

# **SIST 2007 Final Talks**

## **Report of Contributions**

Contribution ID: 0

Type: **not specified**

## Flux Jump Analysis in Superconducting Nb<sub>3</sub>Sn Accelerator Magnets

*Tuesday, 7 August 2007 09:00 (20 minutes)*

Supervisor: Giorgio Ambrosio (TD-Magnet Systems)

The upper limit of performance of the current superconducting magnet technology, NbTi, will have been reached with the operation of the Large Hadron Collider (LHC) at CERN in Geneva, Switzerland in 2008. A new magnet technology, Nb<sub>3</sub>Sn, promises greater critical current density and applied field thresholds; however, thermomagnetic instabilities, or flux jumps, are inevitable with this magnet technology and have yet to be analyzed in depth. Understanding these thermal instabilities will lead to greater magnetic stability for future high field accelerator magnets. Using a new automated spike analysis program along with the existing method, it was found that a current dependent spike magnitude threshold could aide in protecting the integrity of the magnet from premature quenching. This work reports preliminary analysis of flux jumps in superconducting Nb<sub>3</sub>Sn magnets.

**Presenter:** DONNELLY, Conor (University of Pennsylvania, Department of Materials Science and Engineering)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 1

Type: **not specified**

## Autonomous Voltage Spike Analysis Program

*Tuesday, 7 August 2007 09:20 (20 minutes)*

Supervisor: Michael Tartaglia, TD/MSD

With the upcoming inauguration of the Large Hadron Collider (LHC) at CERN, a limit in the maximum magnetic field achievable through NbTi superconductors will be reached based on the properties of the material. Fermilab has been developing a new generation of superconducting accelerator magnets based on Nb3Sn. The performance of these magnets has been found to be below the expected in terms of its critical current density due to thermo-magnetic instabilities present in the superconductor. In order to develop better magnets for future machines, it is essential to fully understand these instabilities. Several analytical studies have been done, but a quantitative analysis on the voltage spikes representing these instabilities has been limited by the high amount of transients that need to be processed. In this paper, I present the functionality and features of the first software designed at Fermilab to perform an analytical and quantitative study on voltage spikes in superconducting Nb3Sn strands, cables, and magnets.

**Presenter:** Mr RAHIMZADEH-KALALEH, Said (Embry-Riddle Aeronautical University)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 2

Type: **not specified**

## Testing the quadrature hybrid , making inductor calculations for the chopper, and making solenoid calculations for the Fast Phase Shifter (FFS)

*Tuesday, 7 August 2007 09:40 (20 minutes)*

Supervisor: David Wildman, Accelerator Physics Center

This summer, I will test 20, 75kW peak power quad hybrids and 3, 400kW quad hybrids using a Hewlett Packard, 8753E, 30 KHz - 6GHz Agilent Network Analyzer. I will also be making a combiner, which is needed to combine 2 individual 1200V voltages serially to make a 2400V output voltage. This will be useful in driving the meanders present in the chopper. In order to ensure that the voltage in the combiner is maximized, keeping in mind the losses in the cable, I will carry out some differential calculations incorporating the voltage and current laws. I will also be making some calculations for the fast phase shifter (FFS), such that we can achieve optimal uniformity in the field of the solenoid wound on the garnet ferrite of the FFS. These calculations will be verified running series of tests on the Agilent Network Analyzer and the Oscilloscope.

**Presenter:** FAPOHUNDA, Adenrele (Benedict College/Electrical Engrng class of 07, Illinois Tech/Comm. & Signal Proc. class of '09)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 3

Type: **not specified**

## CDMS Veto Stability Study and Calibration

*Tuesday, 7 August 2007 10:00 (20 minutes)*

Supervisor: Dan Bauer, PPD.

Most experiments searching for dark matter particles have been led deep underground to minimize the background produced by cosmic rays. In its attempt to detect weakly interacting massive particles (WIMPs) the Cryogenic Dark Matter Search (CDMS) lies  $\frac{1}{2}$  mile (~2000 meters water-equivalent) underground in the Soudan Mine in Minnesota. Even though the muon rate is lowered by a factor of  $\sim 10^5$ , the rate is still high enough to produce background signals. To solve this problem, scintillator panels have been placed around the detector to veto cosmic induced events. This work studies the behavior over time of the scintillator veto panels. By analyzing and tracking the response to a LED pulser system, the stability was determined to be within 3%. The absolute energy scale of the spectrum was then calibrated from digitizer units to MeV using Cobalt-60 and Cesium-137, as well as the muon distribution. Knowing the absolute energy scale and where the veto trigger threshold lies provides useful information for calculating the amount of background neutrons the scintillators might be able to veto.

