2007-08 Physics Seminar Abstracts

"Two-minute seminars"

Faculty and postdocs
Carleton University

Location: Herzberg 4351

Date: 2007-09-21
Time: 11:00-12:00
Abstract:
Every year we hold a special seminar to introduce ourselves to any new people in the department. Everyone gets two minutes to describe who they are and what they do. RAs/postdocs and grad students are especially invited!

Each faculty member and postdoc should be prepared to give a two-minute presentation. This year we will try grouping the talks by research area.

Contact Tong Xu to update your slide.

Generation of High Frequency Acoustic Waves by Magnetic Nanoparticles in an AC Magnetic Field -- Application to Hyperthermia

M. K. Sundaresan
Carleton University, Physics

Location 4351 Herzberg Physics

Date: 2007-09-28
Time: 11:00-12:00
Abstract:

A number of people have studied the possibility of heating magnetic nanoparticles suspended in colloidal solutions by applying AC magnetic field to them with application to hyperthermia in mind. A straight forward approach to this problem has been to monitor the progress of hyperthermia by measuring the temperature rise to the desired level. This may take times of the order of twenty minutes or longer. We are interested in finding out if a real time monitoring of this process could be possible. In our work we examine, the magneto-acoustic effect, that is, the generation (and detection) of high frequency acoustic pressure waves resulting from the periodic heat generation by the magnetic nanoparticles in the AC magnetic field. We find that measurements of the acoustic pressure wave amplitude and its frequency distribution using microphones possessing suitable amplitude and frequency response is quite feasible and can provide information as to the effective size of the nanoparticles as well as the size of the region from which the acoustic emissions occur

(i.e., size of tumor). Real time monitoring of the progress of hyperthermia might be possible using this method.

Contact: Dave Rogers

A Fourth Family at the LHC

Bob Holdom
University of Toronto

Location: Herzberg 4351

Date: 2007-10-12
Time: 11:00-12:00

Abstract:
I argue that a fourth family is motivated by its likely connection to electroweak symmetry breaking. I investigate methods to extract signal from background at the LHC, all from the perspective of a theorist playing with event generators and detector simulations for the first time.

Contact: Heather Logan

Physics and Evolution of Genomic Sequences

H.C. Lee
Department of Physics and Graduate Institute of Systems Biology and Bioinformatics,
National Central University Chungli Taiwan ROC and
National Center for Theoretical Sciences Hsinchu Taiwan ROC

Location: Herzberg 4351

Date: 2007-10-16
Time: 13:30-14:30

Abstract:
Genomes are "Books of Life". They code the blueprints of structure and control signals that run the lives of organisms. Genomic sequences, when viewed as texts of four chemical letters, posses many interesting physical properties including scaling, self similarity, order, symmetry and universality, which, separately and together, tell us much about the growth and evolution of genomes.

Contact: Tong Xu

=== OCIP Seminar ===
Nanoscale mechanics: Approaching Quantum Limits

Rob Knobel
Department of Physics, Engineering Physics and Astronomy,
Queen's University

Location: Herzberg 4351

Date: 2007-10-19
Time: 11:00-12:00
Abstract:

Nano-electro-mechanical systems (NEMS) are tiny moving devices made using the fabrication techniques normally used for the semiconductor industry. NEMS devices hold great promise as sensors and filters, but are also a great laboratory for fundamental physics. When cooled to nearly absolute zero, these simple machines will no longer behave classically, but must be described using quantum mechanics. In order to measure this motion we are integrating electronic transducers with unprecedented sensitivity. What does it take to measure this quantum motion? How small a motion can we measure? How does Heisenberg's uncertainty principle limit us? What can these objects tell us about measurement in general? We'll answer some of these questions and pose more in discussing our work at Queen's, and the work of colleagues elsewhere.

Contact: Kevin Graham

Liquid Xenon detector for medical and physics applications

Fabrice Retiere
TRIUMF

Location: Herzberg 4351

Date: 2007-10-23
Time: 13:00-14:00
Abstract:

Gamma rays, charged particles, neutrons, and the elusive wimps can be detected in liquid xenon with very good energy, position, and timing resolution by measuring both scintillation light and ionization charge. We will show that a liquid Xenon time projection chamber is well suited to detect 511 keV photons from positron annihilation. Such technology offer superior performances over the current positron emission tomography detectors. We will describe the liquid xenon micro-PET concept being designed at TRIUMF and show that we achieved the expected energy resolution performances in a small test chamber. We will then show the possible synergies between the PET applications, and physics applications such as dark matter search and double beta decay.

