Quark-gluon tagged jet quenching studies in PbPb collisions with the CMS detector at LHC

Fact Sheet

Project Information

QGTAGCMSHI

Grant agreement ID: 626843

Project terminated

Start date
1 January 2015

End date
31 December 2016

Funded under
Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 194 046,60

EU contribution
€ 194 046,60

Coordinated by
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS
France

Objective

The studies of high energy nuclear (heavy-ion) collisions have been exploring the properties of QCD under extreme conditions. It is predicted that the matter in these

conditions forms a new phase which is called the quark-gluon plasma (QGP). Many features of this matter is already observed in RHIC and LHC experiments, one of them being the jet-quenching phenomenon. The color-charged highly-energetic projectiles (quarks and gluons) lose some of their energy while traversing this medium, and form jets that are less energetic compared to those produced in proton-proton collisions. This is reflected in the observed hadron and jet spectra, as well as correlations between jets. The analyses so far, however, have not distinguished whether an observed jet originates from a quark or a gluon. This is a rather important aspect, since the color factor difference causes quarks and gluons to suffer the energy-loss differently. While setting constraints on the parameters of the energy-loss, the quark-gluon identification will also help characterization of collisions and make it possible to investigate the patterns of the quenched energy in more detail. The distinct fragmentation features of quark jets and gluon jets make them possible to distinguish, which is a technique already practiced in pp collisions. Performing a similar method in heavy-ion collisions can shed light onto the quenching mechanism in the hot and dense QCD medium. However, more advanced methods have to be developed in order to cope for the large underlying event in the nuclear collisions. The CMS detector at the LHC experiment at CERN has excellent capabilities for charged hadron tracking and calorimetric energy measurement, which constitute the essential elements of jet studies. In addition, with its triggering capabilities, CMS has collected large datasets of dijet and photon+jet events. These different channels, having different parton content, can be used for controlling the quark-gluon tagging performance.

Fields of science (EuroSciVoc)

engineering and technology > materials engineering > **colors**

natural sciences > physical sciences > theoretical physics > particle physics > **gluons**

natural sciences > physical sciences > theoretical physics > particle physics > **quarks**

natural sciences > physical sciences > theoretical physics > particle physics > **photons**

Programme(s)

FP7-PEOPLE - Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

FP7-PEOPLE-2013-IEF - Marie-Curie Action: "Intra-European fellowships for career development"

Call for proposal

FP7-PEOPLE-2013-IEF
See other projects for this call

Funding Scheme

MC-IEF - Intra-European Fellowships (IEF)

Coordinator

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

EU contribution

€ 194 046,60

Total cost

No data

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Region

Ile-de-France > Ile-de-France > Paris

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Last update: 2 May 2017

Permalink: https://cordis.europa.eu/project/id/626843