Internship report: stability test of 2008 COMPASS data

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Abstract

The main goal of this project is to look for the abnormal runs from COMPASS experiment (2008). The COMPASS data being analyzed for each run were already preselected before the stability test. For seeking the abnormal runs, different parameters in each event are extracted and investigated, such as the position of primary vertices, angular distribution of recoiled protons, invariant mass of three pions, etc. By plotting values of the parameters from each different run, run number 70195, 69612, 70223, etc can be directly selected out because of disparities to the normal runs. The most significant abnormalities result from the inconsistency of half width value from pions and photons' invariant mass. The explanation of these disparities are made by further inspecting the corresponding photon number from ECAL2 and recoiled proton angular distribution.

1 Introduction

The COMPASS stands for "Common Muon and Proton Apparatus for Structure and Spectroscopy", a fixed target experiment for investigation of nucleon spin structure and hadron spectroscopy. The final experimental results are concluded by analyzing the data recorded by multiple kinds of detectors during process of scattering. Due to the complexity and sensitivity of COMPASS detectors, recorded data can be easily sabotaged by unexpected external conditions, such as electronic malfunction or unusual shutdown of components. The data with those unwanted effects should be selected out for improving the quality of data analysis in the final step. In this project, the abnormality resulting from these effects are only investigated for the data with different run numbers. By calculating and comparing values of multiple characteristic parameters of each run, the abnormal runs can be identified and further examined to postulate their probable causes. In the end, by checking the already existed information in log book, it then can be determined the data of which runs should be discarded.

2 Target and Detectors

2.1 Target

The proton beam, which is accelerated by the Super Proton Synchrotron, is directed into Beryllium. From the interaction between proton and Beryllium nucleus, a secondary hadron particle beam is created, which is the incoming particle beam for scattering experiment. In this project, the hadron particle beam is selected to be negative charged pion beam.

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References