Contact: Kevin Graham

Charged Higgs searches at DZero

Chris Potter
McGill University

Location: Herzberg 4351

Date: 2007-11-02
Time: 11:00-12:00
Abstract:
In the Standard Model of particle physics, electroweak symmetry breaking is explained by a single Higgs doublet field. In many models beyond the Standard Model, at least two Higgs doublet fields are required. The phenomenological signature of two Higgs doublet fields includes the charged Higgs boson H+ (and its charge conjugate H-). In this talk I will describe recent searches for the charged Higgs boson at the DZero experiment.

Contact: Kevin Graham

Searching for Supersymmetry at the LHC

John Ellis
CERN

Location: Herzberg 4351

Date: 2007-11-05
Time: 15:30-16:30
Abstract:
The prospects are discussed for discovering supersymmetry at the LHC, in scenarios in which the lightest supersymmetric particle is either a neutralino or a gravitino. In the former case, details of supersymmetric spectra can be reconstructed using the kinematics of events with missing transverse energy. In the latter case, the next-to-lightest supersymmetric particle may be metastable and can be found with high efficiency in the ATLAS detector, its mass may be measured accurately and heavier states may be reconstructed through their cascade decay chains.

Contact: Heather Logan / Bruce Campbell

Molten Salt Reactors: The 2 Fluid Approach to a Practical Closed Cycle Thorium Reactor

David LeBlanc
Carleton University

Location: Herzberg 4351

Date: 2007-11-09
Time: 11:00-12:00
Abstract:
Molten Salt Reactors were extensively investigated from the 1950s to early 1970s at Oak Ridge National Laboratories. While work since has been limited, the basic design has been chosen as one of 6 reactor designs in the international Generation IV program of advanced reactor development. In Molten Salt designs, uranium, thorium or plutonium fluorides (UF4 etc) are dissolved in a carrier salt that carries heat between a critical core and external heat exchangers. Having two separate salts for the fissile (U233) and fertile (Th) was the main focus for much of the early work at ORNL. Certain problems led to a change to a Single Fluid design of mixed fissile and fertile in the same fluid. The Single fluid design has since dominated proposed Molten Salt Reactors (MSR) since 1968. A brief history of early MSR development at ORNL and efforts since then will be presented. As well, the many advantages of the earlier 2 fluid design and why it was abandoned will be discussed. Finally, a novel but simple modification to the 2 Fluid design will be presented. The result is a very safe and economic power reactor that once started requires only inexpensive thorium to operate and whose wastes contains very low long term radiotoxicity.

Contact: Heather Logan / Tong Xu

High-Precision Mass Measurements with LEBIT at NSCL - From Fast to Thermal Radioactive Ion Beams

Marius Facina
National Superconductiong Cyclotron Laboratory
Michigan State University

Location: Herzberg 4351

Date: 2007-11-15
Time: 11:30-12:30
Abstract:
Rare-isotope production via relativistic-projectile fragmentation and in-flight separation is a powerful technique. No chemistry is involved in this production technique, and decay losses are minimized. These are significant advantages over other rare-isotope production techniques with respect to the number of elements for which isotopes can be produced and the reach from the valley of beta stability. Accurate mass values of isotopes far away from the valley of beta stability are

critical for the study of nuclear shell structure and for the benchmarking of nuclear models. Masses of rare isotopes are also of great importance for nuclear astrophysics for the understanding of the rapid proton-capture and the rapid neutron-capture processes. In addition, masses of specific nuclides measured with very high precision can contribute to tests of fundamental interactions such as test of the Conserved-Vector-Current (CVC) hypothesis. The low-energy beam and ion trap (LEBIT) facility at the coupled cyclotron facility of the National Superconducting Cyclotron Laboratory (NSCL) was the first to demonstrate that projectile-fragmentation beams can be stopped and used for Penning trap mass measurements. In the first two years of operation, high precision mass measurement of about thirty rare isotopes on both sides of the valley of beta stability have been performed. In the following the LEBIT facility is introduced and some of the physics results are presented. The techniques involved in low-energy beam manipulation are discussed and experimental results are compared to theoretical simulations.

