Theory facing experiment on Electroweak Symmetry Breaking, Flavor and Dark matter: where do we stand

Monday, May 19, 2014 - Friday, May 30, 2014

International Center for the Scientific Culture, Villa Orlandi, Anacapri (island of Capri), Italy

Scientific Program

Experiments as LHC, new B factories, earth- and space-based astro-particle experiments can give us a unique opportunity to understand long-standing puzzles in electroweak symmetry breaking, flavour and dark matter.

The goal of the Institute would be to interpret the results coming from a wide range of experiments and to formulate a coherent framework to account for them. At the same time, outdated models and schemes no more on line with experiments can be identified, together with theoretical approaches based on more solid basis.

We plan to bring together key figures across disciplines and stimulate lively discussions and interdisciplinary exchange of information. It is worth emphasizing the importance of synergistic efforts by experts in complementary fields. The aim is developing strategies to face the three experimental frontiers characterizing particle physics, the energy, intensity, and cosmic frontiers.

Higher energy is the natural path to follow in the exploration of the gauge structure, with the study of the implications of the Higgs data for the SM and for models containing one or more Higgs-like scalar particles. Signatures of new physics beyond the SM may be identified at the LHC in the next couple of years, and it will be important to delineate the ensuing implications for physics beyond the Standard Model, for the nature of dark matter and for extended theories of gravity.

Higher intensity is the path to follow for the exploration of the flavour structure with the study of rare or forbidden decays, both in the quark and in the lepton sector, of tiny deviations from the SM expectations, unification, undiscovered symmetries, the search for other sources of CP violation, the possibility of a weakly coupled hidden sector that is related to dark matter, and so on.

Comparison of constraints from different measurements may be fundamental to assess the consistency of whatever given theory. That including astrophysical and cosmological observations, along with numerous dark-matter experiments, expected to reach new levels of precision in the next few years.

The pursuits of these frontiers are complementary steps of the same exploration, in our ambitious quest for the ultimate laws of physics.