

# Ottawa Carleton Institute for Physics

## L'Institut de physique d'Ottawa Carleton

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### **2001 Newsletter**

The year 2001 saw continued activity of the 57 members of the Institute in a wide variety of areas: research, teaching, and service to the community. The total number of graduate students increased to 74 during the year. Of these, 11 completed their M.Sc. degree requirements, and 4 Ph.D. degrees were awarded.

During the year Dean Karlen stepped down as Director, with Richard Hodgson taking over that role. Gerald Oakham became the Associate Director. Dean began a 3 year term on the NSERC subatomic physics grant selection committee.

An exciting development in the area of research was the publication of the first results from SNO. This was one of the highlights at the CAP Congress in Victoria, and was also published as "Measurement of charged current interactions produced by 8B solar neutrinos at the Sudbury Neutrino Observatory", Journal: Phys. Rev. Lett. **87**:071301, 2001.

Alain Bellerive joined the Carleton group, accepting a CRC chair starting in July. The SNO project benefits from his work, as well as OPAL. At the Ottawa campus, Rejean Munger and Sylvain Raymond became the newest Adjuncts. Rejean works out of the Eye Institute at the Ottawa Hospital, and Sylvain is at the Institute for Microstructural Sciences at NRC.

Andre Longtin and Ivan L'heureux were the guest editors for the special issue of Physics in Canada on Nonlinear Dynamics (March/April 2001).

Béla Joós became the Vice-President Elect of the CAP in June, and Richard Hodgson continued as the Secretary-Treasurer. Marie D'Iorio completed her term as Past President of the CAP in June.

Xiaoyi Bao was the recipient of one of the Ontario Premiers Research Excellence Awards (PREA) announced in November.

Pat Kalymiak served as Co-chair of the Reallocations Steering Committee for Subatomic Physics (GSC 19). Gilles Santyr was awarded the Dean's Teaching Achievement Award and the University Research Achievement Award at Carleton.

A sampling of how members of the Institute provided service to their community also included the following:

Pavel Hawrylak became an Associate, Canadian Institute for Advanced Research, Nanoelectronics Program and also served as a Member of the International Program Committee for the International Conference on Electronic Properties of Two-dimensional Electronic Systems, Prague, 2001.

Marie D'lorio served as Member of the Editorial Advisory Board, Canadian Journal of Physics; Member of the Optoelectronics Advisory Group, Canadian Microelectronics Corporation; NRC Recruitment Committee; Co-Chair, Canada-France Conference on Molecular Photonics and Electronics, Montebello, October 14-17; Member, Technical Committee, NCIT.

Xiaoyi Bao served as a member of the Technical Program Committee for the Optical Fibre Sensors (OFS 15) conference and chaired the laser development section; as member of the Technical Program Committee for the 2nd International Conference on Acoustics, Noise and Vibration; as a member of the organizing committee for SPIE/OSA's Regional meeting on Optoelectronics, Photonics and Imaging; the Technical Committee for ICAPT'2001 (the International Conference on Applications of Photonic Technology); as a member of the International Scientific Program Committee of the World Congress on Biomimetics and Artificial Muscles (BAM)'2002; as a member of the International Scientific Program Committee of the Advanced Sensor Systems and Applications conference (PA09). Shanghai, China; and as the International Scientific and Engineering Committee member of 1<sup>st</sup> International Workshop on Structural Health Monitoring of Innovative Civil Engineering Structures, Winnipeg, Manitoba, Canada.

Activities at the Institute can be consulted online at <http://www.ocip.carleton.ca>, which has links to the departmental web sites at the University of Ottawa and Carleton University.

Richard Hodgson, Director

Gerald Oakham, Associate Director

## 2001 OCIP Seminar Series

### Spring Graduate Student Seminar Day – University of Ottawa – 17 May 2001

Ferenc Dalnoki-Veress

- Ping Lu                      The Interaction of PMD and PML in Optical Fibers
- Salomeh Jelveh            Ultrasonic Interstitial Heating in Dynamic Conditions
- Ken Nkongchu             Quantitative Dosimetry using MRI of PVA Hydrogels
- Mohammed Rezeq         Role of the Return Field of the Magnetized Grains in Ic Hysteresis of Polycrystalline High Tc Samples
- Matthew Wismayer        Measurement of Coherent Form Factors for Amorphous Biological Materials