Contact: Kevin Graham

Charged Leptons as a Probe of the Standard Model

Mike Roney
University of Victoria

Location: Herzberg 5115

Date: 2007-11-15
Time: 16:00-17:00

Abstract:
The status of experiments using muon and tau leptons to probe the standard model will be presented with a focus on measurements from the B-factories. A recently reported 3sigma deviation between the data and standard model in the Vus determination using tau decays will be discussed.

Contact: Kevin Graham

News from the Collider Detector at Fermilab

Pierre Savard
University of Toronto

Location: Herzberg 4351

Date: 2007-11-16
Time: 11:00-12:00

Abstract:
The Tevatron collider at the Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois collides protons on antiprotons at a centre-of-mass energy of 1.96 TeV, making it the highest energy particle accelerator currently in operation. The upgraded Collider Detector at Fermilab (CDF II) is one of two multi-purpose detectors studying the outcome of these high-energy hadronic collisions. The CDF collaboration has been pursuing a broad and exciting physics program and has now integrated almost 3 inverse femtobarn of data. This talk will present recent results obtained by the CDF collaboration. Emphasis will be given to precision mass measurements, searches for new particles, and the current status of Higgs boson searches.

Contact: Kevin Graham

New results from TWIST: Probing the Weak Interaction with Muon Decay

Art Olin
TRIUMF

Location: Herzberg 4351

Date: 2007-11-20
Time: 13:00-14:00

Abstract:
The Standard Model (SM) makes precise predictions for the parameters that characterize the energy and angle distributions of positrons emitted in the decay of polarized positive muons. For this purely leptonic decay strong interactions contributions are O(10^-7). Variations from the SM predictions can be described by extending the weak interaction structure beyond V-A to include all Lorentz invariant local terms. The goal of the TRIUMF Weak Interaction Symmetry Test (TWIST) is to search for new physics by comparing the SM predictions with measurements of the decay parameters rho, delta, and Pmuxi at the level of a few parts in ten thousand. First results at the level of a few parts in a thousand have already been reported. Newer data have been analyzed with substantially reduced statistical and systematic uncertainties. Data taking has been completed. Further improvements in the analysis are still in progress with analysis of the final data sets to be completed in the next year or so. The experiment will be described, results of the most recent analyses will be presented, and the expectations for the final results will be discussed.

Contact: Kevin Graham

Neutrino Physics, Lepton Flavour Violation, and Collider Measurement of Supersymmetric Particles

David Maybury
Carleton University

Location: Herzberg 4351

Date: 2007-11-23
Time: 11:00-12:00

Abstract:
The seesaw mechanism for generating neutrino mass, combined with the MSSM, leads to a prediction for charged lepton flavour violation close to the current experimental bounds. Future lepton flavour violation experiments combined with measurements of the sparticle spectrum at the LHC will provide further input into reconstructing the seesaw mechanism in minimal supergravity models. In this talk, I will discuss constraints on the supersymmetric seesaw arising from cosmology, unitary, triviality, and hidden sector dynamics in light of upcoming LHC measurements and experiments in progress on charged lepton flavour violation. I will also discuss the implications of hidden sector dynamics for the LHC.

Contact: Heather Logan

Accurate patient dosimetry of kilovoltage cone-beam CT in radiation therapy

George X Ding
Vanderbilt University School of Medicine

Location: Herzberg 4351

Date: 2007-11-29
Time: 15:30-16:30

Abstract:
Image-guided radiation therapy (IGRT) with a kilovoltage x-ray imagers integrated with linear accelerators has dramatically improved the accuracy of radiotherapy but it entails new risks that must be accurately accounted for so that clinicians can manage them intelligently. Frequent use of kilovoltage imaging, especially cone-beam CT (CBCT), for patient setup also adds significantly to the radiation dose to normal tissues. This study investigates the dosimetry from a kilovoltage CBCT for real patient geometries. Monte Carlo simulations are used to study the kV beams from a Varian On-Board Imager (OBI) integrated into the Trilogy accelerator. The Monte Carlo calculated results are benchmarked against measurements and excellent agreement was obtained. A novel method is

