, *Rutherford Appleton Laboratory, Chilton, Didcot, OX11 0QX, En-*

gland; M. Vänttinen, *NORDITA, Blegdamsvej 17, DK-2100 Copenhagen Ø, Denmark.* (Received 17 September 1997; published 27 February 1998)

We study the polar and azimuthal decay angular distribution of J/ψ mesons in photoproduction experiments as functions of the inelasticity variable z and transverse momentum p_t. Future measurements of decay angular distributions at the DESY ep collider HERA will provide a new test of theoretical approaches to factorization between perturbation theory and quarkonium bound-state dynamics and shed light on the color-octet production fraction in various regions of z and p_t. [S0556-2821(98)03705-9] [Phys. Rev. D **57**, 4258 (1998)]

Off-forward quark distributions of the nucleon in the large-N_c limit. V. Yu. Petrov, P. V. Pobylitsa, and M. V. Polyakov, *Petersburg Nuclear Physics Institute, Gatchina, St. Petersburg 188350, Russia;* I. Börnig, K. Goeke, and C. Weiss, *Institut für Theoretische Physik II, Ruhr-Universität Bochum, D-44780 Bochum, Germany.* (Received 8 October 1997; published 19 February 1998)

We study the off-forward quark distributions (OFQD's) in the chiral quark-soliton model of the nucleon. This model is based on the large-N_c picture of the nucleon as a soliton of the effective chiral Lagrangian and allows one to calculate the leading twist quark and antiquark distributions at a low normalization point. We demonstrate the consistency of the approach by checking various sum rules for the OFQD's. We present numerical estimates of the isosinglet distribution $H(x,\xi,\Delta^2)$. In contrast with other approaches we find a strong qualitative dependence on the longitudinal momentum transfer, ξ. In particular, $H(x,\xi,\Delta^2)$ as a function of x exhibits fast crossovers at $|x|=\xi/2$. Such behavior could lead to a considerable enhancement of the deeply virtual Compton scattering cross section. [S0556-2821(98)00807-8] [Phys. Rev. D **57**, 4325 (1998)]

Accelerator measurements needed to resolve uncertainties in primary cosmic ray composition and inelasticity. C. G. S. Costa, *Department of Physics, University of Wisconsin, Madison, Wisconsin 53706.* (Received 21 July 1997; published 27 February 1998)

We discuss an intrinsic ambiguity on the interpretation of results on cosmic-ray physics, related to the impossibility of deducing two unknowns: the chemical composition of primary cosmic rays and the dynamics of particle interactions in the fragmentation region, based only on a single measurement. We indicate how measurements of particle production at and near zero degrees—at extreme values of rapidity (or pseudorapidity)—can overcome these uncertainties. Experiments of this nature are possible at the Fermilab Tevatron and will be possible at the CERN Large Hadron Collider, and should resolve the questions concerning the interpretation of cosmic ray data up to the highest measured energies. [S0556-2821(98)04507-X] [Phys. Rev. D **57**, 4361 (1998)]

How the ''*H* particle'' unravels the quark dynamics. Fl. Stancu and S. Pepin, *Université de Liège, Institut de Physique B.5, Sart Tilman, B-4000 Liège 1, Belgium;* L. Ya. Glozman, *Institute for Theoretical Physics, University of Graz, 8010 Graz, Austria.* (Received 28 October 1997; published 2 March 1998)

It is shown that the short-range part of the Goldstone boson exchange interaction between the constituent quarks, which explains baryon spectroscopy and the short-range repulsion in the NN system, induces a strong short-range repulsion in the flavor-singlet state of the $S=-2$ system with $J^P=0^+$. This suggests that a deeply bound H-particle should not exist. We compare our approach with other models employing different hyperfine interactions between quarks in the nonperturbative regime of QCD. [S0556-2821(98)04007-7] [Phys. Rev. D **57**, 4393 (1998)]

***CP* violation versus the matter effect in long-baseline neutrino oscillation experiments.** Hisakazu Minakata, *Department of Physics, Tokyo Metropolitan University, Minami-Osawa, Hachioji, Tokyo 192-03, Japan;* Hiroshi Nunokawa, *Instituto de Física Corpuscular, C.S.I.C., Department of Física Teòrica, Universitat de Valéncia, 46100 Burjassot, Valencia, Spain.* (Received 30 April 1997; published 6 March 1998)

