2002 CONGRESS – WEDNESDAY SESSION WE-P5
CONGRÈS 2002 - RÉSUMÉS DE SESSION WE-P5 (Mercredi)

[WE-P5] ***ENERGY FRONTIER / LES LIMITES ÉNERGÉTIQUES*** ***WEDNESDAY, JUNE 5 MERCREDI LE 5 JUIN***

ROOM / SALLE 2001 B ***Chair: T. Mattison, UBC***

WE-P5-1 **14h15**

K. SACHS, Carleton University

Precision measurements at LEP2

Recent results from the OPAL collaboration based on the high energy data taken during the last years of LEP running are presented. Cross-sections are measured for fermion-pair final states as well asfor the production of pairs of photons, Z- and W-bosons. The high precision of these results allows us to determine Standard Model couplings and set limits on new physics. Results from all four LEP collaborations are combined to improve the results and obtain stringent tests of the electroweak theory.

WE-P5-2 **14h45**

M. RIVELINE, University of Toronto

Physics Results Anf Future Prospects from CDF

In March 2001, the Tevatron collider at Fermilab delivered the first ppbar collisions of run II. Within the next 2 years, 2 fb-1 of data are expected to be collected by the 2 Tevatron experiments CDF and D0. To this end, the CDF experiment has been upgraded to accomodate the higher collision rates, as well as to improve its measurement capabilities. This provides unparalleled opportunities to perform precise measurements of known quantities (eg., the masses of the Top quark and W boson), establish first observations of predicted effects (for instance mixing in the B_s system) and either discover new physics or further push the validity range of the Standard Model by establishing new limits on effects that aren't predicted by this model. This talk will cover the present status of the Tevatron Collider and the CDF detector and focus on the performance of the new components, as well as their impact on the physics program of the experiment. It will also include a look at the preliminary physics studies performed using the new data collected over the last year.

WE-P5-3 **15h15**

Search for W1 at CDF, **Pierre Savard**, *University of Toronto* — We present preliminary results of a search for a $W^\prime$\ boson produced in $p\bar p$\ collisions at a center-of-mass energy of 1.8 TeV using a $106~\hbox{pb}^{-1}$\ data sample recorded by the Collider Detector at Fermilab. We consider the case where the $\Wprime$\ boson decays to a top and bottom quark pair. We observe no statistically significant excess of events above background and set limits on the rate of $W^\prime$\ boson production and decay.

WE-P5-4 **15h30**

A Monte Carlo Study of Associated Higgs Production with a Top Quark Park, **Stanley Lai**, *University of Toronto* — The Standard Model has provided an excellent description of particle physics phenomenology, but the electroweak symmetry breaking sector of the theory remains untested, and the elusive Higgs boson has not yet been discovered. In Run II, CDF may have the ability to discover a Standard Model Higgs boson with a mass as heavy as 180 GeV. The most promising channels for this discovery involves associated Higgs production with a vector gauge boson. However, lower yield channels, such as associated Higgs production with top quark pairs, also provide intriguing discovery prospects due to their unique signatures. A preliminary overview of Monte Carlo studies of the process ppbar -> ttbarH at a centre-of-mass energy of 2.0 TeV, will be given, including estimates for the signal and background yield for this particular channel.

15h45 **Coffee Break / Pause café**

WE-P5-5 **16h00**

ROBERT S. ORR, University of Toronto

The ATLAS Experiment at the CERN LHC

ATLAS was designed to be a general purpose experiment capable of running at the maximum design luminosity of the LHC. Construction of the detector started in 1998 and is now well advanced. In particular the Canadian elements of the calorimeter project are nearing the phase of assembly and then installation. I will describe the status of the Canadian construction projects, and also discuss the situation of ATLAS and the LHC. I will also present some of the physics studies underway in the Canadian group.

WE-P5-6 **16h30**

Higgs Detection in ATLAS, **Rachid Mazini**, *Université de Montréal* — LEP data favour the existence of a relatively light Higgs particle, i.e. with a mass less than 250~GeV. This leads to an electroweak symmetry breaking s ector within reach of future accelerators. At LHC energies, weak boson fusion (W BF) is a significant source of intermediate mass Higgs. This production channe l provides powerful background suppression tools because of the two additional very forward jets. The particular decay H } OO, could be a potential discovery channel as well as a method for achieving the first direct measurement of a Higgs-fermion coupling. A systematic study of different scenarios shows that a 5O signal could be reached after three year running period at the LHC. I will present a complete study of the potentiel of observing a Higgs boson with the O and W+W- decay modes for 100 GeV < M_H < 200 GeV with the ATLAS detector. Sensitivity of the measurements of Yukawa coupling parameters to fermion will be shown as well.

WE-P5-7 **16h45**

R.K. CARNEGIE, Carleton University

Progress Towards a Future e+e- Linear Collider

There is now a clear international consensus that a high energy e+e- linear collider should be the next major international particle physics facility. Recent major planning studies in Europe, Japan and North America have each emphasized the importance of the linear collider physics program and strongly supported an early and phased approach to its construction. The linear collider physics reach and capabilities complement the physics program at the CERN LHC. I will discuss some of the principal linear collider physics topics, and review the current international activities and prospects for a future high energy e+e- facility.

WE-P5-8 **17h15**

Controlling Electron-Positron Beam Position to 1nm, **R. Greenall**, *University of British Columbia* — Accelerator beam energies have been rising since the first accelerators. To achieve usable luminosities, beam diameters have been decreasing. A new linear accelerator design proposes to reduce one beam dimension to 1 nm. A preliminary design consideration is whether this kind of beam diameter can be steered reliably considering man-made and natural vibrations. These vibrations are known to be on the order of 10's to 100's of nanometers with a spectrums near the resonances of support structures: 1..200 Hz. This talk focusses on experiments performed to measure and control the positions of masses modelling final accelerator aiming components. Measurement and control present independent challenges which are discussed along with experimental results. Additionally, some future control options are presented to widen the suite of possible solutions to this challenging problem.

17h30 **Session Ends / Fin de la session**