A Look-See at muon data

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Abstract

We investigate preliminary data from proton-proton collisions in Run 3 at ALICE to compare the new Muon Forward Tracker (MFT) to the newly upgraded Inner Tracking System (ITS).

Contents

1 Introduction

2 Background

2.1 The ALICE Detector

- What is the LHC?
- What is ALICE?
- What does ALICE look for?
- What is Run 3?

The ALICE detector (A Large Ion Collider Experiment) is a detector experiment at the Large Hadron Collider (LHC) at CERN. Its primary goal is the investigation of "strongly interacting matter at extreme energy densities, where a formation of a new phase of matter, the quark-gluon plasma, is expected" ([1]). It achieves this goal by studying the products of head-on collisions of heavy ions such as lead.

The coordinate system used at ALICE needs to be discussed first in order to fully explain the scope of this report. A modified cylindrical coordinate system is used as most detectors in the experiment are cylindrically symmetric about the beamline of the LHC. We place the z-axis along the beamline and call the angle around the z-axis φ, the azimuthal angle. The angle from the z-axis to the $x-y$ plane is called θ, the polar angle. We are interested in the momentum of particles that we track in the detector, which we call $\vec{p}$, but we also define the transverse momentum $p_{\mathrm{T}} = \sqrt{p_x^2 + p_y^2}$

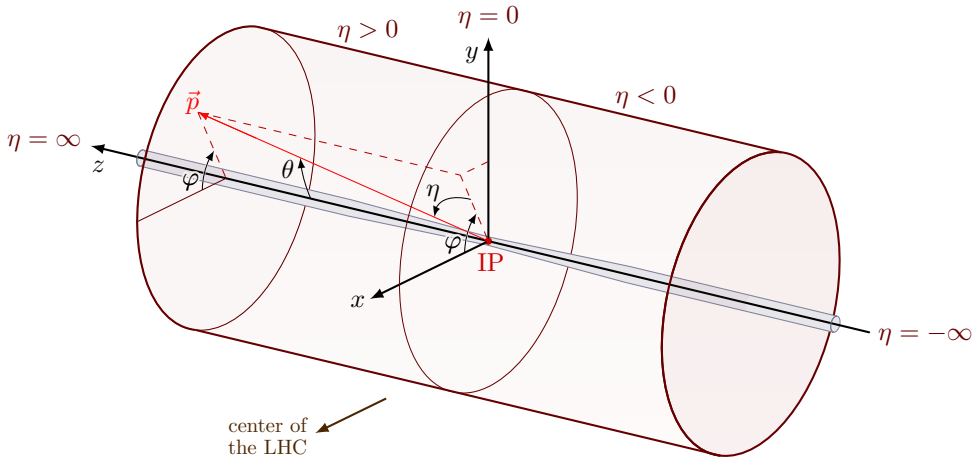

Figure 2.1: Coordinate system [2]

2.2 Run 3 Specifics

- What was upgraded/added in Run 3?
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2.3 Muon Forward Tracker

References

[1] *Letter of Intent for A Large Ion Collider Experiment [ALICE]*. Tech. rep. Geneva: CERN, 1993. URL: https://cds.cern.ch/record/290825.

[2] Izaak Neutelings. *CMS coordinate system*. URL: https://tikz.net/axis3d_cms/ (visited on 07/14/2022).