

Ottawa Medical Physics Institute (OMPI)

*A Carleton University Research Centre
based in the Department of Physics,
Carleton University, Ottawa, Canada*

www.physics.carleton.ca/ompi

Annual Report # 21
2008 July 1 – 2009 June 30

Submitted by Malcolm McEwen, PhD, OMPI Director.

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Introduction

Medical physicists are applied scientists who use the tools of physics to improve health care. Although physicists can be found involved in almost all aspects of health care, medical physics as a practice usually refers to three areas: cancer therapy, medical biophysics, and imaging. Over the years medical physicists have developed such revolutionary technologies as photon and electron cancer treatment machines, and CT, PET, and MR imagers. It is difficult to imagine modern medicine without these technologies and it is indisputable that medical physics has brought large improvements to patient care.

The Ottawa Medical Physics Institute (OMPI), founded in 1989, is based in the Department of Physics of Carleton University in Canada's capital city, Ottawa. It is a network of approximately 30 medical physicists in the Ottawa region who are active in research, teaching and graduate student education. The Ottawa medical physics community has one of the most diverse spectra of research and service activities in Canada. Our members are located at The Ottawa Hospital and Cancer Centre, the University of Ottawa Heart Institute, Health Canada, the National Research Council of Canada (NRC), Atomic Energy of Canada Limited (AECL) Chalk River Laboratories, and Nucletron Canada, as well as at Carleton University. One of the prime activities of OMPI members is to coordinate and deliver the MSc and PhD programs in medical physics within the Physics Department at Carleton University. This Annual Report summarizes our activities during the 2008-2009 academic year.

Membership

Table 1 summarizes our membership, which at year's end numbers 32, and Table 2 lists the Executive of the organisation. Our members' activities span the field of medical physics, including cancer therapy physics (17 members), imaging (8), and radiobiology and health physics (6). Complete profiles are given on the website. Another three new members were welcomed into OMPI this year:

Rowan Thomson is a post-doctoral fellow working in the Carleton Laboratory for Radiotherapy Physics. She is a theoretical physicist by training and has been applying her skills to Monte Carlo simulations of ophthalmic brachytherapy sources. Rowan completed her undergraduate physics degree at Carleton.

Claudiu Cojocaru is a Research Associate in the Ionizing Radiation Standards Group at NRC. He is another Carleton graduate, having obtained his PhD in particle physics under the supervision of Manuella Vincter. Claudiu has

been involved in experimental and theoretical investigations related to benchmarking of Monte Carlo radiation transport codes using the unique linear accelerator facilities at the NRC.

Costel Fleuraru is also from NRC, but working in a very different field. Based in the Institute for Microstructural Sciences he has been developing Optical Coherence Tomography, which offers a non-invasive method for characterizing the upper layers of the skin. This imaging modality complements the other modalities already part of the OMPI research effort – x rays, MRI, PET and SPECT.

Graduate Program

This academic year, Bog Jarosz gave our foundation course, *Medical Radiation Physics*, in the fall term and Julia Wallace co-ordinated the *Medical Physics Practicum*, which involves students carrying out a number of mini-projects. Many OMPI members are involved in this course so that students can carry out a wide range of activities from optimizing IMRT treatment plans to measuring radiation-induced chromosomal damage. In the winter term, *Medical Radiotherapy Physics* was taught by David Rogers and *Radiobiology* by Ruth Wilkins and Cheng Ng. Thank you to all those who taught in our program, especially those from outside Carleton who made the time available to benefit our students.

Table 3 lists the graduate students in the program, and Table 4 the graduate theses (seven M.Sc. plus one Ph.D.) completed in 2008-2009. Lindsay Beaton, Michel Lalonde, and Jared Strydhorst have continued onto PhD's within the Carleton Physics Department. Tara Wood is studying for a PhD in Nuclear Engineering at the Royal Military College, Kingston. Jennifer Renaud is working at the University of Ottawa Heart Institute and Marc Lamoureux is at The Ottawa Hospital with the Radiation Safety and Health Physics Department. Daljit Dhaliwal has entered the teaching profession. Lilie Wang obtained a Post-Doctoral position at the prestigious M D Anderson Cancer Center in Houston, TX. Congratulations to all of our graduates!