### Fall Graduate Student Seminar Day – Carleton University – 3 December 2001

- André Merizzi**            Excitonic Effects in Cu<sub>2</sub>O: Scattered Light, Resonant Absorption, and Bose-Einstein Condensate Amplification
- David Waller**             How much charm does beauty yield?
- Hou Weimin**             The determination of single crystal elastic constants using powder X-ray diffraction
- Gosia Niedbala**         Evaluation of pulsed dose rate irradiation with and without hyperthermia using two breast carcinoma cell lines
- Luc Fournier**             Rupture of Lipid Bilayer Membranes

**OCIP Christmas Symposium – Ottawa University – 18 December 2001**

Joanna Cygler	Endovascular Brachytherapy - a New Art of Treating the Broken Heart
Nikolai Romanenko	Signatures of doubly charged Higgs Bosons in E-Gamma collisions
David Sinclair	The Solar Neutrino Problem Solved - First Results from the Sudbury Neutrino Observatory
Sylvain Raymond	Self-Assembled Dots for information treatment
Denis Rancourt	A physicist's mid life crisis: Invar, mud, graduate students from hell, PDFs from Holland, finite planet, and radical professionalism
Andre Longtin	A new spin on self-organizing ant societies

## 2001 Departmental Seminars

DATE	U	SPEAKER	INSTITUTION	TITLE
Jan. 15	C	Judith Herzfeld	Brandeis University	Entropically Driven Order: From Liquid Crystals to Cell Biology
Jan. 18	C	Peter Krieger	Carleton University	Searches for New Physics Using Photonics Final States at LEP2.
Jan. 25	O	Martin Duncan	Queen's University	The Kuiper Belt: Tantalizing clues to Planet Formation.
Jan. 30	C	Alain Bellerive	University of Chicago	Tests of the Electroweak Gauge Theory at LEP2
Jan. 31	C	Pierre Savard	University of Toronto	Quark Top Physics at the Tevatron
Feb. 1	O	Serge Desgreniers	University of Ottawa	En Route to the Centre of the Earth and Other Interesting Side Trips.
Feb. 1	C	Fraser Duncan	Queens University	The Sudbury Neutrino Observatory's First Year.
Feb. 5	C	Jim Hill	KEK	Long--Baseline Neutrino Experimentation: "The Other Mixing Matrix.
Feb. 8	O	Sylvain Raymond	Institute of Microstructural Sciences, NRC	Carrier Dynamics and Structural Control of Self-Assembled Quantum Dots
Feb. 12	C	Peter Shanahan	FNAL	Experimental Status and Future Prospects for Matter-Antimatter Asymmetry Measurements in the Kaon System
Feb. 15	O	José Luis Giordano	University of Talca, Curicó, Chile, and University of Zaragoza, Zaragoza, Spain.	Optimal Control Approach to Critical State in Technological Superconductors.
Mar. 1	O	Scott Menary (CAP Seminar)	York University	A COSMIC MYSTERY - WHERE ARE ALL THE ANTIPEOPLE?
Mar. 5	C	Kirsten Sachs	Carleton University	Precision tests of the Standard Model at LEP2
Mar. 8	O	Réjean Munger	University of Ottawa Eye Institute and Ottawa Health	Refractive Surgery and Wavefront Sensing: A Physicist's Vision.

Research Institute

Mar. 19	O	Thomas Brabec	Vienna University of Technology, Photonics Institute	Extreme Nonlinear Optics
Mar. 19	C	Richard Hemingway	Carleton University and IPP	LEP is dead ... long live the Standard Model of Particle Physics
Mar. 22	O	Carlo Laing	U. of Ottawa	Memory, Perceptual Oscillations and Noise - Some Aspects of Neural Modelling
Mar. 26	C	Amanda Peet	University of Toronto	String Theory and Black Holes
April 2	C	Xiaoyi Bao	University of Ottawa	Gamma-induced attenuation in normal single mode and multimode, Ge-doped and P-doped optical fibers: A fiber optic dosimeter for low dose levels
April 9	C	Mike Roney	University of Victoria	Probing the Unbalanced Universe: New CP Asymmetry measurements
May 4	C	Stephen Godfrey	Carleton University	Using the hadronic content of the photon to search for new physics
May 29	C	Brian Rutt	Robarts Research Insititute, London Ont.	Developments in Diffusion and Vascular MRI at the Robarts Research Institute
June 5	O	Thomas Brabec	Vienna University of Technology, Photonics Institute	Ultrashort High Intensity Laser Pulses: Generation and Applications
Jun 22	C	David Sinclair	Carleton University	The Solar Neutrino Problem Solved
Jun 25	C	Isabel Trigger	CERN	Searches for Supersymmetric Particles at LEP
Sept. 13	O	Xiaoyi Bao	U. of Ottawa	The impact of fiber polarization mode dispersion (PMD) and polarization dependent loss (PDL) on high speed communication systems and the Brillouin scattering based distributed sensors
Sept. 17	C	Greg Cron	Carleton University	The use of Magnetic Resonance Imaging and intravenously injected contrast agents to measure blood flow in tumours
Sept. 24	C	Rob McPherson	University of Victoria and IPP	Higgs and Other Searches at LEP 2000
Oct. 9	C	Louis Lessard	University of	The PICASSO Project: Towards the Detection of Cold Dark Matter

