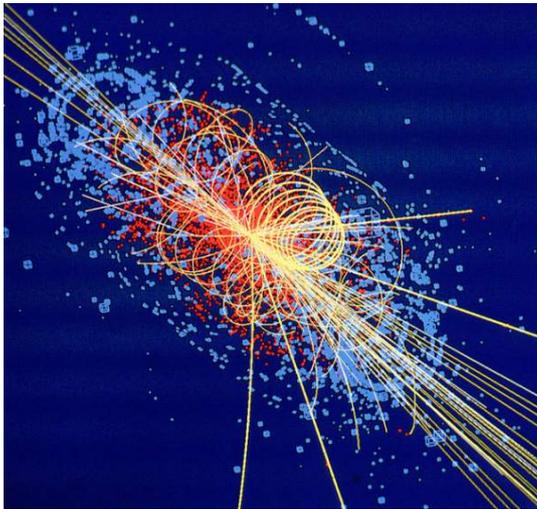


## Particle Physics



### 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 Diphox](#)
- [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
  
- Particle astrophysics and stars
- Low energy neutrinos
- Gamma Ray Burst (GRB)
  
- Cosmology
- CMB and polarisation

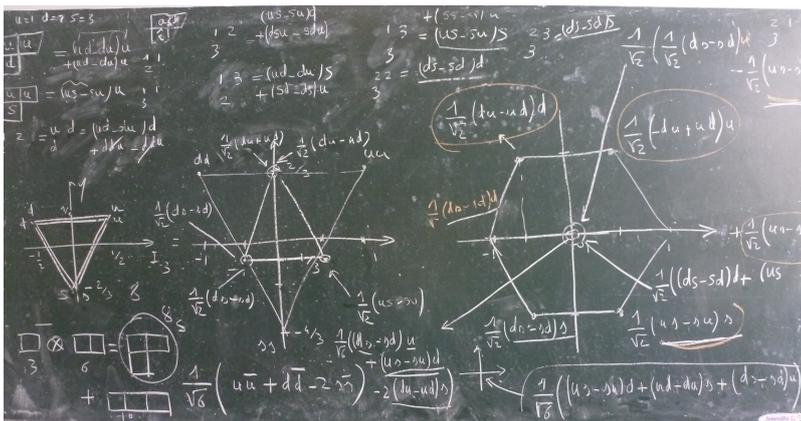
- Models of Dark Energy
- Mirage Dark Energy

### Organisation of doctoral programmes

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

### Fields, Strings and Symmetries

#### Research topics



#### 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

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### 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)