



Theoretical physics to face the challenge of LHC

ESF School of Theoretical Physics

1 – 26 August, 2011

Scientific Direction

L. Baulieu (UPMC, Paris)

B. Mansoulié (CEA, Saclay)

E. Rabinovici (Racah Institute, Jerusalem)

Scientific Committee

K. Benakli (UPMC, Paris)

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E. Witten (IAS, Princeton)

Lectures:

N. Arkani-Hamed (IAS, Princeton)	New Structures In Scattering Amplitudes
J. de Boer (Amsterdam)	AdS/CFT and QCD
M. Douglas (Simons Center, Stony Brook, IHES)	The string landscape
G. Dvali (LMU-MPI, Munich - CERN - NYU)	Implications of Models for the Hierarchy Problem
L. Evans (CERN)	The LHC machine I
L. Fayard (LAL, Orsay)	Higgs searches at the LHC
G.-F. Giudice (CERN)	Supersymmetry
D. Green (Fermilab)	The LHC detectors and the First LHC data
L. Ibañez (IFT, Madrid)	Phenomenology from Strings
K. Jakobs (Freiburg)	Beyond the Standard Model Searches at the LHC
D.A. Kosower (Saclay)	Advanced Methods in Perturbative QCD
J. Maldacena* (IAS, Princeton)	Strongly Coupled Gauge Theories
M. Mangano (CERN)	The Standard Model versus LHC Data
S. Myers (CERN)	The LHC machine II
Y. Oz (Tel Aviv)	Applications of AdS/CFT
A. Pomarol (Barcelona)	Models of Electroweak Symmetry Breaking
Y. Sirois (LLR, Palaiseau)	The LHC detectors and Electroweak Symmetry Breaking Physics
G. 't Hooft* (Utrecht)	Black Holes in Elementary Particles
G. Veneziano (Collège de France, Paris - CERN)	Transplanckian scattering of particles, strings and branes

In addition to the main lectures, there will be daily seminars and shorter lectures on selected topics (*to be confirmed).

Scientific Programme

The LHC campaign and the analysis of experimental results at the TeV scale have finally begun. Soon the many theoretical speculations about physics beyond the Standard Model will be forced to confront real world evidence. At this school, we will discuss the large body of thought about new physics and how it could be tested. New theoretical ideas may or may not manifest themselves at the LHC. In fact, for the first time in many years, theoretical high energy physics has little certainty about what will emerge experimentally. To react quickly to both expected and unexpected discoveries, it will be important to have a broad sense for the many possibilities. The topics of the school will include the origin of the parameters of the standard model, the nature of electro-weak symmetry breaking, supersymmetry and its breaking, the physics of strongly coupled gauge theories, inflation, dark matter candidates, AdS/CFT techniques, extra dimensions and string compactification. On the experimental side, lecture series will provide an introduction to LHC physics for theorists, surveying the accelerator and detectors, data analysis and modeling techniques, and anticipated signatures of new physics. Finally, there will also be lectures on fundamental questions in quantum field theory and black hole theory, integrability, special properties of N=4 Yang-Mills and N=8 supergravity, and stringy cosmology.

Registration

All candidates should apply, **before March 31, 2011**, at <http://www.lpthe.jussieu.fr/houches11/>. Late applications will not be considered. The full cost per participant, including housing, meals and the lectures book, is 1500 euros. Thanks to the financial support from various funding agencies, a contribution of only 900 euros is requested. A few additional grants will be available. Additional information on the Les Houches Institution can be found at the site: <http://houches.ujf-grenoble.fr>, or at **Director Leticia Cugliandolo, École d'été de physique théorique**, la Côte des Chavants, 74310 Les Houches, France, phone: 33-450544069, fax: 33-450555325, email: secretariat.houches@ujf-grenoble.fr.

Les Houches is a village located in Chamonix valley, in the French Alps. Established in 1951, the Physics School is situated at 1150 m above sea level in natural surroundings, with a breathtaking view of the Mont-Blanc range. A quiet place, ideal for intellectual activity.

The les Houches Physics School is affiliated with Université Joseph Fourier and Institut National Polytechnique de Grenoble, and is supported by the Ministère de l'Éducation Nationale et de la Recherche, the Centre National de la Recherche Scientifique (CNRS), the Direction des Sciences de la Matière du Commissariat à l'Énergie Atomique (CEA/DSM).