POSTER SESSION AT KAON 99 AS OF 6/14/99
(Please see instructions at end)

M. N. Achasov *et al.*, presented by D. A. Bukin

Upper Limit on the $K_S \to 3\pi^0$ Decay

The search for $e^+e^- \to \phi \to K_S K_L$ with $K_S \to 3\pi^0$ was performed with the SND detector at VEPP-2M. No events of the process were observed. As a result an upper limit with 90% confidence level was set: $Br(K_S \to 3\pi^0) < 1.4 \times 10^{-5}$. This is to be compared with previous 90% c.l. limits of 3.7×10^{-5} (Barmin *et al.*, 1983) and 1.9×10^{-5} (CPLEAR, 1998).

Johan Bijnens and Joaquim Prades:

The $\Delta I = 1/2$ Rule in the Chiral Limit

We discuss the matching between long-distance and short-distance at next-to-leading in $1/N_c$ and show how the scheme-dependence from the two-loop renormalization group running can be treated. We then use this method to study the three $O(p^2)$ terms contributing to non-leptonic kaon decays, namely the usual octet and 27-plet derivative terms as well as the weak mass term using the Extended Nambu–Jona-Lasinio Model as the low energy approximation. We separate the contributions both from long- and short-distances coming from the different four-quark operators, Q_1, Q_2, Q_3, Q_4, Q_5, and Q_6 to the three $O(p^2)$. The origin of the $\Delta I = 1/2$ enhancement rule is identified in the penguin-like diagrams both from Q_2 and Q_6. We also discuss subtleties in the momentum routing in the low energy theory and a problem in separating factorizable and non-factorizable contributions from the Q_6 operator. We update our earlier results on the B_K parameter as well.

Juan Jose Godina Nava, IPN:

T violation in $K_{\mu 3}$ decays in a general two-Higgs-doublet model

We calculate the transverse muon polarization in the $K_{\mu 3}$ process arising from the Yukawa couplings of charged bosons in a general two-Higgs-doublet model where spontaneous violation of CP invariance is present.

Yong-Yeon Keum, KEK:

ϵ'/ϵ measurement and its impact on kaon and beauty meson physics

We analyze the theoretical implications of the new KTeV measurement of direct CP-violation in $K \to \pi\pi$ decays. In order to explain the large value of the KTeV observation, we suggest three possible senarios: (1) A low value of the strange quark mass; (2) A new physics contribution in the Zds vertex; (3) A new mechanism enchances $B_6^{1/2}$ which can explain simultaneously large $\epsilon^{'}$ and the $\Delta = 1/2$ rule.

In addition we discuss the impact of the ϵ' measurement on kaon and beauty meson physics, for instance, constraints on the CKM parameters (ρ, η) and theoretical uncertainties in measuring the unitarity angles α, β, γ due to penguin contributions.

C.-J. David Lin, University of Kentucky

Matrix elements for electromagnetic contributions to ϵ' and for neutral kaon mixing from the lattice

We present results for the matrix elements and B parameters of $Q_{7,8}^{3/2}$ and $Q^{\Delta S=2}$ from high-statistics, quenched lattice calculations performed at two values of the lattice spacing.

(with Laurent Lellouch (CERN), for the UKQCD Collaboration)

A. Mondragon and Ezequiel Rodriguez-Jauregui, UNAM:

Flavor permutational symmetry breaking: mass textures and the mixing matrix

Different ansätze for the breaking of the flavour permutational symmetry according to $S_L(3) \otimes S_R(3) \supset S_L(2) \otimes S_R(2)$ give different Hermitian mass matrices of the same modified Fritzsch type, which differ in the symmetry breaking pattern characterized by a parameter $Z^{1/2}$ and one CP violating phase Φ. In this work we obtain a clear and precise indication on the preferred symmetry breaking pattern from a fit of the predicted $|\mathbf{V}^{th}|$ to the experimentally determined absolute values of the elements of the quark mixing matrix. The preferred pattern leads to simple mass textures and allows us to compute the quark mixing matrix, the Jarlskog invariant J, and the three inner angles of the unitarity triangle in terms of four quark mass ratios and only two free parameters: $Z^{1/2}$ and Φ. Excellent agreement with the experimentally determined values of the moduli of the elements of the mixing matrix is obtained for $Z^{*1/2} = \sqrt{\frac{81}{32}}$ and $\Phi^* = 90°$.

