Title : From ordinary matter to deconfined matter using the Large Hadron Collider

First Name : Emilie	**Name** : Maurice	**Laboratory** : Laboratoire Leprince-Ringuet

Email : emilie.maurice@llr.in2p3.fr

Webpage : http://lhcb-public.web.cern.ch/

Research Area:
High Energy Physics – Quark Gluon Plasma

Methods:
LHCb data analysis
Detector R&D
Transition from confined to deconfined matter phenomenology

PhD track subject

Quark Gluon Plasma is the deconfined state of matter, where the elementary constituents of matter, quarks and gluons, move freely, as opposed to the ordinary nuclear matter. This state of matter contains fundamental properties of quark-gluon interaction. Even if discovered 20 years ago, this state of matter remains an open and promising field of research.

Thanks to 20 years of investigations, it is clear today that the optimal experimental conditions to fully study the charmonia melting, a smoking gun of the plasma, are met with the new and unique Large Hadron Collider (LHC) fixed target setup. From May 2022, the LHCb experiment will collect the first large fixed-target samples of proton-nuclei and lead-nuclei collisions.

This PhD topic proposes to exploit the LHCb fixed-target configuration to investigate the transition from normal matter to the Quark Gluon Plasma, to understand the very first microseconds after the Big Bang. The candidate will also contribute to the design and construction of the new tracker of LHCb experiment.

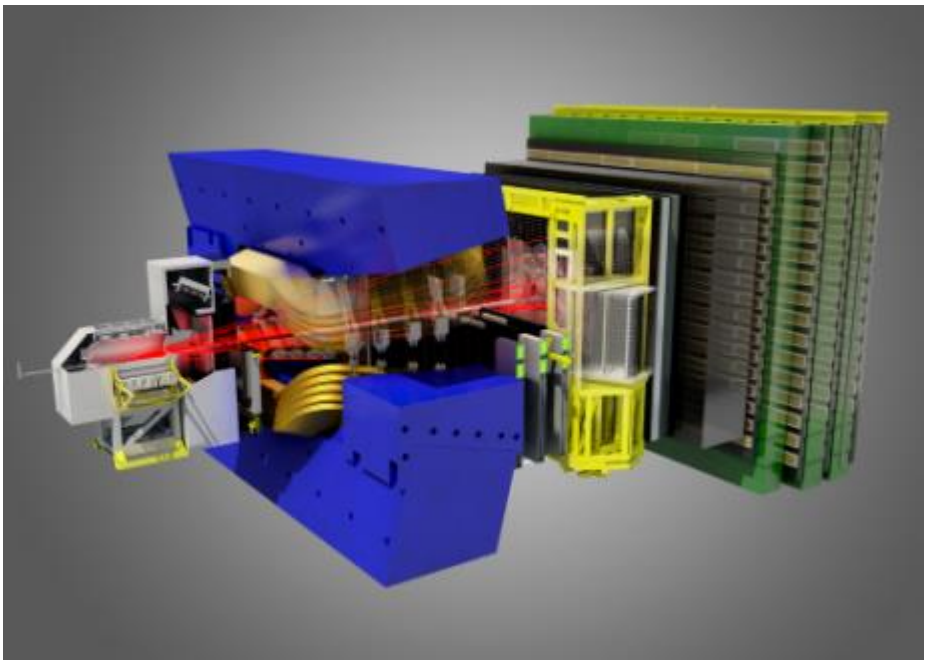

Figure 1. LHCb detector

References :

LHCb Collaboration, https://arxiv.org/abs/1810.07907
LHCb Collaboration, https://cds.cern.ch/record/2673690?ln=fr
https://www.in2p3.cnrs.fr/index.php/fr/cnrsinfo/lhcb-va-etudier-le-plasma-quark-gluon-laide-dune-cible-fixe-gazeuse