Montreal				
Oct. 11	O	Louis Marmet	NRC	The Ultimate Accuracy of Cooled-Cesium Atomic Clocks: Only Time will Tell
Oct. 15	C	Mike Boyce	Carleton University	Introduction to Particle Physics
Oct. 18	O	Daryl Roberts	U. of Ottawa	Molecular Approaches to Assessing metal Speciation in Contaminated Soils using X-Ray Absorption Spectroscopy (XAS) and other Synchrotron-based Techniques
Oct. 29	C	Dave Wilkins	Ottawa Regional Cancer Center	Radiobiological Considerations in Prostate Cancer
Nov. 1	O	Benjamin Lindner	Institut fur Physik, Humboldt-Universitaet Berlin, Germany	Resonance Phenomena in Excitable Systems Driven by Noise
Nov. 5	C	William Bradfield-Smith	Queens University	Exploding stars in the laboratory: A few years in the life of an experimental nuclear physicist
Nov. 15	O	Dr. Zbigniew (Zbig) Wronski	Materials Technology Laboratory, Canada Centre for Minerals and Energy Technology, Natural Resources Canada, Ottawa	What is Materials Nanotechnology? How Physics and Chemistry of Materials can be Boosted with the Advent of Nanomaterials?
Nov. 19	C	Phillipe LeBlanc	Centre de Recherches du Centre Hospitalier de l'Universite de Montreal	Endovascular <sup>32</sup> P Beta Irradiation using Radioactive Coils to Improve the Treatment of Cerebral Aneurysms
Nov. 26	C	Paul Taras	University of Montreal	CP violation in the B-meson system at BaBar
Nov. 29	O	Alain Bellerive	Département de physique, Université de Carleton	Lumière sur les quarks, les bosons, et les neutrinos
Dec. 4	C	John Bahcall	Princeton	How Does the Sun Shine?

## Publications in Refereed Journals and Book Series in 2001

Author(s)	Title	Publication
<b>X. Bao</b> , M. DeMerchant, A. Brown, T. Bremner	Tensile and compressive strain measurement in the lab and field with the distributed Brillouin scattering sensor	J. Lightwave Technol. 19, 1698-1704 (2001).
D. Waddy, P. Lu, <b>L. Chen</b> and <b>X. Bao</b>	Fast state of polarization changes in aerial fiber under different climatic conditions	IEEE Photonics Lett. 13, No. 9, 1035-1037 (2001).
<b>L. Chen</b> , M. Yanez, C. Huang and <b>X. Bao</b>	Pulse-width compression in optical components with polarization mode dispersion using polarization controls	J. Lightwave Technology, 19, No.6, 830-836 2001
P. Lu, <b>L. Chen</b> and <b>X. Bao</b>	Polarization mode dispersion and polarization dependent loss for a pulse in single mode fibres	J. Lightwave Technology, 19, No.6, 856-860, 2001.
P. Lu, <b>L. Chen</b> and <b>X. Bao</b>	Probability density function of polarization dependent loss in single mode fibre	IEEE Photonics Lett., 13, 451-453 (2001).
K. Brown, <b>X. Bao</b> , J. Cameron, <b>L. Chen</b> , J. Stears, W. Hickey, R. Cormire	Characterization of fibres in an existing network for high speed systems (10Gb/s) compatibility	Fibres and Integrated Optics, 20, No.5, 427- 442 (2001).
R.P. Lu, K.L. Kavanagh, St.J. Dixon-Warren, A. Kuhl, A.J. SpringThorpe, E.M. Griswold, G. Hillier, and <b>I.D. Calder</b>	Calibrated Scanning Spreading Resistance Microscopy Profiling of Carriers in III-V Structures	J. Vac. Sci. Technol. B19, 1662 (2001).
Ping Lu, <b>Liang Chen</b> and <b>Xiaoyi Bao</b>	Statistical distribution of polarization dependent loss in the presence of polarization mode dispersion in single mode fibers	IEEE Photonics Technol. Lett. 13 451-453 (2001).
F. Santerre, I. Bedja, J. P. Dodelet Y. Sun, J. Lu, A. S. Hay and <b>M. D'Iorio</b>	Hole transport molecules in high Tg polymers: their effect on the performance of organic light emitting diodes	<i>Chemistry of Materials</i> , 13, 1739-1745 (2001).
Qingguo Wu, James A. Lavigne, Ye Tao, <b>Marie</b>	Novel Blue Luminescent/Electroluminescent 7-	<i>Chemistry of Materials</i> 13, 71-77 (2001).



