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.*

Search for diffractive dissociation of a long-lived H dibaryon. J. Belz,[6,*] R. D. Cousins,[3] M. V. Diwan,[5,†] M. Eckhause,[8] K. M. Ecklund,[5] V. L. Fitch,[4] A. D. Hancock,[8] V. L. Highland,[6,‡] C. Hoff,[8] G. W. Hoffmann,[7] G. M. Irwin,[5] J. R. Kane,[8] S. H. Kettell,[6,†] J. R. Klein,[4,§] Y. Kuang,[8] K. Lang,[7] R. Martin,[8] M. May,[1] J. McDonough,[7,‖] W. R. Molzon,[2] P. J. Riley,[7] J. L. Ritchie,[7] A. J. Schwartz,[4] A. Trandafir,[6] B. Ware,[7] R. E. Welsh,[8] S. N. White,[1] M. T. Witkowski,[8,¶] S. G. Wojcicki,[5] and S. Worm[7] (BNL E888 Collaboration), [1]*Brookhaven National Laboratory, Upton, New York 11973* [2]*University of California, Irvine, California 92717* [3]*University of California, Los Angeles, California 90024* [4]*Princeton University, Princeton, New Jersey 08544* [5]*Stanford University, Stanford, California 94309* [6]*Temple University, Philadelphia, Pennsylvania 19122* [7]*University of Texas at Austin, Austin, Texas 78712* [8]*College of William and Mary, Williamsburg, Virginia 23187.* (Received 14 July 1995)

We have searched for long-lived H dibaryons (six-quark $uuddss$ states) in a neutral beam produced by 24.1 GeV/c p-Pt collisions. The signature was exclusive $\Lambda^0\Lambda^0$ production from diffractive dissociation of H's striking a plastic scintillator. We observed 40 $\Lambda^0\Lambda^0$ events with a background of 3.2 events, but see no evidence of H dissociation. Using our additional observation of 187 ± 39 $\Lambda^0 K_S^0$ events produced by coherent diffractive dissociation of neutrons from carbon for normalization, we place an upper limit of 1 mb/sr on the production of H's with lifetimes $\gtrsim 10^{-8}$ s. [Phys. Rev. D **53**, 3487 (1996)]

Neutron-proton elastic scattering spin-spin correlation parameter measurements between 500 and 800 MeV. III. Mixtures of C_{SS}, C_{LS}, C_{LL}, and C_{NN}. V. Carlson,* R. Garnett,[†] D. Hill, K. F. Johnson,[†] D. Lopiano,[‡] Y. Ohashi,[§] T. Shima,[‖] H. Spinka, R. Stanek, D. Underwood, and A. Yokosawa, *Argonne National Laboratory, Argonne, Illinois 60439;* M. Beddo, G. Burleson, J. A. Faucett,[†] G. Kyle, and M. Rawool-Sullivan,[¶] *New Mexico State University, Las Cruces, New Mexico 88003;* H. Shimizu,** *Tokyo Institute of Technology, Oh-Okayama, Meguro, Tokyo 152, Japan;* G. Glass,[††] S. Nath,[†] and L. C. Northcliffe,[‡‡] *Texas A&M University, College Station, Texas 77843;* J. J. Jarmer, *Los Alamos National Laboratory, Los Alamos, New Mexico 87545;* R. H. Jeppesen, *University of Montana, Missoula, Montana 59801;* G. E. Tripard, *Washington State University, Pullman, Washington 99164.* (Received 2 October 1995)

Measurements are presented for several mixtures of the spin observables C_{SS}, $C_{SL}=C_{LS}$, C_{LL}, and C_{NN} for neutron-proton elastic scattering. These data were obtained with a free polarized neutron beam, a polarized proton target, and a large magnetic spectrometer for the outgoing proton. The neutron beam kinetic energies were 484, 567, 634, 720, and 788 MeV. Combining these results with earlier measurements allows the determination of the pure spin observables C_{SS}, C_{LS}, and C_{LL} at 484, 634, and 788 MeV for c.m. angles $25°\leqslant\theta_{\text{c.m.}}\leqslant 180°$ and at 720 MeV for $35°\leqslant\theta_{\text{c.m.}}\leqslant 80°$. These data make a significant contribution to the knowledge of the isospin-0 nucleon-nucleon scattering amplitudes. [Phys. Rev. D **53**, 3506 (1996)]

Relation of constituent quark models to QCD: Why several simple models work "so well". G. Dillon and G. Morpurgo, *Dipartimento di Fisica, Università degli Studi di Genova, via Dodecaneso 33, I-16146 Genova, Italy and Sezione di Genova, Istituto Nazionale di Fisica Nucleare (INFN), I-16146 Genova, Italy.* (Received 6 July 1995)