developed in order to accurately predict dose in the patient from an imaging procedure that uses x-rays. The results from this study show, from a typical head and neck CBCT acquisition, doses to soft tissues, such as eye, spinal cord and brain can be up to 8, 6 and 5 cGy, respectively. The doses to the bone, due to the photo-electric effect, are more than 3 times higher than that to the soft tissues. The method introduced in this study allows the user to calculate both relative and absolute radiation doses to patients and is capable of calculating exact dose to each organ including the dose to bone marrow from an imaging procedure. The results will give clinicians the information they need to make informed decisions on patient selection and the frequency for each patient.

Contact: Dave Rogers

OCIP Fall Graduate Student Seminar Day

Location: Loeb C164

Date: 2007-12-06
Time: 09:00-12:30
Abstract:
9:00 - Lilie Wang (Carleton U), "Monte Carlo calculation of the replacement correction factor in ion chamber radiation dosimetry"

9:30 - Philippe Marchand (U. of Ottawa), "La formation des nanoparticules de ferrihydrite"

10:00 - Tara Murphy (Carleton U), "Evaluation of treatment planning systems with GAFCHROMIC film for head and neck carcinoma"

10:30 - Break with refreshments

11:00 - Cole Van Vlack (U. of Ottawa), "Time dependent complex scaling: quantum dynamics in strongly perturbed systems"

11:30 - Jared Strydhorst (Carleton U), "Treating breast cancer with TomoTherapy: physics considerations"

12:00 - Jesse Leeson (U. of Ottawa), "Monitoring polarization modulations on OPGW networks"

OCIP 2007 Christmas Symposium

Location: U. of Ottawa, 121 MacDonald Building

Date: 2007-12-12
Time: 09:30-13:00
Abstract:
9:30 - Gerald Oakham, "Working at the energy frontier of particle physics: the LHC and ATLAS"

10:00 - Paul Corkum, "Atto-science"

10:30 - Glenn Wells, "X-ray computed tomography (CT) in nuclear medicine: clarifying "uNclear" imaging"

11:00 - Break with refreshments

11:30 - Albert Stolow, "Ultrafast molecular sciences: from quantum dynamics and control to biophotonics"

12:00 - Hongsheng Hou, "Higgs physics in Standard Model and beyond"

12:30 - Rejean Munger, "Light: a practical tool for non-invasive health assessment"

1:00 - Lunch CBY A707

The Charm Decay Scale at CLEO-c

Peter Onyisi
Cornell

Location: Herzberg 4351

Date: 2007-12-20
Time: 15:30-16:30

Abstract:
Measurements of quantities such as |Vcb| or the Z->c cbar branching fraction, which involve absolute rates of processes involving decays to charm quarks, depend on precise values of "reference" charmed meson branching fractions. I will discuss new measurements of reference branching fractions from the CLEO-c experiment at the Cornell Electron Storage Ring, enabled by the large data sample of charmed meson decays near threshold collected since 2003. These results are limited by very different systematic uncertainties than previous measurements, and in many cases are more precise than previous world averages.

Contact: David Asner

=== OCIP / Undergrad seminar ===
Hot on the trail of particle dark matter

Dan Hooper
Fermilab

Location: 208 Tory Building

Date: 2008-01-22
Time: 13:15-14:15

Abstract:
Over seventy years, the evidence has steadily grown that much of the Universe's mass is non-luminous. Still today, however, we have not identified what makes up this mysteriously dark substance. Many experimental programs that hope to change this are underway, including deep underground detectors, gamma-ray telescopes, neutrino and anti-matter detectors, as well as particle colliders. Each of these efforts are searching for clues of dark matter's identity. With the new technologies needed to observe these particles rapidly developing, the hunt to discover dark matter's identity is well underway.

Contact: Heather Logan

Lattice methods and light-quark hadrons

Randy Lewis
York University

Location: Herzberg 4351

Date: 2008-02-12
Time: 13:15-14:15

Abstract:
Lattice field theory is a computational method that has proven its value in particle physics, through many applications to the strong dynamics of quarks and gluons (QCD), some applications to Higgs physics, and some explorations beyond the Standard Model. A selective overview of lattice field theory results will be presented.