<b>D'Iorio</b> , and Suning Wang	Azaindole Derivatives: 1,3-Di(N-7-azaindoly)benzene, 1-Bromo-3,5-Di(N-7-azaindoly)benzene, 1,3,5-Tri(N-7-azaindoly) benzene, and 4,4'-Di(N-7-azaindoly)biphenyl	
I. Levesque, A. Donat-Bouillud, Y. Tao, <b>M. D'Iorio</b> , S. Beaupré, P. Blondin, M. Ranger, J. Bouchard, and M. Leclerc	Organic tunable electroluminescent diodes from polyfluorene derivatives	Synthetic Metals. <b>122</b> ,79-81 (2001).
Andre Merizzi, Mathieu Masse, <b>Emery Fortin</b>	Anomalous Optical Absorption in Cu <sub>2</sub> O in the presence of an excitonic Bose Condensate	Sol. State Comm.120 [2001] 419-422.
<b>S. Godfrey, P. Kalyniak</b> , B. Kamal, M.A. Doncheski, and A. Leike	Discovery and identification of bosons in e <sup>-</sup> γ → q+X	Phys. Rev. D63, 053005, 2001.
M. Bayer, <b>P. Hawrylak</b> , K. Hinzer, <b>S. Fafard</b> , M. Korkusinski, Z. R. Wasilewski, O. Stern and A. Forchel	Coupling and entangling of quantum states in quantum dot molecules	Science 291, 451 (2001).
K. Hinzer, <b>P. Hawrylak</b> , M. Korkusinski, M. Bayer, O. Stern, A. Gorbunov, <b>S. Fafard</b> and A. Forchel	Optical spectroscopy of a single AlInAs/AlGaAs quantum dot	Phys. Rev. B63 , 75314 ( 2001 )
G. Narvaez, <b>P. Hawrylak</b> , and J. A. Brum	The role of finite hole mass in the negatively charged exciton in two dimensions	Physica E9,716 (2001)
M. Ciorga, A. S. Sachrajda, <b>P.Hawrylak</b> , C. Gould, P. Zawadzki, Y. Feng, and Z. Wasilewski	Readout of a single electron spin based quantum bit by current detection	Physica E 11, 35 (2001).
M. Korkusinski and <b>P. Hawrylak</b>	Electronic properties of vertically stacked self-assembled quantum disks	Phys. Rev. B. 63, 195311(2001).
A. S. Sachrajda, <b>P. Hawrylak</b> , M. Ciorga, C. Gould and P. Zawadzki	Spin polarized injection into a quantum dot by means of the spatial separation of spins	Physica E10, 493 (2001).
<b>P. Hawrylak</b>	Electrons and excitons in quantum dots	Physica E 11, 53 (2001)

