Ecole Doctorale des Sciences Fondamentales

Top-quark physics with the ATLAS experiment

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Summary :
Our understanding of the matter and forces relies on the Standard Model of particle physics. However this model has some weaknesses that various « extensions » try to tackle. Some of them predict new particles, with TeV-scale masses, which could couple preferentially to the top-quark of the Standard Model. Consequently at the LHC, deviations in top-quark related measurements and new particles decaying in top-quark can be expected.

The ATLAS-LPC team has a long experience on the top-quark physics and in particular of the search for top-antitop resonances. The first part of the thesis will be dedicated to this search to conclude the analysis of the LHC Run 2 data. Then, depending on the interest of the student, the focus will be given either to another search for new particles or to top-quark physics precision measurements. In any cases the analyses will be developed thanks to Monte-Carlo simulations and then be confronted with ATLAS' data.

The PhD student is expected to have a significant contribution to both ATLAS data analyses as well as to travel on a regular basis to CERN to take part to collaboration meetings. The team is also involved in detector operation and developments, and some contributions by the PhD student on these fields are also expected.

Good knowledge in particle physics is mandatory, as well as an ease in computer software (C++, ROOT, linux, …).