

# **SIST 2008 Final Talks**

## **Report of Contributions**

Contribution ID: 0

Type: **not specified**

## Preparations and Introductions

*Tuesday, 5 August 2008 09:00 (20 minutes)*

The room will be set up during this time.

**Presenter:** Mr OLSEN, Jamieson (Fermilab)

**Session Classification:** Session 1

Contribution ID: 2

Type: **not specified**

# Dark Matter, Supersymmetry and Accounting for the WMAP Haze

*Tuesday, 5 August 2008 09:20 (20 minutes)*

Previously, it has been argued that the anomalous emission from the region around the Galactic Center observed by the Wilkinson Microwave Anisotropy Probe (WMAP), known as the “WMAP Haze”, may be synchrotron emission from relativistic electrons and positrons produced in dark matter annihilations. In particular, the angular distribution, spectrum, and intensity of the observed emission are consistent with the signal expected to result from a Weakly Interacting Massive Particle (WIMP) with an electroweak-scale mass and an annihilation cross-section near the value predicted for a thermal relic. In this article, we revisit this signal within the context of supersymmetry, and evaluate the parameter space of the Constrained Minimal Supersymmetric Standard Model (CMSSM). We find that over much of the supersymmetric parameters space, the lightest neutralino is predicted to possess the properties required to generate the WMAP Haze. In particular, the focus point, bulk and A-funnel regions typically predict a neutralino with a mass, annihilation cross-section, and dominant annihilation modes which are within the range required to produce the observed features of the WMAP Haze. The stau-coannihilation region, in contrast, is disfavored as an explanation for the origin of this signal.

**Presenter:** Mr CACERES, Gabriel (Augustana College)**Session Classification:** Session 1

Contribution ID: 3

Type: **not specified**

## 4th Concept Detector Alternate Design

*Tuesday, 5 August 2008 09:40 (20 minutes)*

The 4th Concept Detector will have two proposal designs, a two-solenoid design and a one-solenoid design. Using a finite element analysis (FEM) program called COMSOL, preliminary magnetic field, stress, and deflection analyses were developed for the newer one-solenoid design. Much of the summer was dedicated to understanding COMSOL and learning how to use the computer assisted drawing (CAD) tools associated with the program. The overall weight of the structure was assessed and it was determined that due to the size and weight of the detector, a new support system needs to be developed.

**Presenter:** Mr COSENZA, Matthew (Illinois Institute of Technology)

**Session Classification:** Session 1

Contribution ID: 4

Type: **not specified**

## Converting D0 Logbook forms from Java to HTML and Python

*Tuesday, 5 August 2008 10:10 (20 minutes)*

The Electronic Logbook (E-Log) used at the D Zero (D0) experiment at Fermilab was designed to improve and replace paper copies of logbooks which were traditionally used. The E-Log book provides a mechanism for placing information on line where it can be accessed, searched and updated by individuals from any web browser. This web-based system is flexible and saves both time and space. This paper describes the process used by the author to convert old XML Java-based logbook forms to Hypertext Markup Language (HTML) web-based forms.

**Presenter:** Mr DAVIS, Marc'Quinn (University of the District of Columbia)

**Session Classification:** Session 1

Contribution ID: 5

Type: **not specified**

## WEAK MAGNETIC FIELD MEASUREMENT SYSTEM

*Tuesday, 5 August 2008 10:30 (20 minutes)*

This paper describes the research performed on a Hall probe based magnetic measurement system in order to determine if it is capable of recording magnetic fields of required magnitude generated by superconducting solenoid magnets. These superconducting solenoids are being developed for a R&D project named High Intensity Neutrino Source. The project design demands a very low stray field due to adjacent RF cavities. This paper presents the performance of a Hall probe based measurement system when excited by DC and AC currents. The probe's sensitivity to an external weak magnetic field was measured and an estimate of the electromagnetic noise level was performed. Various noise sources were studied and efforts made to attenuate them using software and hardware based signal recovery. The probe's sensitivity was found to vary in relation to the current applied. AC probe excitation was found to provide a lower noise level versus DC excitation.

**Presenter:** Mr DELANNOY, Andrés (University of Puerto Rico at Mayaguez)

**Session Classification:** Session 1

Contribution ID: 6

Type: **not specified**

## Measurement of the Permeability ( $\mu$ ) & Permittivity ( $\epsilon$ ) of Aluminum doped Yttrium-Iron Garnets from 100Hz to 1GHz

*Tuesday, 5 August 2008 11:00 (20 minutes)*

Microwave circulators are important for the RFQ (radio frequency quadripole), that will be installed in the High Intensity Neutrino Source (HINS) linac front end at the Meson Detector building at Fermilab, in order to prevent energy reflections back at the phase shifters. They are composed of magnetized ferrite materials, i.e. garnets, which in collaboration with a permanent magnet produce the magnetic flux through the waveguide. Thus it is important to find and understand the properties of these garnets, two of which are the permittivity and permeability. This paper describes measurements of the permittivity ( $\epsilon$ ) and the permeability ( $\mu$ ) of Aluminum doped Yttrium-Iron Garnets at frequencies between 100Hz and 1GHz. The permittivity and permeability were found using a series of stripline circuits with the garnets so measurements on its different components such as the capacitance, inductance, phase, and the time delay through the stripline could be taken. Finding these quantities required the use of equipment like a Network Analyzer, a LCR Meter, and a Vector Impedance Meter.