Though QCD has been the primary emphasis of lattice practitioners, notable questions about QCD remain unanswered. For example, how many different types of hadrons (beyond the familiar proton, neutron, and pion) can be built from up quarks, down quarks, and gluons? Aspects of the lattice method will be discussed within the context of this current research topic.

Contact: Heather Logan

OCIP Graduate Symposium -- Spring 2008 (Part 1)

Location: MacDonald 121, University of Ottawa

Date: 2008-02-14
Time: 14:30-17:00
Abstract:
In MacDonald 121:

2:30 - Jeff Wheeldon (Henry Schriemer, supervisor): "Symmetry constraints and the existence of Bloch mode vortices in linear photonic crystals"

3:00 - Khalid Al-Qadi (Zbigniew Stadnik, supervisor): "Quasicrystals: the beauty, the art, the investigation, and the rewards"

3:30 - Break with refreshments

Room to be announced:

4:00 - Daljit Dhaliwal (Cheng Ng, supervisor): "A study on the effects of Tp53 status on the response of human colorectal xenografts to chronomodulated treatments"

4:30 - Christine Kingsburry (Gary Slater, supervisor): "Diffusion of a probe molecule in a multi-phase system and in the presence of vibrating obstacles"

Contact: Steve Godfrey

== Joint Physics / OMPI Seminar ==

Quantifying the effect of off-focal (extra-focal) radiation on the output of x-ray systems
Elsayed Ali (Carleton University)

Quantitative Blood Flow Imaging in the Heart with Rb-82 PET
Robert de Kemp (University of Ottawa Heart Institute)

Location: Herzberg 4351

Date: 2008-02-28
Time: 15:30-17:00
Abstract:
Elsayed Ali (Carleton University), *Quantifying the effect of off-focal (extra-focal) radiation on the output of x-ray systems*

In a typical x-ray tube, off-focal radiation is generated by the backscattered electrons that re-enter the anode outside the focal spot. In this study, the accuracy of EGSnrc in performing backscatter calculations is investigated by comparing the simulation results with experimental measurements from 31 different backscatter experiments. Next, the EGSnrc/BEAMnrc system is modified to be able to simulate off-focal radiation. The modified version is used to study the characteristics of the anode backscattered electrons and to quantify their effect on the output of typical x-ray systems in terms of air kerma, spectral shape, HVL, etc. Comparisons are made between EGSnrc simulation results and experimentally measured off-focal spectra and air kerma ratios. In my talk, I will present a summary of the findings of this study.

Robert de Kemp (University of Ottawa Heart Institute), *Quantitative Blood Flow Imaging in the Heart with Rb-82 PET*

Quantification of myocardial blood flow (MBF) and flow reserve has been used extensively with positron emission tomography (PET) to investigate the functional significance of coronary artery disease. Increasingly, flow quantification is being applied to investigations of microvascular dysfunction in early atherosclerosis and in non-atherosclerotic microvascular disease associated with primary and secondary cardiomyopathies. Fully three-dimensional (3D) acquisition is becoming the standard imaging mode on new equipment; bringing with it certain challenges for cardiac PET, but also the potential for MBF to be measured simultaneously with routine ECG-gated perfusion imaging. Existing 3D vs. 2D comparative studies support the use of 3D cardiac PET for flow quantification, and these protocols can be translated to PET-CT which offers a virtually noise-free attenuation correction. This technology combines the strengths of cardiac CT for evaluation of anatomy, with cardiac PET for quantification of the hemodynamic impact on the myocardium. High-throughput clinical imaging protocols are needed to evaluate the incremental diagnostic and prognostic value of this technology.

Contact: Tong Xu

=== 2008 CAP Lecture ===
How cells measure space and time

Eldon Emberly
Simon Fraser U.

Location: Unicentre 180

Date: 2008-02-29
Time: 10:00-11:00
Abstract:

You don't have to look far to see the sophisticated technology that we have developed to measure space and time, whether it be the complex inner-workings of a watch or the GPS equipped compass that you might use on a backcountry expedition. But what about microorganisms? How is a microorganism, which calculates via biochemical reactions, able to make accurate measurements of time and space? In this talk I will highlight some of the amazing biological circuitry that cells use to

keep time, showing how physical modeling can be used to gain insight into how these clocks function. But cells are also capable of measuring space - it's essential that developing organisms put tissues where they are meant to be. I will discuss how cells measure their spatial location and how they overcome the complications of living in a noisy chemical environment.

