Session PS2 : Higgs and New Particle Searches

1- Jason Nielsen, University of Wisconsin at Madison, WI, USA.

Title: Review of Higgs Searches at LEP.

Abstract: During 2000, the LEP collider at CERN is being pushed to higher and higher center-of-mass energies. The most recent results from Higgs searches at LEP2 will be reviewed with some emphasis on the Standard Model and MSSM sectors. The ultimate discovery potential for combined Higgs searches will be developed.

2- Drew Baden, University of Maryland, Maryland, USA.

Title: Higgs Prospects for Tevatron Run II.

3- Lorenzo Bellagamba, INFN Bologna, Bologna, Italy.

Title: A new leptoquark generator for electron-proton scattering.

Abstract: Lepton Flavor Violation (LFV) has been extensively studied with low energy-high precision experiments, which have produced limits on the coupling of hypotetical objects (Leptoquarks) which could violate lepton flavor conservation. These limits are particularly tight for processes involving light quarks. HERA, the electron-proton collider at the DESY laboratory, provides an ideal environment to study LFV processes involving also heavy quarks. For some of these processes HERA limits are competitive with low energy experiments. We have developed a generator which allows to simulate Leptoquark production in electron (positron)-proton scattering, including LFV processes involving muons, taus and quarks of any generation. The features of the generator, based on the phenomenological model of Buchmuller-Ruckl-Wyler and on the fragmentation framework of JETSET, will be presented.

4- Jean-Loic Kneur, Université Montpellier II, Montpellier, France.

Title: Some topics in MSSM spectra determination.

Abstract: We describe some of the theoretical and practical aspects of determining the main physical content (masses, couplings, etc) of the supersymmetric and Higgs particles in the Minimal Supersymmetric extension of the Standard Model, under different high energy theory assumptions. This includes selected topics on e.g, -minimal Supergravity (gravity-mediated susy-breaking), anomaly-mediated susy-breaking, or non-minimal high energy assumptions; -discussion of the renormalization group evolution of supersymmetric and soft-supersymmetry breaking parameters from high to low

energy scale, with possibly particular (fixed-point, etc) scenarios; -calculation of the spectrum with consistent electroweak radiative symmetry breaking, etc. A fortran code providing these calculations within different model options is briefly presented.

5- Andrea Perrotta, INFN Bologna, Italy.

Title: SUSY results (MSSM and LSP) at LEP2.

Abstract: The search for physics beyond the Standard Model is one of the most relevant issues of these final years of running of LEP at high energy. Supersymmetry (SUSY) is probably the most appealing theory able to link the Standard Model with the high energy domain, and a lot of experimental work has been done at LEP trying to find some evidence of the predicted SUSY particles. In this talk the searches for Supersymmetry performed by the four LEP experiments at centre-of-mass energies up to 202 GeV are reviewed and the interpretation of the results in term of the Minimal Supersymmetric Standard Model is presented. In particular, it is discussed the use of such results to set absolute limits on the mass of the Lightest Supersymmetric Particle (LSP) and of the other SUSY particles in the frame of constrained MSSM scenarios.

6- Jean Fay, University of Lyon, France.

Title : SUSY searches in RPV or GMSB at LEP.

Abstract: Data collected by the LEP experiments are analysed in the framework of different extensions to the Minimal SuperSymmetric Model: - Searches for supersymmetric particles in e+e- collisions performed under the assumptions that R-parity is not conserved. - In GMSB model the gravitino is the LSP. The NLSP can be either the neutralino which decays to gravitino and photon or a slepton decaying in gravitino and lepton. Depending on the decay length of the SUSY particles, different topologies are studied. At center-of-mass energies between 189 GeV and 202 GeV no signal is found. Limits on the production cross sections and on the masses of the supersymmetric particles are derived. An update on data taken at higher energies is provided.

7- Alfred Bartl, Institute of Theoretical Physics, University of Vienna, Wien, Austria.

Title: Production and Decay of Charginos, Neutralinos, and Third Generation Sfermions at an e+e- Linear Collider.

Abstract: We study the production and decay of charginos, neutralinos, top squarks, bottom squarks, tau sleptons and tau sneutrinos at a future e+e- linear collider. We give numerical predictions within

the Minimal Supersymmetric Standard Model for cross sections and decay rates at c. m. s. energies between 500 Gev and 1 TeV. For chargino and neutralino production and the subsequent leptonic decays we take into account the spin correlations and study the decay lepton forward-backward asymmetries. We estimate the precision one may expect for the determination of the supersymmetric parameters of the top squark sector.

8- Jan Kalinowski, Warsaw University, Warsaw, Poland.

Title: Reconstructing the Gaugino System at e+e- Colliders.

Abstract: In supersymmetric theories charginos and neutralinos may be relatively light and produced copiously in e+e- collisions. By measuring the total cross sections and the asymmetries with polarized beams in $e^+e^- \to \chi^+\chi^-$ the chargino masses and the gaugino–higgsino mixing angles of these states can be determined accurately. As a result, the chargino system can be reconstructed completely. If only the lightest charginos χ_1 are kinematically accessible in a first phase of the machine, transverse beam polarization or the measurement of chargino polarization in the final state is needed to determine the mixing angles. From these observables the fundamental SUSY parameters can be derived: the SU(2) gaugino mass M_2, the modulus and the cosine of the CP–violating phase of the higgsino mass parameter mu, and $\tan(\beta) = v_2/v_1$, the ratio of the vacuum expectation values of the two neutral Higgs doublet fields. The remaining two–fold ambiguity of the phase can be resolved by measuring the normal polarization of the charginos. Sum rules of the cross sections can be exploited to investigate the closure of the two–chargino system. Similar program for the neutralino sector is also discussed.

9- Mikhail Vysotsky, ITEP, Moscow, Russia.

Title: Diminishing "charginos nearly degenerate with the lightest neutralino" slit using precision data.

Abstract: Though LEP II direct searches still cannot exclude a chargino nearly degenerate with the lightest neutralino if their mass is only slightly above half of the Z boson mass, it can be excluded indirectly analyzing precision data. In this particular limit simple analytical formulas for oblique electroweak radiative corrections are presented.