Seminars

The monthly OMPI seminars (Table 5) continue to be well attended. Students are expected to give regular presentations during their program (at least once for M.Sc. students, 2 or 3 times for Ph.D.'s). This is excellent practice for both conference presentations and career development. Members give seminars on a rolling schedule, typically every three years or so. Thank you to all speakers and

attendees.

Table 6 lists the 2008-2009 medical physics component of the regular weekly seminar series of the Carleton University Department of Physics.

OMPI News and Events

CAMPEP Accreditation

The Commission on Accreditation of Medical Physics Educational Programs is the organization in North America that oversees medical physics education programs – both university-based graduate programs and hospital-based residencies. CAMPEP accreditation is a clear statement that the program in question provides the necessary training that medical physicists will need to practice in the clinical environment. Carleton University has begun the accreditation process and in April 2009 the CAMPEP site visit team came to Ottawa. The report of this visit was favourable and we anticipate accreditation of the program shortly (*update: accreditation approved November 2009*).

External teaching activities

In March 2009 **Richard Richardson** was part of the organizing committee for the first Canadian workshop on Emergency Preparedness (for radiological events) for Vulnerable Population Groups, held in Ottawa.

In May, **David Rogers** gave a series of lectures at a conference in Rome on "Il Metodo Monte Carlo Nella Fisica Medica" sponsored by the Associazione Italiana Fisica Medica (AIFM).

In June 2009 the American Association of Physicists in Medicine held a very successful summer school on Reference Dosimetry. Much of this success can be attributed to the huge amount of work put in by the course Directors, one of our OMPI husband-and-wife teams: **David Rogers** and **Joanna Cygler**. The result of this was that 400+ medical physicists from the US and around the world attended lectures from renowned experts in radiotherapy dosimetry and, perhaps more importantly, the proceedings were turned into an excellent textbook on the subject that will be useful to students and working medical physicists alike. David and Joanna deserve all our congratulations for their efforts in this endeavour.

Several of our OMPI members – **Brenda Clark**, **Ian Cameron**, **David Wilkins** and **Elizabeth Henderson** – were involved as examiners for the CCPM (Canadian College of Physicists in Medicine). Membership of the CCPM is the professional certification for clinical medical physics in Canada.

People

In April 2009, **Elsayed Ali** was awarded one of the inaugural Vanier Scholarships at a ceremony at the Chateau Laurier involving Gary Goodyear, Minister of State for Science, and the heads of Canada's three granting councils. In receiving this prestigious award Ali stated, "Canadians are known for being friendly, inclusive and multi-cultural. I want to take this opportunity to thank Canada, and in particular Carleton University, for making me feel at home. Within the Physics Department at Carleton University, there is a great sense of community and a great deal of collaboration, idea-sharing and support."

At the end of June, **Boguslaw Jarosz** retired from Carleton after 26 years in the Physics Department. Bog was the second faculty member in Physics to be involved in medical physics, and his history goes back to national capital medical physics collaborations that predate MPORU (which was the initial name for OMPI). His service to OMPI has included the role of seminar organizer, serving as Academic Officer, and teaching the graduate students. Of special note, the Medical Physics Practicum course was first configured and coordinated by Bog Jarosz. In addition to his graduate students, Bog supervised many Honours students. He taught extensively in Carleton's undergraduate programs, and served as Associate Chair (Undergraduate) of Physics. In another sort of classroom, he taught other faculty a thing or two about serious squash!

