Selected Abstracts from Other Physical Review Journals

Abstracts of papers which are published in **other Physical Review journals** *and may be of interest to Physical Review C readers are printed here. The Editors of Physical Review C routinely scan the abstracts of* **Physical Review D** *papers. Appropriate abstracts of papers in other Physical Review journals may be included upon request.*

Impact of isospin breaking on the distribution of transition probabilities. C. I. Barbosa, T. Guhr, and H. L. Harney, *Max-Planck-Institut für Kernphysik, Postfach 103980, 69029 Heidelberg, Germany.* (Received 22 November 1999)

In the present paper we investigate the effect of symmetry breaking in the statistical distributions of reduced transition amplitudes and reduced transition probabilities. These quantities are easier to access experimentally than the components of the eigenvectors and were measured by Adams *et al.* [Phys. Lett. B **422**, 13 (1998)] for the electromagnetic transitions in ^{26}Al. We focus on isospin symmetry breaking described by a matrix model where both the Hamiltonian and the electromagnetic operator break the symmetry. The results show that for partial isospin conservation, the statistical distribution of the reduced transition probability can considerably deviate from the Porter-Thomas distribution. [Phys. Rev. E **62**, 1936 (2000)]

Light lepton number violating sneutrinos and the baryon number of the universe. H. V. Klapdor-Kleingrothaus, *Max-Planck-Institut für Kernphysik, P.O. Box 10 39 80, D-69029 Heidelberg, Germany;* St. Kolb, *Max-Planck-Institut für Kernphysik, P.O. Box 10 39 80, D-69029 Heidelberg, Germany and Institute for Nuclear Research of the Russian Academy of Sciences, 60th October Anniversary Prospect 7a, 117321 Moscow, Russia;* V. A. Kuzmin, *Institute for Nuclear Research of the Russian Academy of Sciences, 60th October Anniversary, Prospect 7a, 117321 Moscow, Russia.* (Received 7 April 2000; published 13 July 2000)

Recent results of neutrino oscillation experiments point to a nonvanishing neutrino mass. Neutrino mass models favor Majorana-type neutrinos. In such circumstances it is natural that the supersymmetric counterpart of the neutrino, the sneutrino, bears also lepton number violating properties. If the amount of lepton number violation is large enough the sneutrino may be the cold dark matter in the universe. On the other hand, the fact that the universe exhibits an asymmetry in the baryon and antibaryon numbers poses constraints on the extent of lepton number violation in the light sneutrino sector if the electroweak phase transition is second or weak first order. From the requirement that the baryon asymmetry of the universe should not be washed out by sneutrino induced lepton number violating interactions and sphalerons below the critical temperature of the electroweak phase transition, we find that the mass splitting of the light sneutrino mass states is compatible with the sneutrino cold dark matter hypothesis only for heavy gauginos $M_1, M_2 \gtrsim 500$ GeV and opposite sign gaugino mass parameters. [Phys. Rev. D **62**, 035014 (2000)]

Nuclear dependence coefficient α for Drell-Yan and J/ψ production. Xiaofeng Guo, *Department of Physics and Astronomy, University of Kentucky, Lexington, Kentucky 40506;* Jianwei Qiu and Xiaofei Zhang, *Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011.* (Received 15 December 1999; published 26 July 2000)

Define the nuclear dependence coefficient α in terms of the ratio of the transverse momentum spectrum in hadron-nucleus and in hadron-nucleon collisions $d\sigma^{hA}/dq_T^2/d\sigma^{hN}/dq_T^2 \equiv A^{\alpha}$. We argue that, in the small q_T region, the α for the Drell-Yan and J/ψ production is given by a universal function $a + bq_T^2$, where the parameters a and b are completely determined by either calculable quantities or independently measurable physical observables. We demonstrate that this universal function α is insensitive to A for normal nuclear targets. For a color deconfined nuclear medium, α becomes strongly dependent on A. We also show that our α for the Drell-Yan process is naturally linked to the perturbatively calculated α at large q_T without any free parameters, and α is consistent with E772 data for all q_T. [Phys. Rev. D **62**, 054008 (2000)]

