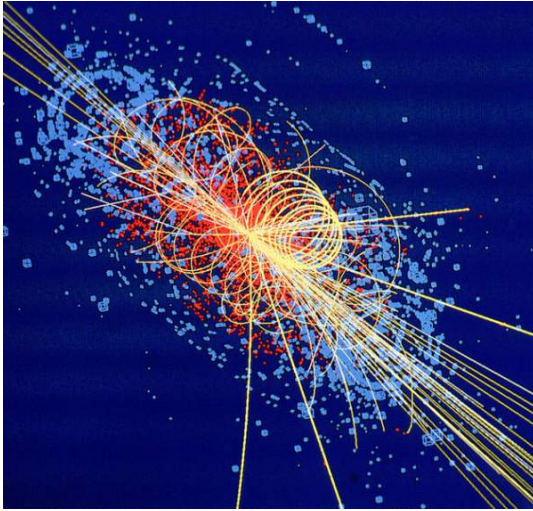


Particle Physics



Research topics

- Quantum Chromodynamics at short and long distances
- Fragmentation
- Prompt photons
- Phenomenology of the electroweak interaction, symmetry breaking
- Higgs physics
- Physics beyond the Standard model (supersymmetry, extra dimensions, Higgsless models,...)
 - Models of Dark Matter, interplay between collider, direct and indirect searches and cosmology
- QCD and Electroweak radiative corrections, techniques for loop multi-leg processes
- Flavour physics
- Quark gluon plasma
- Heavy ion collisions
- Renormalisation and gauge fixing
- Field theory at finite temperatures

Organisation of Conferences and Workshops

- [Les Houches Workshop](#) : Physics at TeV Colliders (series since 1999, every two years)
- Tools for the New Physics (2006, [2008](#) , [2010](#) , 2012: Stockholm, in preparation)

Codes

- [Phox and Dipfox](#)
- [Golem](#)
- [micrOMEGAs](#) ,
- [Sloops](#)

Astroparticle physics / Cosmology

Research topics



- Cosmic rays
 - Sources of galactic cosmic rays
 - Propagation of galactic cosmic rays
 - Gamma rays and radio skies
 - Anisotropies
-
- The nature of Dark Matter
 - Indirect signatures
 - Formation of proto-haloes
 - Alternative wimps
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- Particle astrophysics and stars
 - Low energy neutrinos
 - Gamma Ray Burst (GRB)
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- Cosmology
 - CMB and polarisation

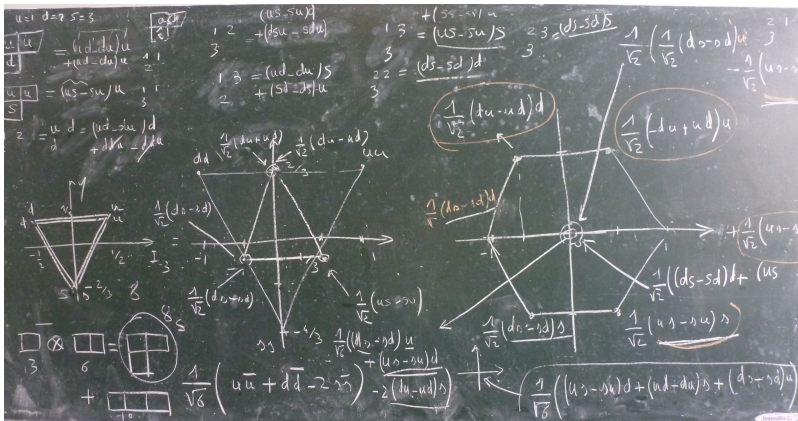
- Models of Dark Energy
- Mirage Dark Energy

Organisation of doctoral programmes

- [Erasmus Mundus Joint Doctorate](#) (International Relativistic Astrophysics PhD Programme)
- [Ecole prédoctorale des Houches](#)

Fields, Strings and Symmetries

Research topics



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Gauge theories, dualities and string theory

- Scattering amplitudes in gauge and string theories
- N=4 Super Yang Mills
- Conformal and superconformal symmetries
- Wilson loops
- Exact solutions and integrability
- Application to QCD, recursion relations

- String theory and instantons
- axiomatic scattering Matrix
- String Phenomenology
- Swampland Program
- de Sitter solutions

-

Integrable systems

- Algebraic approach to spin chain
- Bethe Ansatz
- Integrable field theory on graphs and quantum wires
- Application to condensed matter and statistical physics
- Integrability in gauge theories

-

Field theory and topology

- Chern-Simons theories
- Deligne-Beilinson cohomologies
- Geometric quantisation

-

General relativity

- Exact solutions, black holes
- Sigma model formulation
- Three dimensional gravity

Organisation of Workshops

- [RAQIS Series](#) : Recent Advances in Quantum Integrable Systems (since 2003)
- [AnLy Strings & Fields](#)

- [ISA](#) : Integrability and Scattering Amplitudes (2011)