On the Commissioning of the 12 GeV HMS Drift Chambers, Electronics/Computer Live Time Monitoring and Overview of the D(e,e'p)n Experimental Run Plan

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Abstract

Three separate topics, all of equal importance, are briefly discussed. The new (12 GeV Era) HMS Drift Chambers are ready to be put in the HMS detector stack, in place of the old HMS Chambers. Several efficciency tests were performed on one of the chambers during the second week of October 2017. The efficciecies were determined to be better than 99%. The second chamber has not been tested yet, but it is expected to behave the same since both chambers were tested under similar conditions in the past. Live time studies are currently in progress to determine how many physics events (triggers) are actually lost due to computer and electronic deadtime inherent in our experimental equipment. There had been some technical issues found related to the computer livetime that are being addressed by the Jefferson Lab DAQ group. The experimental run plan of my thesis experiment, the electro-disintegration of deuteron (D(e,e'p)n), is briefly discussed as the kinematics have slightly changed and new simulations had to be done.

I. INTRODUCTION

On March 7-10 of 2017, a 5 μA electron beam was delivered to a BeO and Carbon targets for the first time to experimental Hall C since the 12 GeV upgrade. The beam was delivered as part of the Key Performance Parameters (KPP) required by the Department of Energy (DOE) to demonstrate the operability of the High Momentum Spectrometer (HMS) and Super HMS (SHMS). Hall C was able to demonstrate KPP in four days of beam time before an important component of the accelerator was damaged which caused to accelerator to shut down for repair. The accelerator is expected to be operational starting December 4, 2017. As a result of this delay, the commissioning experiments that were scheduled to run on Fall 2017 have now shifted to Spring 2018. This time window has allowed the Hall C collaboration to work extensively in preparation for the commissioning of the spectrometers on December.

One of the projects I have been involved in is the ongoing work on testing and commissioning the 12 GeV HMS Drift Chambers. The chambers were constructed at Hampton University by Dr. Lyuang Tang and his graduate student Bishnu Pandey in 2016. They were made the same design as the SHMS chambers, but smaller in size. The chambers we transported to Jefferson Lab on November 2016, where they underwent extensive tests as part of conditioning the chambers to sustain High Voltages using a gas mixture[1] of 75:25 Argon/CO_2 by volume. The chambers were found to be operational at 1860 V which is below the expected value. The chambers often drew significant amount of current ($\sim$ few μA) which caused the High Voltage to shut down as a safety mechanism. It was determined that the most likely cause of not being able to raise the High Voltage was the gas mixture being used, so one of the chambers was transported to the experimental Hall C where a gas mixture of 50:50 Argon/Ethane by volume was used. A test stand for the chamber was set up in the HMS hut, where it has been tested and verified to be operational with the new gas mixture. A second project I am currently involve in is the determination of electronic and computer dead times by a different method than was previously used in Hall C.

[1]This gas mixture is at lower cost compared to the gas mixture that the chambers run on during an experiment, which is why it is preferred during stress testing this detector.

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$$\alpha + \beta = \chi \tag{1}$$

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- The word data is plural, not singular. [1]
- The subscript for the permeability of vacuum ?0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter o.
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TABLE I
AN EXAMPLE OF A TABLE

One	Two
Three	Four

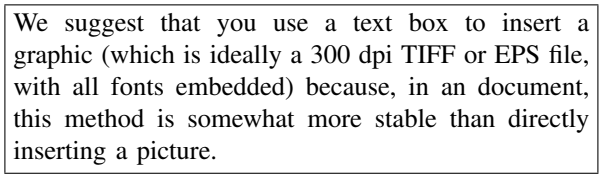

Fig. 1. Inductance of oscillation winding on amorphous magnetic core versus DC bias magnetic field

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V. CONCLUSIONS

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes should appear before the acknowledgment.

ACKNOWLEDGMENT

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References are important to the reader; therefore, each citation must be complete and correct. If at all possible, references should be commonly available publications.

REFERENCES

[1] W. Leo, *Techniques for Nuclear and Particle Physics Experiments: A How-to-Approach*. New York: Springer-Verlag New York, LLC, 1987.