We investigate, within the framework of three generations of neutrinos, the effects of CP violation in long-baseline neutrino oscillation experiments. We aim at illuminating the global feature of the interplay between a genuine effect due to the CP-violating phase and a fake one due to the Earth matter effect. To this goal, we develop a formalism based on the adiabatic approximation and perturbative treatment of the matter effect which allows us to obtain approximate analytic expressions of the oscillation probabilities. We present an order-of-magnitude estimation and a detailed numerical computation of the absolute and the relative magnitudes of the CP violations under the mass hierarchy suggested by the atmospheric neutrino anomaly and the cosmological dark matter. We find that the genuine CP-violating effect is at most $\sim 1\%$, and the matter effect dominates over the intrinsic CP violation only in a region of parameters where the oscillation probability of $\nu_\mu \rightarrow \nu_e$ is large. [S0556-2821(98)06305-X] [Phys. Rev. D **57**, 4403 (1998)]

Space-time description of neutrino flavor oscillations. Yu. V. Shtanov, *Inter-University Centre for Astronomy and Astrophysics, Post Bag 4, Ganeshkhind, Pune 411 007, India and Bogolyubov Institute for Theoretical Physics, Kiev 252143, Ukraine.* (Received 17 June 1997; revised manuscript received 20 November 1997; published 3 March 1998)

Recently the issue of EPR-like correlations in the mutual probability of detecting a neutrino together with an accompanying charged lepton has received a new impetus. In this paper we describe this effect using the propagators of the particles involved in Schwinger's parametric integral representation. We find this description more simple and more suitable to the purpose than the usual momentum-space analysis. We consider the cases of a monochromatic neutrino source, wave packet source, and neutrino creation in a localized space-time region. In the latter case we note that the space-time oscillation amplitude depends on the values of the neutrino masses, and becomes rather small for large relative mass differences (mass hierarchy). We obtain the expressions for the oscillation and coherence lengths in various circumstances. In the region of overlap our results confirm those of Dolgov *et al.* [S0556-2821(98)03307-4] [Phys. Rev. D **57**, 4418 (1998)]

Atmospheric neutrino oscillation and a phenomenological lepton mass matrix. M. Fukugita, *Institute for Cosmic Ray Research, University of Tokyo, Tanashi, Tokyo 188, Japan and Institute for Advanced Study, Princeton, New Jersey 08540;* M. Tanimoto, *Faculty of Education, Ehime University, Matsuyama 790-77, Japan* T. Yanagida, *Department of Physics, University of Tokyo, Tokyo 113, Japan.* (Received 18 September 1997; published 27 February 1998)

We propose simple phenomenological lepton mass matrices which describe the three neutrinos almost degenerate in mass, leading to a very large mixing angle between ν_μ and ν_τ, as consistent with a recent report on atmospheric neutrino oscillations from the SuperKamiokande Collaboration. Our matrix model also gives $\nu_e - \nu_\mu$ mixing in agreement with the value required for neutrino oscillation to explain the solar neutrino problem. [S0556-2821(98)03707-2] [Phys. Rev. D **57**, 4429 (1998)]

Heavy hexaquarks in a chiral constituent quark model. S. Pepin and Fl. Stancu, *Université de Liège, Institut de Physique B.5, Sart Tilman, B-4000 Liège 1, Belgium.* (Received 29 October 1997; published 19 February 1998)

We discuss the stability of hexaquark systems of type uuddsQ (Q=c or b) within a chiral constituent quark model which successfully describes the baryon spectra including the charmed ones. We find these systems to be highly unstable against strong decays and give a comparison with some of the previous literature. [S0556-2821(98)02207-3] [Phys. Rev. D **57**, 4475 (1998)]

Spin content of Λ and its longitudinal polarization in e^+e^- annihilation at high energies. C. Boros, *Institut für Theoretische Physik, Freie Universität Berlin, Arnimallee 14, 14195 Berlin, Germany and Special Research Centre for the Subatomic Structure of Matter, University of Adelaide, Adelaide, Australia 5005;* Liang Zuo-tang, *Institut für Theoretische Physik, Freie Universität Berlin, Arnimallee 14, 14195 Berlin, Germany and Department of Physics, Shandong University, Jinan, Shandong 250100, China.* (Received 8 August 1997; published 18 February 1998)

Longitudinal polarization of Λ produced in e^+e^- annihilation at CERN LEP energies is calculated in a picture for the spin content of Λ which is consistent with the polarized deep inelastic lepton-nucleon scattering data and SU(3) flavor symmetry for hyperon decay, so that the spin of Λ is not completely carried by its s-valence quark. A comparison with the recent ALEPH data and the results of earlier calculations based on the static quark model, in which the spin of Λ is completely determined by the s quark, is given. The result shows that further measurements of such polarization should provide useful information as to the question of which picture is more suitable in describing spin effects in the fragmentation processes. [S0556-2821(98)06205-5] [Phys. Rev. D **57**, 4491 (1998)]