**Presenter:** Mr LOWERY, Adam (Lincoln University)

**Session Classification:** Session 1

Contribution ID: 7

Type: **not specified**

## Development and Debugging of CAPTAN boards

*Tuesday, 5 August 2008 11:20 (20 minutes)*

Information from pixel detectors is sent to data acquisition boards which go on to send the information to computers for analysis. CAPTAN (Compact and Programmable daTa Acquisition Nodes) are versatile and flexible data acquisition boards that allow analog signal from pixel detectors to be digitized and have primary processing done. The information is then sent via ethernet to a computer for further processing. This presentation will describe the creation of firmware to allow the FPGA on captan boards to write and read information to and from its RAM from a remote computer via an ethernet/ IP protocol

**Presenter:** Mr OKRAKU, Jefferson (Morehouse College)

**Session Classification:** Session 1



Contribution ID: 9

Type: **not specified**

## Preparations and Introductions

*Wednesday, 6 August 2008 09:00 (20 minutes)*

**Presenter:** Mr OLSEN, Jamieson (Fermilab)

**Session Classification:** Session 2

Contribution ID: **10**

Type: **not specified**

## **Building WebPages to Display the Temperature Monitoring Project in the Grid Computing Center**

*Wednesday, 6 August 2008 09:20 (20 minutes)*

This document describes a project to expand and improve the web pages used to monitor the temperatures in areas of the Fermilab Computing Division's Grid Computing Center and Lattice Computing Center.

**Presenter:** Ms BLAND, Amanda (Mississippi Valley State University)

**Session Classification:** Session 2

Contribution ID: 11

Type: **not specified**

## Flux Jump Studies of Nb<sub>3</sub>Sn magnets

*Wednesday, 6 August 2008 09:40 (20 minutes)*

A luminosity upgrade has been planned for the LHC within the next 5 years. So far Nb<sub>3</sub>Sn magnets seems to be the best candidate for this upgrade. Unfortunately, these conductors suffer from thermo-magnetic instabilities, flux jump, which limit their practical use. Thus, two experiments were done to analyze and hopefully understand these instabilities in further detail.

**Presenter:** PALACIOS, Edgar (Illinois Institute of Technology)

**Session Classification:** Session 2

Contribution ID: 12

Type: **not specified**

## Monitoring the Consequences of Ground Motion on Accelerators

*Wednesday, 6 August 2008 10:10 (20 minutes)*

This paper focuses on the impact of the earth's motion on magnetic alignment. More directly, this paper analyzes ground motion of water pools that were set up for modeling the slow degeneration in the alignment of magnets. It explores theories that have been found to express a relation between distance and time and the existence of a constant, in the determination of an alignment 'factor' at some point, based on these ground motion variations. This paper also presents and evaluates data on this theory to better determine a model for magnet alignment and how often it needs to be done.

**Presenter:** Mr PRESCOD, Andre (South Carolina State University)

**Session Classification:** Session 2

Contribution ID: 13

Type: **not specified**

## The Antimatter Gravitation Experiment

*Wednesday, 6 August 2008 10:30 (20 minutes)*

This paper discusses data acquisition/analysis techniques used early on in the Antimatter Gravitation Experiment (AGE). It covers the use of lasers, photodiodes, and interferometers in conjunction with a three grating interferometer to that end. A short discussion of the first results from this experiment is included. It also explains the use of these results and how they can help in the future.

**Presenter:** Mr TILLMAN, Caleb (Reed College)

**Session Classification:** Session 2

Contribution ID: 14

Type: **not specified**

## Simulating an RF Cavity in Real Time Using an FPGA

*Wednesday, 6 August 2008 11:00 (20 minutes)*

An RF simulator is needed to test the electronics used to control RF cavities. This paper discusses the process to configure the FPGA for simulating an RF cavity, and creating an interface in MATLAB using C MEX-files. It also includes information about the hardware used in this project and tests done to verify the correct functionality of the card's configuration.

**Presenter:** TRINIDAD-PÉREZ, Jason (Inter American University of Puerto Rico, Bayamón Campus)

**Session Classification:** Session 2

Contribution ID: 15

Type: **not specified**

# Graphic User Interface (GUI) Design, Using Python

*Wednesday, 6 August 2008 11:20 (20 minutes)*

Case Study: The Muon Calorimeter Checklist

**Presenter:** WINJOBI, Ifeoluwa (Benedict College)

**Session Classification:** Session 2