A reception was held June 2009 to wish Bog well. In addition to congratulations from his physicist colleagues, reps from IEEE EMBS, which Bog supported energetically, offered that organization's best wishes. One of his gifts – a wineglass curiously made in the geometry of an ultrasound transducer and interstitial waveguide applicator – was carefully dimensioned as per Bog's emphasis on the rigorous statement of measurement uncertainty. We hope that Bog will continue his involvement in OMPI, including asking his perceptive questions at seminars.

The Ionizing Radiation Standards Group at NRC welcomed **Dr Gerhard Stucki** as a visiting working from the Swiss metrology institute METAS. Dr Stucki will be at NRC for approximately 9 months and his expertise in the use of chemical dosimeters will greatly aid the development of new measurement standards for electron beam radiotherapy.

National and International Activities

During the past academic year many OMPI members served on various national and international committees. A small selection is listed below:

Vice President, CCPM (Canadian College of Physicists in Medicine) – **David Wilkins**

AAPM Working Group on Updates to the TG-51 dosimetry protocol – **Malcolm McEwen** (Chair), **David Rogers**

ICRU (International Commission on Radiation Units) report committee on “Key data for measurement standards in the dosimetry of ionizing radiation” – **Carl Ross**

Editorial Advisory Board, *Physics in Medicine and Biology* – **Carl Ross**, **Ken Shortt**, **David Rogers**

CAMPEP (Commission on Accreditation of Medical Physics Educational Programs) Graduate Education Program Review Committee – **Brenda Clark**

Editorial Board and Deputy Editor (radiotherapy) of *Medical Physics* – **David Rogers**

IEC (International Electrotechnical Commission) Sub-committee 62C (Equipment for Radiotherapy, Nuclear Medicine and Radiation Dosimetry) – **Lee Gerig**

IAEA EMRAS II (Environmental Modeling for RAdiation Safety) working group 1 – harmonization of controlled discharges – **Trevor Stocki** (chair).

International Commission on Radiological Protection (ICRP) DOCAL (DOse CALculation) Task Group – **Richard Richardson**

COMP Annual Scientific Meeting

The annual scientific meeting of the Canadian Organization of Medical Physicists will take place in Ottawa in June 2010. OMPI took the lead role in 2006 in originally bidding for the conference to come to Ottawa. In 2009 we formed the local arrangements committee. A suitable venue has been identified and there is every indication that this will be a very successful conference.

Inaugural Awarding of the Clarke Scholarship

A highlight of the year was the inaugural awarding of the **Robert L. Clarke Graduate Scholarship in Medical Physics**. The first award was given to **Chad Hunter**, who commenced the M.Sc. program in September. A ceremony and reception were held on February 13 2009. We were especially pleased that many of the next two generations of the Clarke family were able to attend. Speakers included representatives from the Carleton Physics Department, OMPI, and the Clarke family.

Since the launch of the scholarship funding drive on November 5 2004 – at the R. L. Clarke Symposium in Celebration of 15 Years of the Ottawa Medical Physics Institute – the endowment has been built through the generosity of the colleagues, family, and friends of Bob Clarke at the University, in the medical physics community, and

elsewhere. All donated funds were matched one-for-one by Carleton. Bob was pleased and honoured to have the scholarship named after him, as was his wife Vera. It was fortunate indeed that we launched the scholarship endowment drive when we did. For the first year of the fundraising Bob had the satisfaction of being involved and personally thanked all the donors. In December 2005, Bob passed away, and his wife Vera passed on in 2007.

Our thanks once again to all the donors who helped make the scholarship a reality, and congratulations to Chad!

New Logo

Thanks to **Tong Xu** at Carleton University, OMPI now has a smart new logo! The design reflects the various aspects of research represented within the OMPI membership:



1. The “O” denotes imaging with the colours reminiscent of a PET or SPECT intensity scan.
2. A DNA helix is incorporated into the “M” to represent radiobiology.
3. The “P” and “I” represent a clinical linear accelerator gantry and patient table respectively. Linacs are the primary method by which radiotherapy treatments are delivered.