Contact: Paul Johns / Heather Logan

Monte Carlo modeling in image-guided radiotherapy

Frank Verhaegen

Medical Physics Unit, McGill University

Location HP 4351

Date: 2008-03-04
Time: 11:00-12:00

Abstract:
In external-beam radiotherapy the trend towards more conformal treatments has necessitated the introduction of image-guidance during treatment fractions. Many imaging modalities are currently being explored such as MV or kV cone-beam imaging, 3D ultrasound imaging, MRI imaging etc. Information extracted from these images can serve to improve radiotherapy by correcting the position of radiation targets, and by providing information which can be used for updating dose calculations. Eventually, these systems may lead to true adaptive radiotherapy. In this seminar a brief overview will be given on some recent work at McGill on Monte Carlo modeling applications in image-guided radiotherapy. We will briefly discuss topics such as dose reconstruction from portal imaging, image quality in CT and cone-beam CT, dual-energy CT, 3D ultrasound imaging. The role of Monte Carlo modeling in radiotherapy and treatment verification imaging will be highlighted.

Contact: Dave Rogers

Indirect search for dark matter with a neutrino telescope

Anna Davour
Queen's University

Location: Herzberg 4351

Date: 2008-03-11
Time: 13:15-14:15
Abstract:
The attempts to detect the dark matter of the universe are usually classified in two categories: direct and indirect detection. Direct detection would be to get evidence of the interaction of dark matter particles with the detector material, while indirect detection attempts to collect the annihilation products of the dark matter particles. I will discuss indirect dark matter searches in general, and mention some examples of detection techniques in use. I will then continue with describing how neutrino telescopes are used in the search for dark matter, and illustrate with some results from the AMANDA neutrino telescope at the South Pole.

Contact: Alain Bellerive

OCIP Graduate Symposium -- Spring 2008 (Part 2)

Location: Room 118 Leeds House (residence), Carleton U.

Date: 2008-03-27
Time: 10:00-12:30
Abstract:
10:00 - Jennifer Renaud (Carleton U.), *Myocardial blood flow and coronary flow reserve with Rb-82 PET imaging*

10:30 - Pu Wang (U. Ottawa), *The physical properties of novel alloys*

11:00 - Break with refreshments

11:30 - Marc Lamoureux (Carleton U.), *Quantification of myocardial blood flow in rat myocardium with N-13-ammonia and the Inveon microPET system*

12:00 - Christopher Smeenk (U. Ottawa), *Ionization of noble gases by femtosecond lasers*

Contact: Steve Godfrey

Collider physics at HERA

John Martin
University of Toronto

Location: Herzberg 4351

Date: 2008-04-15
Time: 10:30-11:30
Abstract:
The HERA ep collider at DESY finished operations last summer. This talk will review some of the history of the project and summarize the highlights and impact of the physics results.

Contact: Kevin Graham

Study of Low-Energy Nuclear Recoils for Direct Detection of Dark Matter

Christina Hagemann
University of New Mexico

Location: Herzberg 5115 (Computer Science Conference Room)

Date: 2008-04-23
Time: 10:30-11:30
Abstract:
I will briefly describe the nature of the directionality signature from dark matter particles passing through the solar system, and motivate the importance of detecting this signal. I also show how this directional signal can be measured in our detectors, which use low-pressure gas as the target material. Just how well the directionality can be measured is limited by detector resolutions and by uncertainties in our knowledge of the energy-loss of low energy nuclear recoils resulting from WIMP interactions. I will describe in detail preliminary results from our ongoing R&D, whose goal is to ultimately address both of these issues.