Non-Fermi liquid behavior, the Becchi-Rouet-Stora-Tyutin identity in the dense quark-gluon plasma, and color superconductivity. William E. Brown, *Department of Physics, The Rockefeller University, 1230 York Avenue, New York, New York 10021;* James T. Liu, *Randall Laboratory of Physics, University of Michigan, Ann Arbor, Michigan 48109;* Hai-cang Ren, *Department of Physics, The Rockefeller University, 1230 York Avenue, New York, New York 10021 and Department of Natural Science, Baruch College of CUNY, New York, New York 10010.* (Received 28 March 2000; published 31 July 2000)

At sufficiently high baryon densities, the physics of a dense quark-gluon plasma may be investigated through the tools of perturbative QCD. This approach has recently been successfully applied to the study of color superconductivity, where the dominant di-quark pairing interaction arises from one gluon exchange. Screening in the plasma leads to novel behavior, including a remarkable non-BCS scaling of T_C, the transition temperature to the color superconducting phase. Radiative corrections to one gluon exchange were previously considered and found to affect T_C. In particular, the quark self-energy in a plasma leads to non-Fermi liquid behavior and suppresses T_C. However, at the same time, the quark-gluon vertex was shown not to modify the result at leading order. This dichotomy between the effects of the radiative corrections at first appears rather surprising, as the BRST identity connects the self-energy to the vertex corrections. Nevertheless, as we demonstrate, there is in fact no contradiction with the BRST identity, at least to leading logarithmic order. This clarifies some of the previous statements on the importance of the higher order corrections to the determination of T_C and the zero temperature gap in color superconductivity. [Phys. Rev. D **62**, 054013 (2000)]

Off-forward parton distributions and Shuvaev's transformations. Jens D. Noritzsch, *Institut für Physik, Universität Dortmund, D-44221 Dortmund, Germany.* (Received 4 April 2000; published 1 August 2000)

We review Shuvaev's transformations that relate off-forward parton distributions (OFPDs) to the so-called effective forward parton distributions (EFPDs). The latter evolve like conventional forward partons. We express nonforward amplitudes, depending on OFPDs, directly in terms of EFPDs and construct a model for the EFPDs, which allows us to consistently express them in terms of the conventional forward parton distributions and nucleon form factors. Our model is self-consistent for arbitrary x, ξ, μ, and t. [Phys. Rev. D **62**, 054015 (2000)]

Debye screening and the Meissner effect in a three-flavor color superconductor. Dirk H. Rischke. *RIKEN-BNL Research Center, Brookhaven National Laboratory, Upton, New York 11973.* (Received 29 March 2000; published 2 August 2000)

I compute the gluon self-energy in a color superconductor with three flavors of massless quarks, where condensation of Cooper pairs breaks the color and flavor $SU(3)_c \times U(3)_V \times U(3)_A$ symmetry of QCD to the diagonal subgroup $SU(3)_{c+V}$. At zero temperature, all eight electric gluons obtain a Debye screening mass, and all eight magnetic gluons a Meissner mass. The Debye as well as the Meissner masses are found to be equal for the different gluon colors. These masses determine the coefficients of the kinetic terms in the effective theory for the low-energy degrees of freedom. Their values agree with those obtained by Son and Stephanov. [Phys. Rev. D **62**, 054017 (2000)]

Critique of a pion exchange model for interquark forces. Nathan Isgur, *Jefferson Lab, 12000 Jefferson Avenue, Newport News, Virginia 23606.* (Received 8 October 1999; published 11 August 2000)

I describe four serious defects of a widely discussed pion exchange model for interquark forces: it does not solve the ''spin-orbit problem'' as advertised, it fails to describe the internal structure of baryon resonances, it leads to disastrous conclusions when extended to mesons, and it is not reasonably connected to the physics of heavy-light systems. While extensions of the original pion exchange model may be able to correct these defects, this catalogue of criticisms defines some of the most formidable problems such elaborations must address. [Phys. Rev. D **62**, 054026 (2000)]

Pion propagation in the linear sigma model at finite temperature. Alejandro Ayala and Sarira Sahu, *Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, Aptartado Postal 70-543, México Distrito Federal 04510, México.* (Received 28 March 2000; published 7 August 2000)

