PROCEEDINGS OF SCIENCE

Summary of New Experiments Session

Angel M. Lopez[*†]
Physics Department
University of Puerto Rico at Mayaguez
PO Box 9000, Mayaguez, PR, 00682, USA

E-mail: angel@charma.uprm.edu

The new experiments session presented an excellent review of the mid-term future of heavy quark and lepton physics experiments; all areas of the field were covered. Given the reality of the present energy limits of existing machines, future accelerator experiments plan on moving forward by increasing luminosity which will require improved detectors. However, it is good to see that there is still room for new initiatives such as the antiproton storage ring at FAIR in Darmstadt, Germany.

The Xth Nicola Cabibbo International Conference on Heavy Quarks and Leptons,
October 11-15, 2010
Frascati (Rome) Italy

[*]Speaker.
[†]I would like to thank our hosts for their warm hospitality and for providing a beautiful setting for the conference.

PoS(HQL 2010)091

1. Summary

The current reality in the field of high energy physics is that there is no date for the construction of an accelerator with an energy higher than those currently available. Nevertheless, there is a rich diversity of new experiments that have started to take data recently or are being planned or constructed and will add significantly to our capacity to answer an exciting array of physics questions. This bodes very well for the future of our field.

The session consisted of seven talks covering a wide range of experiments with most being united by the common theme of luminosity upgrades to existing facilities. Increased luminosity poses an interesting challenge to every aspect of our experimental design from fast sensor technology and its resistance to radiation damage to triggering systems and online data handling. The development of new experimental techniques to solve these problems will continue to be a very important component of the work done in the field.

Two of the talks presented plans for future, augmented B factories, two covered the future of Kaon physics and one discussed a new experiment in hadron physics using the strange and charm quarks. The large number of new neutrino experiments was the topic of one talk while the last talk was dedicated to the LHC experiments, particularly their capability in the study of flavor physics and how this is expected to be strengthened by the plans for an LHC upgrade.

The physics reach of SuperB factories is complementary to that of the LHC. Super KEKB has been approved by the Japanese government with a target luminosity of $8x10^{35}/cm^2/s$ and a goal of delivering $50ab^{-1}$ by 2021. A proposed SuperB factory at Frascati was less certain at the time of the conference. Besides offering an independent experiment to SuperBelle, it would have the unique capability of using a polarized electron beam. Meanwhile, the LHC experiments are already beginning to be competitive in the area of flavor physics particularly in the measurement of $B_s \to \mu^+\mu^-$ which is a good candidate for finding new physics. Interestingly, LHCb is not only complementary to the electron collider experiments but also to CMS and ATLAS since it is a forward spectrometer. The planned LHC upgrade should result in a truly impressive reach for the LHC experiments. For example, for $B_s \to \mu^+\mu^-$ the sensitivity would be $5-10\%$ of the Standard Model prediction.

Many facilities in the world will continue to do Kaon physics with expanded programs. At Frascati, the DAFNE collider has been modified and is expected to provide a factor 3 increase in luminosity in 2011. FNAL and JPARC also have plans for Kaon rare decay experiments with greatly increased luminosity but with a later time frame.

A new and unique facility (FAIR) is starting to be built at Darmstadt, Germany. An antiproton storage ring (HESR) with an energy reach of $14GeV$ will hold 10^{10} particles and deliver them to the PANDA experiment.

Neutrino physics has provided important discoveries in recent years. It is thus not surprising to see the large number of neutrino experiments currently taking data with many plans for increasing their sensitivity and with many new facilities under consideration. This is a very active and rich area of research.