# XMAS WORKSHOP TALKS

## **1. LEV LIPATOV**

## Title: "Integrability and high energy effective actions in QCD and in gravity"

#### Abstract:

We review the theory of high energy processes in non-abelian gauge theories based on the effective action for the reggeized gluons. The BFKL equation for the Pomeron wave function and the BKP equation for the wave function of the gluon colorless composite states are known in the next-to-leading approximation. We discuss their integrability for the singlet and adjoint representations in the t'Hooft limit. In the N=4 SUSY the Pomeron is dual to the reggeized graviton. The interaction of the reggeized gravitons can be described in an effective action approach. The currents entering in this action satisfy the Hamilton-Jacobi equation for a massless particle moving in the gravitational field.

## 2. DIETER LUEST

#### Title: "Non-geometric Fluxes and Non-commutative/Non-associative Geometry"

## Abstract:

In this talk I discuss closed strings moving in non-geometric flux backgrounds. These backgrounds are shown to be related to non-commutative and non-associative geometries.

## 3. JIHN E. KIM

#### Title: "Extra Z' and Effective SUSY"

#### Abstract:

I discuss phenomenology of extra Z' in SUSY models with an emphasis on effective SUSY. The effective SUSY idea is realized in Z' mediation scenario which is shown possible in a Z(12) orbifold model from heterotic string.

## 4. ALBERT DE ROECK

## Title: "News from the LHC"

#### Abstract:

The LHC has completed the 2011 data taking run for pp collisions at 7 TeV. In total more than 5 fb-1 of data have been delivered to the ATLAS and CMS experiments, and more than 1 fb-1 to LHCb.

In this presentation we will review the status of the LHC physics results, in particular for searches for new effects and physics, as released by the experiments to date. These cover the usual search channels such as the ones for supersymmetry, extra dimensions, new possible gauge bosons, etc, but also more exotic channels. The latest news on the search for the Higgs particle will be detailed as well.

# **5. RICCARDO BARBIERI**

## Title: "Where are we with the search for supersymmetry?"

**Abstract:** I describe where and why one should look to understand if supersymmetry is relevant to produce a natural Fermi scale.

# 6. ANA MARÍA FONT

## Title: "Yukawa couplings in 7-brane models"

## Abstract:

We study corrections induced by non-perturbative effects on Yukawa couplings in local 7-brane models. We compute these corrections in a simple model and show how they lead to a realistic pattern of fermion masses.

## 7. LUIGI DEL DEBBIO

## Title: "Lattice results for BSM model building"

#### Abstract:

I present recent results on the phase structure of gauge theories with massless fermions in various representations of the color gauge group, and discuss their impact on the construction of viable models of dynamical electroweak symmetry breaking.

#### **8. HANS PETER NILLES**

#### Title: "The heterotic string at the LHC"

#### Abstract:

The most promising MSSM candidates of the heterotic string reveal some distinctive properties. These include gauge-top unification, a specific solution to the mu-problem and mirage pattern for the gaugino masses. The location of the top- and the Higgs-multiplets in extra dimensions differs significantly from that of the other quarks and leptons leading a characteristic signature of the soft breaking terms.

## 9. CECILIA JARLSKOG

Title: "Two Nobel stories: Marie 2 - Ernie 1"

#### **10. SHELDON GLASHOW**

# Title: "NEUTRINOS: SOME THINGS BORROWED AND SOME THINGS NEW"

#### **11. LAWRENCE HALL**

Title: "The Higgs Search -- Implications for Supersymmetry"

## **12. GRAHAM ROSS**

## Title: "Whither SUSY?"

**Abstract:** To date the LHC has not found evidence of the new states that are predicted to exist if supersymmetry provides a solution to the hierarchy problem. However SUSY must be broken and the non-observation of SUSY states may indicate that there are strong correlations between the soft SUSY breaking terms that must be added to the theory. Theoretically-well-motivated correlations can lead to a significant increase in the expected mass of the SUSY states without requiring significant fine-tunning. I will discuss the prospect for testing these cases at the LHC, both in the supersymmetric and Higgs scalar sectors.

## **13. KIWOON CHOI**

#### Title: Axions and anomalous U(1) gauge symmetry

**Abstract:** I discuss possible implications of anomalous U(1) gauge symmetry for the axion solution to the strong CP problem, and also the connection to supersymmetry breaking soft terms.

#### **14. STEFAN THEISEN**

## Title: "From trace anomaly matching to the a-theorem"

#### Abstract:

We argue that when conformal symmetry is spontaneously broken, the trace anomalies in the two phases match. We construct the dilaton effective action. The one associated with the a-type anomaly is the starting point for a recent proof of the a-theorem. (The first part is based on joint work with A. Schwmmer. The proof of the a-theorem, which is based on these results, is due to Komargodksi and Schwimmer.)

## **15. FERNANDO QUEVEDO**

Title: "Recent developments on local string models and moduli stabilisation".

## **17. DAVID GROSS**

## TITLE: "Theoretical Particle Physics: Past, Present, Future"

## **18. GRACIELA GELMINI**

## Title: "Light WIMPs in Direct Dark Matter Searches: signal or background"

**Abstract:** I will review and assess results of direct dark matter searches pointing to dark matter consisting of ``light" WIMP's with mass close or below 10 GeV.

## **19. ELIEZER RABINOVICI**

#### Title : "On the dynamical generation of the Maxwell term and scale invariance"

#### **20. MARTINUS VELTMAN**

#### Abstract:

The world data concerning the Higgs are considered. In particular, the possibility that there is no Higgs is analyzed.

#### **21. PIERRE BINETRUY**

## Title: "LISA is alive and well" and here is the abstract:

#### Abstract:

The LISA mission is now reformulated in a European-only context. The new mission, named ELISA (Evolved LISA) or NGO (Next Gravitational wave Observatory) will be described, together with its scientific programme, with emphasis on cosmology.

## 22. ANTONIO MASIERO

#### Title: "SUSY or not SUSY: the LHC and LFV Answers (so far"

#### Abstract:

I discuss the prospects for SUSY searches in flavor changing neutral current processes (in particular the lepton flavor violating ones) in view of the bounds and discovery reach of the present 7 TeV LHC run.

# 23. GENEVIÈVE BÉLANGER

## TITLE: "Light susy dark matter: from astroparticle to LHC"

#### Abstract:

We present the light neutralino scenario in the framework of the MSSM and the NMSSM.

We discuss the constraints from direct detection searches and Fermi measurements of the photon flux from dwarf spheroidal galaxies, emphasizing the complementarity between the two modes. We then show how LHC results on Higgs searches and Bphysics further probe the light neutralino dark matter.

## 24. WILFRIED BUCHMÜLLER

#### Title: "Higher-dimensional unification & the low energy superparticle spectrum"

#### Abstract:

Unified models with extra dimensions at the GUT scale typically contain exotic states with Standard Model charges and GUT-scale masses. This can lead to hybrid gauge-gravity mediation of supersymmetry breaking. The superparticle spectrum contains light and near-degenerate higgsinos with masses below 200 GeV, while other superparticles have much larger masses, from 500 GeV up to several TeV. We discuss how evidence for this mass pattern can be found in hadronic supersymmetry searches at the LHC.