We construct effective one-loop vertices and propagators in the linear sigma model at finite temperature, satisfying the chiral Ward identities and thus respecting chiral symmetry, treating the pion momentum, pion mass and temperature as small compared to the sigma mass. We use these objects to compute the two-loop pion self-energy. We find that the perturbative behavior of physical quantities, such as the temperature dependence of the pion mass, is well defined in this kinematical regime in terms of the parameter $m_\pi^2/4\pi^2 f_\pi^2$ and show that an expansion in terms of this reproduces the dispersion curve obtained by means of chiral perturbation theory at leading order. The temperature dependence of the pion mass is such that the first and second order corrections in the above parameter have the same sign. We also study pion damping both in the elastic and inelastic channels to this order and compute the mean free path and mean collision time for a pion traveling in the medium before forming a sigma resonance and find very good agreement with the result from chiral perturbation theory when using a value for the sigma mass of 600 MeV. [Phys. Rev. D **62**, 056007 (2000)]

Nuclear β decay, atomic parity violation, and new physics. M. J. Ramsey-Musolf, *Department of Physics, University of Connecticut, Storrs, Connecticut 06269 and Theory Group, Thomas Jefferson National Accelerator Facility, Newport News, Virginia 23606.* (Received 6 April 2000; published 11 August 2000)

The determinations of $|V_{ud}|^2$ with super-allowed Fermi β decay in nuclei and of the weak charge of cesium in atomic parity violation deviate from the standard model predicitions by 2σ or more. In both cases, the standard model overpredicts the magnitudes of the relevant observables. I discuss the implications of these results for R-parity violating (RPV) extensions of the minimal supersymmetric standard model. I also explore the possible consequences for RPV supersymmetry of prospective future low-energy electroweak measurements. [Phys. Rev. D **62**, 056009 (2000)]

Status of the solution to the solar neutrino problem based on nonstandard neutrino interactions. S. Bergmann, *Department of Particle Physics, Weizmann Institute of Science, Rehovot 76100, Israel;* M. M. Guzzo and P. C. de Holanda, *Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas, UNICAMP, 13083-970 Campinas SP, Brazil;* P. I. Krastev, *Department of Physics, University of Wisconsin, Madison, Wisconsin 53706;* H. Nunokawa, *Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas, UNICAMP, 13083-970 Campinas SP, Brazil.* (Received 27 April 2000; published 21 August 2000)

We analyze the current status of the solution to the solar neutrino problem based both on (a) nonstandard flavor-changing neutrino interactions (FCNI) and (b) nonuniversal flavor diagonal neutrino interactions (FDNI). We find that FCNI and FDNI with matter in the Sun as well as in the Earth provide a good fit not only to the total rate measured by all solar neutrino experiments but also to the day-night and seasonal variations of the event rate, as well as the recoil electron energy spectrum measured by the SuperKamiokande Collaboration. This solution does not require massive neutrinos and neutrino mixing in vacuum. Stringent experimental constraints on FCNI from bounds on lepton flavor violating decays and on FDNI from limits on lepton universality violation rule out $\nu_e \to \nu_\mu$ transitions induced by new physics as a solution to the solar neutrino problem. However, a solution involving $\nu_e \to \nu_\tau$ transitions is viable and could be tested independently by the upcoming B factories if flavor violating tau decays would be observed at a rate close to the present upper bounds. [Phys. Rev. D **62**, 073001 (2000)]

Flow equations for gluodynamics in the Coulomb gauge. Elena L. Gubankova, Chueng-Ryong Ji, and Stephen R. Cotanch, *Department of Physics, North Carolina State University, Raleigh, North Carolina 27695-8202.* (Received 19 August 1999; revised manuscript received 22 March 2000; published 17 August 2000)

A systematic procedure to consistently formulate a field theoretical, QCD bound state problem with a fixed number of constituents is outlined. The approach entails applying the Hamiltonian flow equations, which are a set of continuous unitary transformations, to a QCD motivated Hamiltonian with a confining interaction. The method is developed in detail for gluodynamics in the Coulomb gauge to obtain an effective block-diagonal Hamiltonian appropriate to a reduced Fock space with a fixed number of dynamical gluons. Standard many-body techniques are used to numerically diagonalize this Hamiltonian in a constituent two gluon Fock space. The calculated gluon condensates and glueball masses are in good agreement with QCD sum rule and lattice results. [Phys. Rev. D **62**, 074001 (2000)]

Erratum: Nucleon strangeness and unitarity [Phys. Rev. D 55, 2741 (1997)]. M. J. Musolf, H.-W. Hammer, and D. Drechsel (Received 2 May 2000; published 17 August 2000) [Phys. Rev. D **62**, 079901 (2000)]