technologies. At present Wavefront has commercialized it's technologies world wide and licensed the oil field applications to Haliburton. In the environmental industry commercial applications involve the placement of chemicals for the purpose of neutralizing a contaminant or the use of surfactants to mobilize LNAPL's or DNAPL's. Clients range from NASA to the NY DEC, to major defence contracts, U.S. government sites and private industry contaminants such as service stations and dry cleaning plants.

1. T.J.T. Spanos, *The Thermophysics of Porous Media*, 2002, Chapman & Hall/CRC Press, Monographs and Surveys in Pure and Applied Mathematics series.
2. T.J.T. Spanos, M.B. Dusseault, B. Davidson D. Shand and M. Samaroo, "Pressure Pulsing at the Reservoir Scale a New IOR approach", *Journal of Canadian Petroleum Technology* February 2003, **Volume 42**, 1-13.

* This work is being supported by NSERC and Wavefront Energy and Environment

MO-A7-6 12h00

Forensic electron paramagnetic resonance (EPR) dosimetry of drywall, **Jeroen Thompson**, Ibrahim Abu Atiya, Douglas Boreham, *McMaster University* — Concern regarding the possibility of criminal or terrorist use of nuclear materials has led to an interest in developing the capability to measure radiation dose in a variety of natural and man-made materials. Measurement of radiation dose in "fortuitous" dosimeters is intended to aid in law enforcement, screening of affected populations (triage), and possibly even weapons inspections. Electron paramagnetic resonance (EPR) may be used to perform radiation dosimetry on suitable materials. Historically, this field has linked radiation physics with archaeology and geology; at McMaster University, we are extending EPR dosimetry to materials that are of use in forensic dosimetry. One such novel EPR dosimeter is drywall, a common construction material composed largely of gypsum (calcium sulphate dihydrate). A radiosensitive EPR signal in drywall has been identified, and suitable dose measurement protocols have been developed. As a proof-of-concept, a drywall slab was irradiated with a ^{60}Co source, and the absorbed dose was measured across the slab. The resulting two-dimensional dose map illustrates the possibility that one can determine the unambiguous former presence and even location of an illicit radioactive source. Possible applications in counter-terrorism and criminal investigations will be discussed.

MO-A7-7 12h15 (G)

Development of silicon nanowires for applications in small-dimension transistors and field emission devices*, **Han-Jen Yang**, Ishiang Shih, *McGill University* — Silicon nanowire has many potential applications, one of which is to fabricate small dimension transistors. For example, silicon nanowire can form the channel region for the vertical surround-gated field effect transistor. Silicon nanowire can also be used as the sharp, small dimension emission tip for the field emission device. One of the issues facing the field emitter array (FEA) is the device uniformity across the array and uniformly fabricated silicon nanowires can possibly be a solution to such issue. Various silicon nanowires are fabricated using different fabrication methods such as crystal orientation dependent etching process with photolithography and also the self-aligning silica colloids as etching mask combining with metal induced etching process. The fabrication uniformity of the nanowires is examined and the silicon nanowire based transistors and field emission devices are fabricated and characterized.

* This work is being supported by McGill University

12h30 Session Ends / *Fin de la session*

[MO-A8] Particle Physics Instrumentation / *Instrumentation en physique des particules*

(PPD / *PPD*)

MONDAY, JUNE 9 / LUNDI, 9 JUIN

10h00 - 12h30

ROOM / SALLE VCH 3860* (cap. 148)** ***Chair: John F. Martin, University of Toronto

MO-A8-1 10h00

KARL KRUSHELNICK, University of Michigan

Compact laser-plasma based accelerators

Recent developments in femtosecond laser technology have enabled the proliferation of relatively compact high power laser systems in university laboratories around the world. One potentially important application of this technology is the generation of relativistic electron beams having energies of hundreds of MeV to a GeV using the plasmas produced by such lasers. I will discuss recent results and future prospects for this technology.

MO-A8-2 10h30

STEVEN ROBERTSON, McGill University

SuperB: New Physics Opportunities at a High Luminosity Flavour Factory *

Flavour will play a crucial role in understanding physics beyond the Standard Model. Progress in developing a future programme to investigate this central area of particle physics has recently passed a milestone, with the completion of the conceptual design report for SuperB — a novel technological solution for colliding electrons and positions at centre-of-mass energies around the Y(4S) (~10.6 GeV) with extremely high luminosities (>O(10^{36}cm^{-2}s^{-1}) in a low background environment. Such a research tool, opens the exciting possibility of a programme of high statistics heavy flavour physics (B and D mesons and tau leptons) that has sensitivity to physics beyond the Standard Model by measuring subtle effects in CP-violating asymmetries and in rare decay branching fractions and kinematic distributions affected by new heavy particles in the loops of second order diagrams. It will provide unique and complementary data for interpreting results from the LHC and indirect access to energy scales beyond those directly probed at the LHC. The time scale for this effort has first collisions occurring in 2014 with the physics programme completed before an ILC is expected to begin collecting data.

* This work is being supported by NSERC

MO-A8-3 11h00

International RD collaboration for the development of micro pattern gaseous detectors, **Alain Bellerive**, *Carleton University* — Micro pattern gaseous detectors (MPGD) were designed to give excellent response for very high particle flux experiments. The versatility of MPGD leads the way for many different applications in various fields of research. The RD51 collaboration at CERN aims to push forward technological and system aspects of MPGD. Current trends in MPDG technology, together with new fabrication processes that lead to improvement in performance for detectors of various sizes and shapes, will be reviewed. Basic experimental studies and evaluation for high energy physics, particle astrophysics, nuclear physics, industrial and medical imaging, as well as development of radiation hard technology, detector simulation, and fast electronics, will be summarized.