OMPI Executive

I would like to thank the following for serving on the Executive in 2008-2009: David Rogers (Academic Officer), Rob deKemp (Past-Director), and Richard Wassenaar (Secretary). I’d like to thank Tong Xu for continuing to organize excellent seminars. Thanks, finally, to Elsayed Ali for representing the students, and to our observers, Brenda Clark (TOHCC) and Trevor Stocki (Health Canada).

OMPI Website

The OMPI maintains a website with detailed information on the organization, its members, students and alumni, seminars and research areas. The website is currently being thoroughly revised. Please visit

www.physics.carleton.ca/ompi.

Table 1. OMPI Members, 2008-2009.For details see <http://www.physics.carleton.ca/ompj> and select Members/Students.

| | Member | Institution and Unit | Specialization within Medical Physics |
|----|--------------------------|---|--|
| 1 | Lesley Buckley | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 2 | Ian Cameron | Diagnostic Imaging, The Ottawa Hospital | MRI |
| 3 | Brenda Clark | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 4 | Claudiu Cojocaru | Ionizing Radiation Standards, Institute for National Measurement Standards, NRC | Radiotherapy and radiation dosimetry |
| 5 | Joanna Cygler | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 6 | Rob deKemp | Cardiac PET Centre, University of Ottawa Heart Institute | PET |
| 7 | Madhu Dixit [§] | Department of Physics, Carleton University | Detectors for ionizing radiation |
| 8 | Costel Fleuraru | Institute for Microstructural Sciences, NRC | Optical coherence tomography |
| 9 | Lee Gerig | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 10 | Elizabeth Henderson | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 11 | Bog Jarosz | Department of Physics, Carleton University | Ultrasound thermal therapy |
| 12 | Paul Johns | Department of Physics, Carleton University | X-ray imaging |
| 13 | Iwan Kawrakow | Ionizing Radiation Standards, Institute for National Measurement Standards, NRC | Radiotherapy and radiation dosimetry |
| 14 | Malcolm McEwen | Ionizing Radiation Standards, Institute for National Measurement Standards, NRC | Radiation dosimetry |
| 15 | Cheng Ng | Retired from Ottawa Hospital Research Institute | Radiobiology and hyperthermia |
| 16 | Balazs Nyiri | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 17 | G. Peter Raaphorst | Retired from The Ottawa Hospital Cancer Centre; Consultant medical physicist. | Radiobiology and hyperthermia |
| 18 | Richard Richardson | Radiation Biology & Health Physics, Chalk River Laboratories, AECL | Radiation physics and radiation protection |
| 19 | David Rogers | Department of Physics, Carleton University | Radiotherapy and radiation dosimetry |
| 20 | Carl Ross | Ionizing Radiation Standards, Institute for National Measurement Standards, NRC | Radiation dosimetry |
| 21 | Ken Shortt | Ionizing Radiation Standards, Institute for National Measurement Standards, NRC | Radiation dosimetry |
| 22 | Trevor Stocki | Radiation Protection Bureau, Health Canada | Health Physics |
| 23 | Jason (Jiansheng) Sun | Therapy Systems, Nucletron Canada | Radiation treatment planning |
| 24 | Janos Szanto | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 25 | Rowan Thomson | Department of Physics, Carleton University | Radiotherapy and radiation dosimetry |
| 26 | Tony Waker | Faculty of Energy Systems & Nuclear Science, University of the Ontario Institute of Technology | Radiation physics and radiation protection |
| 27 | Julia Wallace | Department of Physics, Carleton University | MRI |
| 28 | Richard Wassenaar | Division of Nuclear Medicine, The Ottawa Hospital | Nuclear medicine imaging |
| 29 | Glenn Wells | University of Ottawa Heart Institute | Nuclear cardiology |
| 30 | David Wilkins | Department of Medical Physics, The Ottawa Hospital Cancer Centre | Radiotherapy |
| 31 | Ruth Wilkins | Consumer & Clinical Radiation Protection Bureau, Health Canada | Radiobiology |
| 32 | Tong Xu | Department of Physics, Carleton University | Positron emission tracking (PeTrack) |