We discuss the relationship between exact QCD and constituent quark models (nonrelativistic, bag, or others) to clarify why different models work reasonably in many cases. For this we use the general parametrization method [G. Morpurgo, Phys. Rev. D **40**, 2997 (1989)] now expressed in terms of the standard current quark fields (m_u and m_d a few MeV; $m_s\approx 150$ MeV, at the usual mass renormalization point $q=1$ GeV). The method provides for several quantities the most general exact form of the spin-flavor structure derivable from the QCD Lagrangian. We can thus determine for many important quantities (masses of lowest baryons and mesons, baryon magnetic moments, semileptonic decays, etc.), from a fit to the data, the coefficients of the parametrization, the same ones that a direct QCD calculation, if feasible, would give. It turns out that only a few coefficients are relatively important. Because different models, each with its few free parameters, can produce these terms by some choice of parameters, one can see why models so different as the nonrelativistic or quasichiral models work "well." Finally, expressing the coefficients in the general parametrization dimensionally in terms of current quark masses and Λ, we find that the m_s expansion of broken SU(3)×SU(3) is just an expansion in $\Delta m/(\xi\Lambda)\approx m_s/(\xi\Lambda)\approx 0.3$. The ξ's determined from different data are rather close (from 2.3 to 3.7). The resulting effective light quark masses in constituent models are of order $(\xi\Lambda)$. None of the above conclusions depend on whether or not the chiral limit $m_u, m_d, m_s\to 0$ is mathematically sound. [Phys. Rev. D **53**, 3754 (1996)]

ρ-meson self-energy and dielectron emissivity in an isospin-asymmetric pion medium. A. I. Titov and T. I. Gulamov,* *Bogoliubov Theoretical Laboratory, Joint Institute for Nuclear Research, 141980 Dubna, Russia;* B. Kämpfer, *Research Center Rossendorf, Institute for Nuclear and Hadron Physics, PF 510119, 01314 Dresden, Germany and Institute for Theoretical Physics, Technical University Dresden, Mommsenstr. 13, 01062 Dresden, Germany.* (Received 21 July 1995)

The ρ-meson self-energy in an isospin-asymmetric pion gas at finite temperature and charged-pion chemical potential is evaluated. We utilize a conventional effective π-ρ Lagrangian and the functional integral representation of the partition function in the second

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order in the $\rho\pi\pi$ coupling constant. We analyze the ρ-meson polarization operator and its dependence on the invariant mass M and spatial momentum $|\mathbf{p}|$ of the ρ meson. The pole positions and the values of the imaginary parts of the self-energy for different polarization states have different functional dependences on M and $|\mathbf{p}|$. The corresponding dielectron rate (calculated from the imaginary part of the in-medium ρ-meson propagator) shows a distinctive asymmetry when the momentum $\mathbf{t}=\mathbf{p}_+-\mathbf{p}_-$ is perpendicular or parallel to $\mathbf{p}$, where $\mathbf{p}_\pm$ are the $e^\pm$ momenta of the electron pair. [Phys. Rev. D **53**, 3770 (1996)]

Properties of vector mesons at finite temperature: Effective Lagrangian approach. Chungsik Song, *Cyclotron Institute, Texas A&M University, College Station, Texas 77843.* (Received 25 January 1995)

We examine the properties of ρ mesons at finite temperature T with the use of an effective chiral Lagrangian. The effective Lagrangian includes vector and axial-vector mesons as massive Yang-Mills fields of the chiral symmetry. It is shown that at the leading order of the temperature the effective mass of the ρ meson is not changed and only a mixing in vector and axial-vector correlators takes place. [Phys. Rev. D **53**, 3962 (1996)]

Electromagnetic form factors of the SU(3) octet baryons in the semibosonized SU(3) Nambu–Jona-Lasinio model. Hyun-Chul Kim,* Andree Blotz,† Maxim V. Polyakov,‡ and Klaus Goeke,§ *Institute for Theoretical Physics II, P.O. Box 102148, Ruhr-University Bochum, D–44780 Bochum, Germany.* (Received 25 April 1995)

The electromagnetic form factors of the SU(3) octet baryons are investigated in the semibosonized SU(3) Nambu–Jona-Lasinio model (chiral quark-soliton model). The rotational $1/N_c$ and strange quark mass corrections in linear order are taken into account. The electromagnetic charge radii of the nucleon and magnetic moments are also evaluated. It turns out that the model is in remarkably good agreement with the experimental data. [Phys. Rev. D **53**, 4013 (1996)]

Improved limit on charge conservation derived from ^{71}Ga solar neutrino experiments. Eric B. Norman, *Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, California 94720;* John N. Bahcall, *Institute for Advanced Study, Princeton, New Jersey 08540;* Maurice Goldhaber, *Physics Department, Brookhaven National Laboratory, Upton, New York 11973.* (Received 21 August 1995)

The reported counting rates of the SAGE and GALLEX solar neutrino detectors have been used to establish an improved limit on the charge-nonconserving decay $^{71}\mathrm{Ga}\rightarrow{}^{71}\mathrm{Ge}+\text{neutrals}$. The 1σ lower limit on the lifetime against such decays is 3.5×10^{26} yr. This result can be used to establish a 1σ upper limit on the ratio of the charge-nonconserving to the normal weak interaction decay width of the neutron, $\Gamma(n\rightarrow p+\nu_e+\bar{\nu}_e)/\Gamma(n\rightarrow p+e^-+\bar{\nu}_e)\leqslant 8\times10^{-27}$. This result represents by far the most stringent limit yet derived for charge-nonconserving decays involving baryons. [Phys. Rev. D **53**, 4086 (1996)]

η production in peripheral heavy-ion collisions. Alec J. Schramm* and Daniel H. Reeves, *Department of Physics, Occidental College, Los Angeles, California 90041.* (Received 14 November 1995)

We estimate the impact parameter dependence of the production cross section for η_c and η_b mesons in peripheral heavy-ion collisions. Total and elastic $\gamma\gamma$ cross sections are calculated in an equivalent photon approximation. [Phys. Rev. D **53**, 4092 (1996)]