The Galileo Galilei Institute for Theoretical Physics
Arcetri, Florence

Amplitudes in the LHC era

October 15, 2018 - November 23, 2018

Scattering amplitudes describe the high-energy interactions of elementary particles and are central to theoretical predictions for processes at the "Large Hadron Collider" (LHC) at CERN in Geneva. Recent years have revealed that scattering amplitudes hide a wealth of mathematical structure, whose study is not only interesting in its own right, but may eventually lead to a new approach to perform computations in particle physics. A lot of progress is being made regarding the computation of perturbative amplitudes in gauge and gravity theories, resulting in a novel interdisciplinary field of research connecting algebraic geometry and number theory to string and gauge theories, and thus eventually to LHC phenomenology through the computation of precision observables. The aim of this program is to bring together experts from theoretical physics and mathematics in order to advance our understanding of the mathematics underlying scattering amplitudes in field and string theory. Ultimately, the goal will be to deepen our knowledge of the mathematics underlying theoretical physics and to use advances in pure mathematics and string theory to develop powerful new computational tools for scattering amplitudes and precision predictions for collider experiments.

Topics:

- Differential equations, iterated integrals and elliptic functions.
- Algebraic structures associated to scattering amplitudes.
- Loop integrands, ambitwistors and algebraic geometry.
- Integrable structures in scattering amplitudes.
- Multi-loop computations for LHC physics.

Organizing Committee:

Vittorio Del Duca (ETH Zürich, INFN LNF)
Claude Duhr. (CERN, Uni. Louvain)
Falko Dulat (SLAC)

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Local organizer: Stefano Catani

GGI: http://www.ggi.infn.it/

Deadline for the applications - February 28, 2018