MO-A8-4 11h15

The T2K Fine-Grained Detector: design and performances*, **Fabrice Retiere** , *TRIUMF* — The Fine-Grained Detector (FGD) is an element of T2K's near detector. Its purpose is to provide target mass where neutrinos interact and track the particles produced in the interactions. It is constructed from 0.96x0.96x184 cm^3 scintillator bars extruded with a hole down the center and coated by a thin layer of titanium dioxide. A wavelength shifting fiber is inserted in the central hole. One end of the fiber is coupled to a Multi-Pixel Photon Counter (MPPC) and the other end is mirrored. The fast MPPC pulses (< 1 ns rise time, 9 ns fall time) are stretched into slower pulses (120 ns rise time, 240 ns fall time) and sampled at 50 MHz during 10 microseconds by the AFTER ASIC. The 10 microsecond sampling time is chosen to encompass the beam spill plus two muon decay constants, in order to detect Michel electrons from pions stopping in scintillator bars. We report on the performance of the FGD detector elements. Beam test measurements show that minimum ionizing particles produce at least 15 photo-electrons. Despite the slow sampling frequency, a timing resolution better than 3 ns has been achieved for MIPs by fitting the rise time of the pulse, which fulfills the detector requirements.

* This work is being supported by NSERC

MO-A8-5 11h30 (G)

Performance of the prototype module of the GlueX electromagnetic barrel calorimeter*, **B.D. Leverington**[1], G.J. Lolos [1], Z. Papandreou [1], A.R. Dzierba [2], E. Scott [2], M. Shepherd [2], D. Lawrence [3], E. Smith [3], S. Taylor [3], E. Wolin [3], F. Klein [4], [1] *University of Regina*, [2] Indiana University, [3] TJNAF, [4] The Catholic University of America — A photon beam test of the prototype module for the GlueX electromagnetic barrel calorimeter was carried out in Hall B at the Thomas Jefferson National Accelerator Facility with the objective of measuring the energy and timing resolutions of the module as well as the number of photoelectrons. The data were collected in September 2006; the results are $\sigma_{\Delta T} = 74\ ps / \sqrt{E} \oplus 33\ ps$, $\sigma_E / E = 5.54\% / \sqrt{E} \oplus 1.64\%$ and 650-750 photoelectrons at 1 GeV. Details of the beam test and analysis will be shown during the talk with a brief overview of the GlueX experiment.

* This work is being supported by NSERC and the US Department of Energy

MO-A8-6 11h45 (G)

Geant4 Studies of the ATLAS Liquid Argon Forward Calorimeter, **John Paul Archambault**, ATLAS FCal Group, *Carleton University* — The Large Hadron Collider will collide 7 TeV proton beams with the intent of studying the Standard Model of Particle Physics and searching for physics beyond. The Liquid Argon Forward Calorimeter (FCal) of the ATLAS detector is an important component in the studies mentioned above. The FCal contains both electromagnetic and hadronic modules and in 2003, a beam test was conducted to obtain the energy calibration. Using the H6 beam line at CERN, the beam test was performed to investigate the response of the FCal to both electrons and pions in the energy range of (10-200) GeV. A simulation of the beam test was incorporated into the ATLAS software framework to study the beam test data. Results of the Geant4 simulation are compared to the data for the linearity and the resolution of the FCal, over the above mentioned energy range.

MO-A8-7 12h00 (G*)

Using Boosted Decision Trees for Tau Identification in ATLAS*, **Jennifer Godfrey**, Dugan O'Neil, *Simon Fraser University* — The production of Tau leptons at the LHC is a key signature of the decay of both the standard model Higgs (via H-> $\tau\tau$) and SUSY particles. Taus have a short lifetime of $c*\tau = 87\mu m$ and can decay hadronically. Because backgrounds have cross-sections about 1 billion times larger than tau production, multivariate techniques are often used. Boosted Decision Trees (BDTs) have recently gained more attention in HEP. Decision Trees optimize the signal and background separation by combining many simple cuts into a multivariate discriminate while the boosting method creates subsequent trees that concentrate on events that are harder to separate. I am using BDTs to identify hadronically decaying taus in the ATLAS experiment.

* This work is being supported by NSERC

MO-A8-8 12h15 (G)

Parameter Estimation with a Weighted Monte-Carlo Likelihood Fit.*, **David Asgeirsson** , Thomas Mattison , *University of British Columbia* — We present recent work done to develop software for a novel method of parameter estimation. In a standard likelihood or chi-squared fit, the data is compared to an analytical theoretical prediction. For many models, it becomes quite difficult to write an analytic expression for the convolution of the physics model of interest, and the detector response function. This means many researchers may resort to either using numerical convolution with a great reduction in the speed of calculations and the overall fitting process, or they may choose to use a simplified instrument response function using only functions which allow for easy evaluation of the convolution integrals. This second approach can lead to fit biases which hinder precision measurements. We present a novel method for avoiding the problems associated with analytic convolution. First we use high statistics Monte Carlo simulation to generate a template for the data we wish to fit. The Monte Carlo events contain enough truth information to allow our software to reweight the events correctly as we vary the physical parameters in the fit. This allows one to perform an exact fit when the underlying distributions are understood, even if one cannot easily write an analytical convolution of all of the underlying probability density functions. We will briefly present some results based on feasibility studies of measuring the frequency of neutral B meson oscillations with dilepton decays in the BaBar experiment.

* This work is being supported by NSERC

12h30 Session Ends / *Fin de la session*