Advanced simulation techniques in particle physics and cosmology

Monday, 15 November 2010 - Saturday, 20 November 2010

NBI

Scientific Programme

Day 1: Ass. Prof. A. Maccio', assisting: S.H.Hansen

I Introduction to structure formation and evolution of the universe

II The problem of non-linear evolution of structures

Day 2: Ass. Prof. A. Maccio', assisting: S.H.Hansen

III Initial conditions for simulations. Introduction to the concept of numerical simulations (including both N-body and Hydrodynamical simulations).

Computer Exercises

Day 3: Ass. Prof. A. Maccio', assisting: S.H.Hansen, Prof. F.Maltoni, assisting: S.Xella, R.Mackeprang
IV Visualization and analysis tools.

V Computer Exercises

VI Introduction to event simulation at the LHC: Motivations, Basics of Monte Carlo techniques, Anatomy of a collision event at hadron-hadron colliders. Matrix element generators.

Day 4: Prof. F.Maltoni, assisting: S.Xella, R.Mackeprang

VII Simulation at parton level with MadGraph program: Introduction to the code, event generation from the Web. Case studies.

VIII Towards a more realistic simulation:
From partons to hadrons and jets. Examples of implementation.

Day 5: Prof. F.Maltoni, assisting: S.Xella, R.Mackeprang

IX Full event simulation with MadGraph + Pythia. Simulation of Standard Model and Beyond the Standard Model physics.

Computer Exercises.

X Advanced techniques: Simulation of signal and backgrounds and full analysis.

Case studies.