**Presenter:** CACERES, Gabriel (Augustana College, Physics Department)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 4

Type: **not specified**

## Online Database: Linac 201 MHz Power Amplifiers (M#7835)

*Tuesday, 7 August 2007 13:35 (20 minutes)*

Supervisor: Elliott McCrory, AD/HQ

One of the most indispensable devices critical to the running of the LINAC, is the LINAC 201 MHz power amplifier vacuum tube, which provides the final amplification that drives the five 201-MHz resonant drift-tube cavities to 4.5 MW in the low-energy half of the Fermilab Linac. Because of the importance of these tubes to the operation of the Linac, the Linac staff and particularly Larry Allen, has collected relevant 7835 tube data since operations began in 1969. The purpose of my project is to create an online database of inventory and performance information on these tubes, whereby authorized users such as the Linac staff and other observers, will have the ability to modify and input new and existing data that would assist them in monitoring the lifespan and functionalities of the tubes.

**Presenter:** Mr FRANCIS, Dirk (South Carolina State University, Computer Science)**Session Classification:** SIST 2007 Final Talks

Contribution ID: 5

Type: **not specified**

## Foward Pixel Configuration Database Interface

*Tuesday, 7 August 2007 11:00 (20 minutes)*

Supervisor: Umesh Joshi, PPD

An interface in C++ programming language that read from foward pixel configuration database that is being builded for CMS detector at LHC (CERN). This interface is for configure some components of the tracker foward pixel detector that is the inner layer of CMS.

**Presenter:** Mr DONES, Michael A. (Polytechnic University of Puerto Rico, Electrical and Computer Enginnering Department)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 6

Type: **not specified**

## **CALIBRATION OF THE TEVATRON IONIZATION PROFILE MONITOR (IPM) FRONT END (FE) MODULES**

*Tuesday, 7 August 2007 11:20 (20 minutes)*

Supervisor: Kwame Bowie, PPD/EED

This project involves the comprehensive testing and calibration of the front end (FE) boards in the Tevatron Ionization Profile Monitor (IPM) Front End modules. The calibration of the FE boards is performed in order to ensure that the Application Specific Integrated Circuit (ASIC) called the Charge Integrating Encoder (QIE), located on each FE board, functions according to the design specifications and to also make certain that the highest QIE charge measurement accuracy is attainable. The calibration of the boards is a tedious yet crucial process that necessitates the generation of gain plots with fitting coefficients. The plots showing the expected results versus the experimental results were created in order to determine, if any, the magnitude of variation factors.

**Presenter:** Ms BANDELE, Moronkeji (Benedict College, Physics and Engineering Department)

**Session Classification:** SIST 2007 Final Talks



Contribution ID: 7

Type: **not specified**

## Software Infrastructure for the Reconstruction of Events at the International Linear Collider

*Tuesday, 7 August 2007 13:15 (20 minutes)*

Supervisor: Caroline Milstene, ILC

This paper describes a way to test the tracking of particles within a detector. (in our particular case the Silicon Detector, SiD detector). I worked on the development of an efficient software tool to test the reconstruction package in the detector based on the Kalman filtering. In many cases (International Linear Collider, ILC) particles are produced as jets, hence the identification, separation and reconstruction of the particles is of paramount importance. The reconstruction I tested takes into account the magnetic field, the material e.g. the  $dE/dx$  and the multiple scattering of the particles in the SiD detector. Approximately 80% of the particles are below 30 GeV, hence an accurate reconstruction of lower energy particles is important. In the lower range of energy the  $dE/dx$  plays an important role, and this effect is emphasized by the High Magnetic Field of the SiD (5 Tesla) which enhances the importance of a good tracking tool and its testing procedure.

**Presenter:** Mr MUNETSI-MUGOMBA, Kudzanayi (Lincoln University, Physics)**Session Classification:** SIST 2007 Final Talks

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Type: **not specified**

## Resonance Control in the ILC: Preload & A Case Study in Data Acquisition

*Tuesday, 7 August 2007 10:40 (20 minutes)*

Supervisor: Yuriy Pischalnikov, TD/IB1

The superconducting radio frequency (SCRF) cavities of the International Linear Collider (ILC) will require high precision length control to operate on resonance. Piezoelectric columns are employed as actuators, and current research aims at lengthening the lifetime of these implements by applying the correct preload, or axial load before actuation. One method of measuring the preload involves placing a metallic block in-line with the piezoelectric column and reading strain gauges on the block. This paper discusses current pitfalls of this method and ways to avoid them. Bench tests of measurement equipment and theory of static mechanics have shown this to be a viable method and have provided insight about specific, beneficial modifications to the current configuration. These improvements make the goal of a reliable accuracy of 50 pounds—currently frustrated by temperature effects—theoretically attainable while also allowing for migration to a more compact, less expensive data acquisition system.

