Performance of ALICE forward Muon Chambers in p+p collisions at $\sqrt{s}$ = 7 TeV

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Introduction

A Large Ion Collider Experiment (ALICE) is a general-purpose heavy ion experiment which has been designed to study the physics of the strongly interacting matter and the quark-gluon plasma in nucleus-nucleus collisions in Large Hadron Collider (LHC). The ALICE experiment will be the only experiment at the LHC devoted to heavy ion physics to study the nature of the quark matter under the conditions of extreme temperature and high energy density.

The complicated structure of nuclear matter at low temperatures, where it is composed of a multitude of hadronic particles, baryons and mesons, is thus expected to give way at high temperatures to a plasma of weakly composed of quarks and gluons, the Quark - Gluon Plasma (QGP). A thermalized system where the properties of the system are governed by the quark and gluon degrees of freedom is called the QGP. Heavy quarks (charm and beauty quarks) are produced in the first stages of the relativistic collisions and then they coexist with the surrounding medium due to their long life-time. Transverse momentum (p_T) and rapidity (y) distributions and quarkonia production rates are the significant probes which will allow for probing the properties of the medium.

In the framework of the ALICE physics program, the goal of the Muon spectrometer [1] of ALICE is the study of open heavy flavor production and quarkonia production (J/Ψ , $\Psi^{'}$ and Υ(1S), Υ(2S) and Υ(3S)) via the muonic channel. For heavy ion collisions the dependence with the collision centrality and with the reaction plane will also be studied. The spectrometer acceptance covers the pseudorapidity interval $2.5 \leq \eta \leq 4.0$ and the resonances can be detected down to zero transverse momentum. The invariant mass resolution is of the order of 70 MeV in the J/Ψ region and about 100 MeV close to the Υ [2]. These values allow to resolve and measure individually all five resonance states. Basic principle of the Muon spectrometer: an absorber to filter the background, a set of tracking chambers before, inside and after the magnet and a set of trigger chambers. The Muon physics program is focused on the measurement of heavy flavor production in p+p, p+A like and A+A collisions at LHC energies.

The present data taking in the Large Hadronic Collider(LHC) at CERN has started from 2009 with p+p collisions at $\sqrt{s}$=900 GeV and from 2010 at $\sqrt{s}$=7 TeV. Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.75 TeV are expected also at the end of 2010.

Objectives of Run Coordination

Experiments need to have a person-in-charge to understand and solve the detector related problems during beam-time. Henceforth in ALICE each detector sub-system is assigned a co-ordinator who is answerable for that sub-system performance during the running period of ALICE experiment in LHC. As a Run-coordinator one has to :

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- Look into the detector slow-control systems carefully and know how to operate them to optimize the detector functionality.
- Periodically check the Data Quality Monitoring(DQM) plots to understand if the detector dead-time is optimal.
- Also look into the first-hand raw data produced and inform the offline analysis team incase something is queer which can be fixed.

Discussion

This year the p+p collisions in LHC at $\sqrt{s}$=7 TeV has been very much exciting where we had two important trigger streams for ALICE. The minimum-bias trigger running presently at $\approx$ 400 Hz and Muon Trigger at $\approx$ 50 Hz. 694 Million minimum-bias and 48 Million muon trigger events have already been recorded. The Muon-chambers has been operational upto $\approx$ 95% and the data analysis is also in fast progress. The Muon-chambers recorded their crucial magnetic-field off run for the alignment of the detector-elements and that has further enhanced the quarkonia measurements by a large scale which is now close to what is expected from simulations. Details of the run-coordination and detector functionality towards the successful analysis of quarkonia in p+p collisions at $\sqrt{s}$=7 TeV will be presented.

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References

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