Patrick Robbe
Bâtiment 208
Tél. : +33 1 64 46 82 24
Portable : +33 6 08 09 35 59
Mail : patrick.robbe@ijclab.in2p3.fr

Measurement of the γ angle with the decay $\Lambda_b \rightarrow D^0\, p\, K$ at LHCb

LHCb is one of the experiments at the Large Hadron Collider (LHC) at CERN. It is dedicated to the study of flavor physics and in particular to the measurement of CP violation of weak decays of *B* hadrons. In the Standard Model, CP violation is described by the CKM (Cabibbo-Kobayashi-Maskawa) mechanism. Among the parameters of this mechanism, the γ angle of the unitarity triangle is the one measured experimentally with the poorest precision. Improving this measurement is one of the goals of the LHCb experiment. In order to validate the CKM mechanism, one approach is to measure this angle with several decay modes and to compare these measurements. Inconsistencies between these measurements and other parameters of the CKM mechanism would be an indication of possible sources of CP violation beyond the Standard Model processes.

The thesis subject will consist in measuring the γ angle with the decay of a b-baryon, $\Lambda_b \rightarrow D^0\, p\, K$, with D^0 decaying into CP related decays such as K^+K^-, $\pi^+\pi^-$ or $K^-\pi^+/K^+\pi^-$, using the entire dataset collected by LHCb during the Run 1 and 2 of the LHC. This decay mode has so far never been used for CP violation measurements. The work will be to reconstruct and select the decay, perform an amplitude analysis of this 3-body decay, measure asymmetries between Λ_b and anti-Λ_b decays and then interpret the results to obtain a measurement of γ. The IJCLab LHCb group has been active in the past years in analysis related to measurements of the γ angle and to amplitude analyses of baryon decays, so the thesis work will be a continuation of these activities, benefiting from the large dataset available now.

The thesis work will also contain a part related to the testing and running of a particle physics detector. The IJCLab LHCb group in involved in the building of a new luminosity detector, PLUME, for the experiment. This detector will be installed at the end of year 2021 and be put in operation during year 2022. Part of the thesis work will be dedicated to participating to the testing and commissioning of this detector and to development of control software for it.

The PhD thesis will be supervised by Patrick Robbe. During the thesis, there will be regular opportunities to travel to CERN to take part to detector commissioning and to meetings with colleagues from the LHCb collaboration to present results related to the analysis.

Laboratoire de Physique des 2 infinis Irène Joliot-Curie

IJCLab - Laboratoire de Physique des 2 Infinis **Irène Joliot-Curie**
UMR 9012, CNRS, Université Paris-Saclay, Université de Paris
Bâtiment 100 - 15 rue Georges Clémenceau - 91405 Orsay cedex - France