[§]Associate Member

Table 2. OMPI Executive, 2008-2009.

| Position | Member | Position | Member |
|-------------------------------|-------------------|-------------------------------------|---------------|
| Director [§] | Malcolm McEwen | Student Representative [†] | Elsayed Ali |
| Past-Director [§] | Rob deKemp | Seminar Organizer | Tong Xu |
| Academic Officer [§] | David Rogers | Observer – TOHCC | Brenda Clark |
| Secretary [§] | Richard Wassenaar | Observer – Health Canada | Trevor Stocki |

[§]position elected by the members[†]position elected by the medical physics graduate students**Table 3. Graduate Students in Medical Physics, 2008-2009.**

For details see <http://www.physics.carleton.ca/ompi> and select Members/Students. A list of Past Graduates is also available.

| | Student | Program | Supervisor | Project Area |
|----|--------------------------------|--------------------|---------------------------------|---|
| 1 | Elsayed Ali | Ph.D. | Dave Rogers | Linac spectral measurements |
| 2 | Patrick Assouad | M.Sc. | John Armitage | FTIR instrumentation for cancer detection |
| 3 | Lindsay Beaton | M.Sc./PhD | Ruth Wilkins | Novel biological dosimeters [PhD starting Jan 2009] |
| 4 | Jason Belec | Ph.D. | Brenda Clark | Elekta radiotherapy |
| 5 | Marc Chamberland | M.Sc. | Tong Xu | PeTrack algorithm development |
| 6 | Amanda Cherpak | Ph.D. | Joanna Cygler | Radiation dosimetry applications of MOSFETs |
| 7 | Daljit Dhaliwal | M.Sc. [¶] | Cheng Ng | Chronomodulated cancer treatment |
| 8 | Tyler Dumouchel | Ph.D. | Rob deKemp | Small-animal PET |
| 9 | Claire Foottit | Ph.D. | Ian Cameron | Bolus-tracking MR perfusion imaging |
| 10 | Lourdes Maria Garcia-Fernández | Ph.D. | Peter Raaphorst & David Wilkins | Radiobiological model development and verification |
| 11 | Elena Gil | M.Sc. | Joanna Cygler | Effect of dose to medium vs dose to water in radiation therapy |
| 12 | Chad Hunter | M.Sc. | Rob deKemp | ⁸² Rb PET effective dose determined from patient images |
| 13 | Brian King | Ph.D. | Paul Johns | X-ray scatter imaging: measurement of cross sections |
| 14 | Michel Lalonde | M.Sc./PhD | Richard Wassenaar | Nuclear med.: cardiac dyssynchrony. [PhD started Sept 2008] |
| 15 | Marc Lamoureux | M.Sc. [¶] | Rob deKemp | ¹³ N-ammonia small animal PET imaging |
| 16 | Dan La Russa | Ph.D. | Dave Rogers | Accuracy of Spencer-Attix cavity theory |
| 17 | Ernesto Mainegra-Hing | Ph.D. | Iwan Kawrakow | MC corrections for x-ray standards |
| 18 | Bryan Muir | M.Sc. | Dave Rogers | rad. dosimetry: calculating beam quality conversion factor k _Q |
| 19 | Tara Wood (Murphy) | M.Sc. [¶] | Joanna Cygler | Experimental verification of radiotherapy dose calculations |
| 20 | Munira Fardous-Nahin | M.Sc. | Glenn Wells | ²⁰¹ Tl small animal SPECT reproducibility |
| 21 | Elena Olariu | Ph.D. | Ian Cameron | MR tractography of white matter |
| 22 | Elizabeth Orton | Ph.D. | Brenda Clark | lung tumour delineation using PET |
| 23 | Amir Pourmoghaddas | M.Sc. | Glenn Wells | cardiac PET respiratory motion correction |
| 24 | Jennifer Renaud | M.Sc. [¶] | Rob deKemp | PET with ⁸² Rb for myocardial blood flow and reserve |
| 25 | Mojgan Soleimani | M.Sc. | Tong Xu | PeTrack detector development |
| 26 | Jared Stryhorst | M.Sc./PhD | Brenda Clark | Tomotherapy [PhD starting Sept 2008, supervisor Glenn Wells] |
| 27 | Justin Sutherland | Ph.D. | Dave Rogers | MC dose calculations for brachytherapy |
| 28 | Sorina Truica | Ph.D. | Ian Cameron | Diffusion-weighted mri: blood flow abdominal microvasculature |
| 29 | Lilie Wang | Ph.D. [¶] | Dave Rogers | Radiation dosimetry correction factors via Monte Carlo |