**Presenter:** STOOKE, Adam (US Air Force Academy)**Session Classification:** SIST 2007 Final Talks

Contribution ID: 9

Type: **not specified**

## Implementing E-mail Alerts to the GCC Temperature Monitoring Program

*Tuesday, 7 August 2007 13:55 (20 minutes)*

Supervisor: Dr. David Ritchie, CD

This document describes the continued process to find a way to monitor a high density computing center remotely and efficiently through the use of a web browser. To accomplish this, a web-based temperature monitoring program was created, and implemented at Grid Computing Center (GCC). This Python program is utilized to read data out from thermocouple heat sensors and superimposes their values onto a floormap of GCC in the proper locations of the sensors in relation to the actual room. Additions to the program include the creation of a temperature threshold. If the temperatures read exceed a temperature threshold of (>95.0 oF), e-mail is then sent out to the appreciate personnel with a mailing list.

**Presenter:** Mr THOMAS, DeMarcus (Mississippi Valley State University, Computer Science)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 10

Type: **not specified**

## On The Stability Of Longitudinal Coupled Bunch Motion Using The Vlasov Equation

*Tuesday, 7 August 2007 14:30 (20 minutes)*

Supervisor: James A. MacLachlan, AD/PS

The longitudinal stability of couple bunch synchrotron oscillation is studied analytically using the Vlasov equation. The first step is to write the time dependent Vlasov equation for the interacting h bunch. The interaction is made by a coupling impedance that is modeled by a parallel RLC circuit. Because of the complexity of the Vlasov equation we are forced to use a perturbative approach to solve the equation for the distribution. A technique of multiple Fourier transforms was used to significantly to reduce the number of differential operator in the differential equation.

**Presenter:** MENDEZ RODRIGUEZ, Ruben (Universidad de Puerto Rico, Recinto de Mayagüez, Departamento de Física)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 11

Type: **not specified**

# Implementing Checklist in Electronic Form using the Control Room Logbook

*Tuesday, 7 August 2007 14:50 (20 minutes)*

Supervisor: Taka Yasuda D0

This paper describes the Electronic Logbook used at the D0 experiment at Fermi Lab, in particular the conversion of various checklist into the Electronic Logbook using XML, HTML, and Python programming language. The Electronic logbook is highly flexible and has long-lasting data storage capabilities. The electronic logbook is also portable and saves time and space that would have been used for the paper copies of the logbook.

**Presenter:** Mr WINN, Marcus (Mississippi Valley State University (Computer Science) May 2010)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 12

Type: **not specified**

## Remotely Downloading Firmware to the SVX Sequencer on D0 Detector

*Tuesday, 7 August 2007 15:10 (20 minutes)*

Supervisor: Geoff Savage, D0

The D0 detector, at the heart of the D0 experiment at Fermilab, monitors the tracks created by particles formed from the energy released during the collision of protons and anti- protons. It sifts through millions of tracks, looking for specific ones that physicists are interested in. The data it collects with its silicon strip detector about these tracks is in a 128 bit analog format. Computers cannot interpret analog data. Hence, the data is passed through several Field Programmable Gate Arrays (FPGAs) on SVX Sequencers in crates at the platform of the detector to digitize the signal. This presentation is on the project aimed at enabling remote downloading of firmware – a set of instructions responsible for the digitization of the analog signals - onto the FPGAs. Ability to download remotely is essential because of the inconveniences entailed going down to the platform to access the boards.

**Presenter:** Mr OKRAKU, Jefferson (Morehouse College/Dual Degree:Applied Physics & Mechanical Engineering, Class of 2010)

**Session Classification:** SIST 2007 Final Talks

Contribution ID: 13

Type: **not specified**

## Data Acquisition Graphs for DZero

*Tuesday, 7 August 2007 15:30 (20 minutes)*

Supervisor, Stefan Gruenendahl, PPD/DZero

For over five years the DZero Experimental team has been in need for a big picture of what was going on with trigger data versus luminosity. The team could get a snapshot every minute on trigger data from the Data Acquisition Monitor but no big picture. The team needed to have a big picture of what was going on with a run, store, hour, day, week, month, and even a year. With the assistance of the programming language Python and the graphical tool from CERN known as ROOT we now can provide the scientists with a big picture. A collaboration of scientists has come together and designed the DAQ Graphs project.

**Presenter:** Mr CARTER, Michael (GEM)**Session Classification:** Other Contributions

Contribution ID: 14

Type: **not specified**

## Welcome

*Tuesday, 7 August 2007 08:50 (10 minutes)*

**Presenter:** Dr MCCRORY, Elliott (Fermilab)

**Session Classification:** Preparations and Introductions