The corresponding computed values of the Jarlskog invariant and the inner angles are $J = 3.00 \times 10^{-5}$, $\alpha = 84^\circ$, $\beta = 24^\circ$ and $\gamma = 72^\circ$ in very good agreement with current data on CP violation in the neutral kaon-antikaon system and oscillations in the B_s^0-$\bar{B}_s^0$ system. Furthermore, a rephasing of the quark fields in the mass representation allows us to show that the mixing matrix $\mathbf{V}^{th}$ derived from flavour symmetry breaking and the standard parametrization $\mathbf{V}^{PDG}$ advocated by the Particle Data Group are equivalent. From here, we derive exact explicit expressions for the three mixing angles θ_{12}, θ_{23}, θ_{13} and the CP violating phase δ_{13} occurring in $\mathbf{V}^{PDG}$ in terms of the quark mass ratios $m_u/m_t, m_c/m_t, m_d/m_b, m_s/m_b$ and the parameters $Z^{*1/2}$ and Φ^* characterizing the preferred symmetry breaking pattern. The predicted values of these parameters computed from quark masses are: $\sin\theta_{12}^* = 0.22081$, $\sin\theta_{23}^* = 0.03959$, $\sin\theta_{13}^* = 0.00369$ and $\delta_{13}^* = 72^\circ$, which coincide almost exactly with the central values of the experimentally determined quantities.

Ulrich Nierste, Fermilab:

$K \rightarrow \pi\nu\bar{\nu}$ and left-right symmetry

$K_L -> \pi^0\nu\bar{\nu}$ is the decay mode with the cleanest hadronic environment in kaon physics. In the Standard Model this decay mode is CP-violating and suppressed. Yet in certain left-right symmetric models the decay can take place via a CP-conserving transition and may be used to constrain the right-handed sector. We sum the QCD leading logarithms to all orders in perturbation theory, which is mandatory for a reliable analysis.

(in collaboration with Gabriela Barenboim and Martti Raidal)

Michael Scadron, University of Arizona:

Hyperon nonleptonic decays revisited

We first review the current algebra – PCAC approach to 14 nonleptonic octet baryon weak decay $B \rightarrow B'\pi$ amplitudes. The needed four parameters are independently determined by $\Omega \rightarrow \Xi\pi$, ΛK and $\Xi^- \rightarrow \Sigma^-\gamma$ weak decays in dispersion theory tree order. We also summarize the recent chiral perturbation theory (ChPT) version of the eight independent $B \rightarrow B'\pi$ weak $\Delta I = 1/2$ amplitudes containing considerably more than eight low-energy weak constants in one-loop order.

Michael Scadron, University of Arizona:

Kaon weak decays in chiral theories

The ten nonleptonic weak decays $K \to 2\pi$, $K \to 3\pi$, $K_L \to 2\gamma$, $K_S \to 2\gamma$, $K_L \to \pi^0 2\gamma$, are predicted for a chiral pole model based on the linear sigma model theory which automatically satisfies the partial conservation of axial current (PCAC) hypothesis. These predictions, agreeing with data to the 5% level and containing no or at most one free parameter, are compared with the results of chiral perturbation theory (ChPT). The latter ChPT approach to one-loop level is known to contain at least four free parameters and then predicts a $K_L \to \pi^0\gamma\gamma$ rate which is 60% shy of the experimental value.

Johann Zmeskal, University of Vienna:

The DEAR Experiment at DAFNE

The scientific goals and the experimental setup of DEAR (DAFNE Exotic Atom Research) as well as first results of the machine background measurements will be described. The objective of DEAR is to perform a 1% measurement of the K_α line shift due to the strong interaction in kaonic hydrogen, and for the first time a measurement in kaonic deuterium. The aim is to investigate low energy KN physics and to understand SU(3) chiral symmetry breaking. The setup takes advantage of the unique features of the *kaon beam* from the ϕ decay in DAFNE, of the CCD (Charge-Coupled Device) Detector for soft X rays (characterized by good resolution and by an unprecedented background rejection capability) and of a low-temperature pressurized gaseous target. The DEAR experiment represents a major effort in the study of low-energy KN interactions and has the potential to produce a breakthrough in the field.

TO PARTICIPANTS OF KAON 99 PLANNING TO EXHIBIT POSTERS IN THE POSTER SESSION:

1) We anticipate being able to accommodate roughly 18 sheets of $8\frac{1}{2} \times 11$ inches (or 18 A4 sheets) per participant, but modest amounts in excess of this will probably be acceptable.

2) We are asking you to write in type as large as possible so that people can see the posters from a distance of three feet (1 meter). This will allow more than one participant at a time to view the poster. We discourage simply posting typed versions of papers but will accept them if there is no alternative.

3) We are asking you to be ready to give your poster sheets to the Organizers no later than Monday morning, June 21, but preferably at the arrival reception on Sunday, June 20.