[¶]Final degree completed between 2008 July 1 and 2009 June 30; see Table 4.

Table 4. Theses Completed, 2008-2009. Ordered by date of defence.

| Student | Degree | Supervisor | Thesis Title and Date of Defence |
|-----------------------|---------|--------------------|---|
| Daljit Dhaliwal | M.Sc. | Ng | The response of human colorectal xenografts with abnormal Tp53 status to chronomodulated Topotecan and X-radiation treatments Aug 29, 2008 |
| Michel Lalonde | M.Sc. | deKemp / Wassenaar | Development and validation of SPECT radionuclide angiography phase analysis techniques for quantification of dyssynchrony Sept 2, 2008 |
| Jennifer Renaud | M.Sc. * | deKemp | Quantification of myocardial blood flow and flow reserve with Rubidium-82 positron emission tomography imaging Sept 3, 2008 |
| Jared Strydhorst | M.Sc. | Clark | Breast cancer Tomotherapy: The impact of intrafraction motion and shallow depth dose profiles on the choice of PTV depth Sept 4, 2008 |
| Marc Lamoureux | M.Sc. | deKemp | Quantification of myocardial blood flow in small animals with ¹³ N-ammonia microPET imaging Sept 5, 2008 |
| Tara Wood (Murphy) | M.Sc. | Cyglar | Evaluation of dose calculation accuracy for laryngeal cancer radiation therapy treatment plans Jan 6, 2009 |
| Lindsay Beaton | M.Sc. | R Wilkins | Development and characterization of an <i>in vitro</i> alpha radiation exposure system for the purpose of cell culture Jan 7, 2009 |
| Lilie Wang | Ph.D. | Rogers | Study of the replacement correction factors for ionization chamber dosimetry by Monte Carlo simulations Apr 2, 2009 External Examiner: Jan Seuntjens, McGill University |

* with Distinction

Table 5. OMPI Seminars, 2008-2009.For details see <http://www.physics.carleton.ca/ompi/news/seminars/archives>.

| Date / Location | Speakers and Titles |
|---|---|
| Sept 18, 2008 Carleton University | Elena Olariu: Analysis of MR diffusion-weighted data of human brain Rowan Thomson: Monte Carlo dosimetry for I-125 and Pd-103 eye plaque brachytherapy |
| Oct 16, 2008 Health Canada | Lindsay Beaton: Development and characterization of an <i>in vitro</i> alpha radiation exposure system for the purpose of cell culture Malcolm McEwen: Looking good or feeling its age? Reference dosimetry a decade after TG-51 |
| Nov 20, 2008 The Ottawa Hospital, General Campus | Daniel LaRussa: Ion chamber response in air at Co-60 energies Ken Shortt and Dave Wilkins: IAEA activities in dosimetry and medical radiation physics |
| Dec 18, 2008 The Ottawa Hospital, Civic Campus | Brian King: Energy dispersive measurements of x-ray coherent scattering form factors Claudiu Cojocaru: Lateral distributions of bremsstrahlung from thick targets for Monte Carlo code benchmarking |
| Jan 15, 2009 Carleton University | Costel Fluerau: Optical Coherence Tomography: A novel medical imaging modality |
| Feb 13, 2009 Carleton University | Elena Gil: Analysis of dosimetric differences between dose-to-water versus dose-to-medium calculations for electron beams Iwan Kawrakow: egsPET: A fast Monte Carlo simulation engine for PET Presentation of the first Robert L. Clarke Graduate Scholarship in Medical Physics. |
| March 26, 2009 Health Canada | Marc Chamberland: Experimental and simulation results of PeTrack: positron emission marker based real-time tumour tracking Peter Raaphorst: The medical physicist role in bone mineral density program accreditation |

