Session PS3 : Heavy Flavours

1- Giuseppina Anzivino, Universita di Perugia, Perugia, Italy.

Title: Rare Kaon Decays at NA48.

Abstract: The main purpose of the NA48 experiment is the determination of the direct CP violation parameter $\mathcal{R}](\epsilon'/\epsilon)$ from simultaneous measurements of the $K_{L,S} \to \pi^+\pi^-, \pi^0\pi^0$ decay modes. At the same time, however, other Kaon decay modes as well as hyperon decays are being recorded. The non-leptonic $K_{L,S}$ decays are important for understanding the low energy hadron dynamics of Chiral Perturbative Theory (CPT), since they are sensitive to higher order loop effects ($K_L \to \pi^0\gamma\gamma, K_S \to \gamma\gamma$, the latter especially interesting because CPT predicts unambigously the branching ratio with an error of less than 10 percent).

Other rare kaon decays are interesting to test standard model predictions. In the decay $K_L \to \pi^+\pi^-e^+e^-$, for instance, the measurement of the asymmetry of the decay rates gives informations on the different CP-violating and CP-conserving contributions; the companion decay $K_S \to \pi^+\pi^-e^+e^-$ where no CP-violating asymmetry is expected, was first observed at NA48.

The NA48 experiment also studies hyperon decays, such as $\Xi \to \Lambda\gamma$, $\Xi \to \Sigma^0\pi^0$. In this talk I will report on the latest results both on Kaon rare decays and on measurement of hyperons branching ratios and decay asymmetries.

2-Roberta Arcicidiacono, Universita di Torino, Torino, Italy.

Title: New Measurements of Direct CP Violation by the NA48 Experiment at CERN.

Abstract: The NA48 experiment is conceived to measure Re(epsilon'/epsilon) with high accuracy using the double ratio method. The first result, based on the data acquired during the 1997 run, has been published last year. A new result based on 1998 data analysis, with statistical sample three times larger, is presented, together with the details of the systematics study.

3-J.Dodd, Columbia University, NewYork, USA.

Title: Top Physics at ATLAS.

Abstract: The LHC can be considered as a top-factory, with about 10 millions t-tbar events produced in one year of running at low luminosity. This large data set will allow very precise measurements of the properties of the top quark, which may also reveal New Physics. The mass of the top quark will be measured with a precision of better than 2 GeV. The top quark Yukawa coupling can be determined with a precision of better than 10 percent. The t-tbar spin correlations can be observed and used

to study anomalous couplings or CP violation. Heavy resonances decaying to t-tbar pairs could be detected with masses up to 3 TeV. Rare decays of the top quark can be probed for branching ratios as small as 10^{-5}. Finaly, the detailed study of three different mechanisms of electroweak single top production will yield a wealth of information, including precision measurements of V_{tb} and of the W and top polarizations, and searches for anomalous couplings.

4- Aurelio Bay, Universite de Lausanne, Lausanne, Switzerland.

Title: The LHCb experiment.

Abstract: LHCb is a Large Hadron Collidert experiment dedicated to the study of CP violation and rare decays in the B-meson systems. It will be operationnal at the start of the Collider. An overview of the experiment and the status of the project will be presented.

5-Carlo Caso, University of Genova, Genova, Italy.

Title: Selected topics on B physics from LEP.

Abstract: This talk will cover some of the most recent results obtained by the LEP experiments using the full LEP1 statistics. A particular emphasis will be given to the following topics: 1) search for new physics in rare B decays; 2) measurements of $|V_{cb}|$ and $|V_{ub}|$ using semileptonic B decays; 3) B_s lifetime measurements; 4) B_s oscillations; 5) CKM fits.

6- Swee-Ping Chia, INTI College Malaysia, Nilai, Sembilan, Malaysia.

Title: The process $e^+e^- \to q_1\overline{q}_2$ at high energies.

Abstract: The process $e^+e^- \to q_1\overline{q}_2$ at high energies is considered within the framework of the Standard Model with three generations of quarks. This process is of interest because at sufficiently high energies, it allows the investigation of physics above the threshold at W-boson mass for the electroweak penguins. Both the cross-sections and the CP violating asymmetry parameter are calculated for cases when the final states involves (a) anti-c and s quarks, and (b) anti-s and d quarks. The cross-section is found to be order 10^{-14} GeV^{-2} and the asymmetry parameter of order 10^{-5}. The process of flavor-changing decays quarks with the emission of electron-positron is also investigated. For b to s decay, the decay rate is found to be very close to the present upper bound. For s to d decay, however the calculated decay rate agrees with that estimated from the experiment. The decay rate asymmetry is found to be small for both cases.

7-Marco Fabbrichesi, INFN and SISSA, Trieste, Italy.

