Study of the ATLAS Tile Calorimeter LASER Calibration System Dynamic

Meghan Shanks

Drake University, University of Michigan CERN REU 2008, CERN Summer Student Program 2008

Mentors: Prof. Claudio Santoni and Mr. Renato Febbraro

LPC/IN2P3 CLERMONT-FERRAND

Introduction

The Large Hadron Collider (LHC) is a particle accelerator located at the European Organization for Nuclear Research (CERN) in Switzerland. The LHC is a crucial component of the ATLAS Experiment, which is a large hadron collider project aimed at exploring the fundamental nature of matter and energy. In order to analyze particle physics collisions, the experiment relies on a complex system of detectors and tools to measure the properties of the particles produced. One such tool is the LASER system, which is used to calibrate the ATLAS Tile Calorimeter (TGC) to ensure accurate measurements.

Data Samples and Event Selection

Samples were obtained from two different experiments: mandarine and TGC. In mandarine data, data was obtained from files 1, 2, 3, 4, 5, 6, and 7. In TGC data, data was obtained from files 1, 2, 3, 4, 5, 6, 7, 8, and 9. The samples were obtained from the TGC data obtained from the ATLAS experiment.

Dynamical Range of the Wheel Filters

The dynamical range of the Wheel Filters, also known as the LTX and the TGC, is crucial for ensuring the accuracy of the measurements. The LTX filter is used to filter out noise and improve the signal-to-noise ratio, while the TGC filter is used to further refine the signal and improve the resolution.

Problems Observed

Problems observed during the calibration process included issues with the LTX and TGC filters, as well as with the TGC system as a whole. These issues were addressed by adjusting the settings of the filters and optimizing the calibration process.

Conclusions

Overall, the study showed that the ATLAS Tile Calorimeter LASER Calibration System Dynamic is functional and effective in achieving the desired calibration accuracy. However, there is still room for improvement in terms of the stability and reliability of the system.

Acknowledgments

I would like to thank my mentors, Prof. Santoni and Mr. Febbraro, for their guidance and support throughout this project. I would also like to thank the ATLAS Collaboration and the CERN Summer Student Program for providing me with this opportunity.

For Further Information

Please contact Meghan Shanks for more information. Additional information on the ATLAS project can be found on the ATLAS website: http://atlas.ch.