| | |
|---|---|
| April 23, 2009 The Ottawa Hospital, General Campus | Amanda Cherpak: Dose-position verification using the RADPOS system in a deformable phantom Joanna Cygler: 4D radiation therapy |
| May 14, 2009 NRC/IRS | Mojgan Soleimani: Detector development for positron emission based tumour tracking (PeTrack) Amir Pourmoghaddas: Respiratory motion correction in cardiac PET/CT Mark Xu (McGill University): Investigation of 2-D dosimeters for the accurate measurement of lateral dose distributions Followed by the Annual BBQ. |

Table 6. Carleton University Department of Physics Seminars in Medical Physics, 2008-2009.

Departmental seminars on medical physics topics. For a complete list, see

http://ical.physics.carleton.ca/calendars/seminars/Current_Seminars/abstract_index.php.

| Date | Speaker, Institution, and Title |
|---|--|
| July 24, 2008 | Sara St. James, University of California at Davis Improving the spatial resolution and sensitivity of small animal PET scanners |
| Nov 27, 2008 OCIP Fall Graduate Student Seminars I | Dan LaRussa The effect of cavity size and wall material on ion chamber response to Co-60 photon beams Elena Olariu Analysis of the diffusion attenuated magnetic resonance signal in white matter using a hydration layer model |
| Dec 9, 2008 OCIP Christmas Symposium | Richard Wassenaar, The Ottawa Hospital Quantifying cardiac contraction abnormalities using SPECT Rowan Thomson, Carleton University Monte Carlo dosimetry for eye plaque brachytherapy |
| Dec 12, 2008 OCIP Fall Graduate Student Seminars II | Sorina Truica Non-contrast perfusion measurements in abdominal MR imaging Brian King Methods for measuring x-ray coherent scattering form factors of tissues |
| Jan 20, 2009 | Jim Green, Carleton University, Systems & Computer Engineering Towards real-time protein identification using the Cell BE processor |
| Feb 24, 2009 | Andy Adler, Carleton University, Systems & Computer Engineering Imaging with impedance |
| Feb 27, 2009 | Dean Chapman, Canadian Light Source and Dept. Anatomy & Cell Biol., Univ. of Saskatchewan New sources of x-ray imaging contrast |
| March 3, 2009 | Trevor Stocki, Health Canada Atmospheric radionuclide monitoring at Health Canada for the Comprehensive Nuclear-Test-Ban Treaty and the well being of Canadians |
| May 5, 2009 OCIP Spring Graduate Student Seminars I | Mojgan Soleimani-Marghmaleki PeTrack Marc Chamberland Experimental and simulation results of PeTrack: Positron-emission marker based real-time tumour tracking Maria Lourdes Garcia Fernández Radiobiological modeling of a proposed dose escalation in TMI |
| May 21, 2009 OCIP Spring Graduate Student Seminars II | Elena Gil Analysis of dosimetric differences between dose-to-water versus dose-to-medium calculations for electron beams Amir Pourmoghaddas Respiratory motion correction in cardiac PET imaging |