Title: Theory of the CP-Violating parameter EPS'/EPS.

Abstract: I briefly review the current experimental and theoretical status of direct CP violation in the kaon system.

8-Tom Ferbel, University of Rochester Rochester, NY, USA.

Title 1: Top Physics from the Tevatron.

Abstract: Properties of the top quark such as its mass, its decay properties, and the $t\bar{t}$ production cross section, have been studied by the CDF and DØ experiments at the Tevatron Collider. Currently, the observed characteristics conform to expectations from the standard model. Nevertheless, all conclusions are limited by statistical uncertainty, and with the anticipated improvement in quality of detectors and the increase by over a factor of 100 in data before the turn-on of the LHC, the enhanced sensitivity may finally reveal the presence of new particle interactions and phenomena.

9- Yong-Yeon Keum, Institute of Physics, Academia Sinica Taipei, Taiwan.

Title: Nonleptonic Charmless B decays, Factorization vs Perturbative QCD.

Abstract: We compare the factorization approach, the perturbative QCD approach and the Beneke-Buchalla-Neubert-Sachrajda approach to nonleptonic charmless B meson decays. We discuss their treatments of factorizable contributions, nonfactorizable contributions, annihilation contributions, infrared cutoff and scale dependences, and strong phases. The roles of parton transverse momenta and of the Sudakov resummation in the perturbative QCD approach are explained. We emphasize that penguin contributions are dynamically enhanced by nearly 50 percent compared to those assumed in the factorization approach, and that annihilation diagrams give larger strong phases than those from the Bander-Silverman-Soni mechanism.

10- Yves Lemoigne, SPP-DAPNIA, CE Saclay, France.

Title: CP-violation studies in the B-sector at LHC.

Abstract: After BABAR and BELLE, the CP-violation studies in the B-sector will mainly concentrate on the decays of Bs states that the two experiments cannot access so easily due to the lack of an equivalent resonance. This study will begin soon at the Tevatron, but will continue intensively during the first three years of the LHC's life, when the luminosity (10^{33} or more) will be still too low for Higgs hunting, but amply sufficient for B decay studies. At that luminosity about 5×10^{12} b-bbar

quark pairs will be produced each year at the intersection points of ATLAS and CMS (five times less for LHCb). This requires very selective trigger systems, triggering mainly on muons, which will have been set up for Higgs triggers anyhow. Only an adaptation of the threshold will be necessary.

For instance CMS will reconstruct every year, several hundred thousands of Bd $\rightarrow J/\Psi$ Ks $\rightarrow$ Mu Mu Pi Pi for comparison with BABAR and BELLE results, and also several hundred thousands of Bs $\rightarrow J/\Psi+\Phi \rightarrow$ Mu Mu K K. The last channel is of first importance as it allows oscillation measurement up to Xs = 40. It allows also to measure delta(Gamma) between the two states of opposite CP, and finally to check the Standard Model and have a probe on possible New Physics. These studies require good capabilities to tag the particle / anti-particle nature of the decaying B. Results of detailed simulations show that the combination of several tagging methods is a very promising tool and assures high tagging efficiencies: an accuracy of one to two percent on the measurement of the angle beta of the Unitarity triangle, should be reachable per year in CMS.

The LHC will also allow to study very rare B-decays, like Bs $\rightarrow$ Mu Mu, which is a way to test the standard model through FCNC decays which are foreseen at the level of 10^{-9}. CMS will be able to test this limit.

The expected performances of the LHC in the B-sector will be reviewed mainly for the two main facilities, CMS and ATLAS, with short indications on the foreseen LHCb performances.

11-Nguyen Phuoc Xuan, University of Notre Dame, Notre Dame, IN, USA.

Title: D0-RunII B-physics at Fermilab.

Abstract : Prospects for B physics at the Tevatron for Run II using the D0 detector are discussed. Run I D0 B physics results are summarized and Run II detector upgrades important for B physics are described. Monte Carlo studies of the $B_s - - > J/\psi K^*$ channel are shown as an example of the capabilities that D0 will have for future mixing and lifetime studies.

12- Luca Trentadue, University di Parma, Parma, Italy.

Title: Axial Anomaly and Polarized Decays.

Abstract: We extend the approach of Dolgov and Zakharov to the axial anomaly to study polarized radiative decays. The pattern of mass singularity cancellation in the corresponding decay rates are analysed. We compare polarized and unpolarized cases. The cancellation of the infrared and collinear singularities is explicitely verified to all powers of the lepton mass for the π^+ and Z^0 polarized radiative decays. A new mechanism for the mass singularities cancellation is shown to take place.

13- Tony Walter Vaiciulis, Fermilab, USA.

Title: Top at the Tevatron.