Contact: Kevin Graham

OCIP Graduate Symposium -- Spring 2008 (Part 3)

Location: Room 146 MacDonald Building, University of Ottawa

Date: 2008-04-29
Time: 14:00-17:00
Abstract:
2:00 - Michel Lalonde (Carleton U.), *Can phase analysis of SPECT blood pool imaging diagnose medical dyssynchrony?*

2:30 - Ziyi Zhang (U. Ottawa), *Distributed optical fiber vibration sensor: development and applications*

3:00 - Lindsay Beaton (U. Ottawa), *Design of a simple alpha radiation exposure system for irradiation of adherent cell lines*

3:30 - Break with refreshments

4:00 - John Paul Archambault (Carleton U.), *Searches for supersymmetry with the ATLAS detector*

4:30 - Saeed Almarzoug (U. Ottawa), *Application of Luus-Jaakola optimization method to the design of optical coatings*

Contact: Steve Godfrey

OCIP Graduate Symposium -- Spring 2008 (Part 4)

Location: Room 238 Tory Building, Carleton University

Date: 2008-05-22
Time: 13:30-17:00
Abstract:
1:30 - Sasha Chigodaev (Carleton U.), *The Fat Higgs model at the LHC*

2:00 - Jakub Cieniak (U. Ottawa), *Synchronization and stimulus coding of neurons*

2:30 - Dmitriy Tseliakhovich (Carleton U.), *Dark matter in the Little Higgs models*

3:00 - Break with refreshments

3:30 - Herve Guy (Carleton U.), *Landau states and astrophysical jets*

4:00 - Jeff Snoddy (U. Ottawa), *The distributed Brillouin sensor: EOM bias stabilization and sensing of vibration frequencies*

4:30 - Ahmed Ismail (Carleton U.), *Search for new physics beyond the electroweak Standard Model*

Contact: Heather Logan

Improving Radiotherapy Outcome through modelling Tumour (local) Control Probability (TCP)

Alan E Nahum
Physics Department, Clatterbridge Centre for Oncology, Liverpool, UK

Date: 2008-06-06
Time: 15:00-16:00

Abstract:
In this talk I want to examine the ways in which TCP models can be actively used to change/improve clinical outcome in external-beam radiotherapy. I will go through these, roughly in order of increasing sophistication.

Location: HP4351

Contact: Dave Rogers

Improving the spatial resolution and sensitivity of small animal PET scanners

Sara St. James
University of California, Davis

Location: Herzberg 4351

Date: 2008-07-24
Time: 14:30-15:30

Abstract:
PART 1: Characterization of Depth of Interaction PET Detectors Using 0.5 mm and 0.7 mm LSO Arrays.

By employing depth of interaction (DOI) detectors in small animal PET scanners, the efficiency of such scanners may be improved and the spatial resolution across the field of view is more uniform than in small animal PET scanners that use traditional PET detectors. In addition, PET detectors that have DOI capability and smaller crystal elements will improve the spatial resolution of future small

animal PET scanners. In this study we characterize four depth of interaction PET detectors that use very finely pixelated LSO crystals.

PART 2: Simulation of Spatial Resolution and Sensitivity for Tapered PET Detectors for Small Animal Imaging

Improvements to current small animal PET scanners can be made by increasing the sensitivity and the spatial resolution of the scanner. We have designed tapered scintillator arrays with the goal of optimizing the sensitivity of a future generation small animal PET scanner. For tapered detectors more scintillation material is used per detector resulting in a higher sensitivity of the scanner. However, degradation in spatial resolution is also expected with the tapered arrays. In this work we investigate spatial resolution and sensitivity of a scanner based on tapered detector elements using Monte Carlo simulations.

Contact: Tong Xu

Resonances and unitarity in weak-boson scattering at the LHC

Juergen Reuter
U. Freiburg

Location: Herzberg 4351

Date: 2008-08-18
Time: 15:30-16:30

Abstract:
A crucial test of the Standard Model is the measurement of electroweak gauge-boson scattering. In this talk, I will describe a generic parameterization aimed at a realistic simulation of weak-boson scattering at the LHC. The parameterization implements resonances of all possible spin and isospin combinations, properly matched to the low-energy effective (chiral) Lagrangian, includes leading higher-order effects and contains a minimal unitarization scheme. The goal is to describe the first visible resonance at the LHC in a model-independent way, and use as little assumptions as necessary. The structure of the amplitudes is discussed, partonically as well as for an LHC environment. Full matrix elements for that approach will be compared to the effective W approximation that previously has been used for most WW scattering studies at hadron colliders.

Contact: Heather Logan