<b>Hodgson, R.J.W.</b>	Genetic Algorithm Approach to the Determination of Particle Size Distributions from Static Light-Scattering Data	Journal of Colloid and Interface Science, <b>240</b> (2001) 412-418.
M. Li, M.S. Dixit, and <b>P.C. Johns</b>	Photon-Counting Digital Radiography using High-Pressure Xenon Filled Detectors	Nuclear Instruments and Methods in Physics Research A471, 215-221 (2001)
R.J. Leclair and <b>P.C. Johns</b>	X-Ray Forward-Scatter Imaging: Experimental Validation of Model	Medical Physics 28, 210-219 (2001).
<b>D. Karlen</b> and H. Burkhardt	Investigation of vacuum polarization in t-channel radiative Bhabha scattering	Eur. Phys. J.C 22, 39-46 (2001).
F Pérez-Rodríguez, <b>M A R LeBlanc</b> and G Gandolfini	Flux-line cutting in granular high-T <sub>c</sub> and semi-reversible classical type-II superconductors	Supercond. Sci. Technol. <u>14</u> 386-397 (2001).
<b>M. A. R. LeBlanc</b> , S. Celebi, M. Rezeq	Generation of quasi-reversibility in a commercial Bi: 2223/Ag tape by vortex shaking with varying orthogonal magnetic fields	Physica <u>C361</u> , 251 – 259 (2001)
<b>Longtin A.</b> and <b>L'Heureux, I</b>	Dynamical effects of noise on nonlinear systems	Phys. in Can. 57, 145-153, 2001
Katsev, S., <b>L'Heureux, I.</b> and Fowler, A.D	Mechanism and duration of banding in Mississippi Valley-type sphalerite	Geophys. Res. Lett. 28, 4643-4646, 2001
Katsev, S. and <b>L'Heureux, I</b>	Two-dimensional model of banding pattern formation in minerals by means of coarsening waves: Mississippi Valley-type sphalerite	Phy. Lett. A 292, 66-74, 2001.
Laing, C.R. and <b>Longtin, A</b>	Noise-induced stabilization of bumps in systems with long-range spatial coupling	Physica D 160, 149-172.
Brandts, W.A.M., <b>Longtin, A.</b> , and Trainor, L.E.H.	Dynamics of a two-category model of task allocation with application to ant societies.	Bull. Math. Biol. 63, 1125-1161
Chacron, M.J., <b>Longtin, A.</b> and Maler, L	Negative interspike interval correlations increase the neuronal capacity for encoding time-dependent stimuli	J. Neurosci. 21, 5328-5343
Doiron, B., <b>Longtin, A.</b> , Turner, R.W. and Maler, L.	Model of gamma frequency burst discharge generated by conditional backpropagation.	J.Neurophysiol. 86, 1523-1545
Chacron, M..J., <b>Longtin, A.</b> and Maler, L.	Simple models of bursting and non-bursting electroreceptors	Neurocomputing 38, 129-139
<b>Longtin, A.</b> and L'Heureux, I.	Dynamical effects of noise on nonlinear systems	Physics in Canada 57(2),

- Capurro, A., **Longtin, A.**, Bagarinao, E., Sato, S., Macadar, O. and Pakdaman, K. Variability of the electric organ discharge interval duration in resting *Gymnotus carapo* Biol. Cybern. 84, 309-321
- Doiron, B., **Longtin, A.**, Berman, N. and Maler, L. Subtractive and divisive inhibition: Effect of voltage-dependent inhibitory conductances and noise Neural Comput. 13 (1), 227-248
- Niedbala, M., Alsbeih, G., **Ng, C.E.** and Raaphorst, G.P. Equivalence of pulsed dose rate using tumor and normal cell lines Rad. Res., 155: 297-303, 2001
- Ng, C.E.**, Mazaheri, K., Payant, C. and Raaphorst, G.P. Evaluation of cell survival, DNA double strand breaks and DNA synthesis during concurrent camptothecin and X-radiation treatments Int. J. Cancer (Rad. Oncol. Invest.), 96: 277-285, 2001.
- Niedbala, M., **Ng, C.E.** and Raaphorst, G.P. Response to pulsed dose rate with and without mild hyperthermia using tumor and normal cell lines Int. J. Hypertherm., 17: 536-544, 2001.
- Raaphorst, G.P., Cybulski, S. and **Ng, C.E.** The response of human breast tumor cell lines with altered polymerase  $\beta$  levels to cisplatin and radiation Anticancer Res., 21: 2079-2084, 2001.
- Vernon, .D.C., Plischke, M., and **Joós, B.** Viscoelasticity near the gel-point: a molecular dynamics study Phys. Rev. E, 64:031505-(1-5)(2001)
- D.G. Rancourt, D.** Fortin, T. Pichler, P.-J. Thibault, **G. Lamarche,** R.V. Morris, and P.H.J. Mercier Mineralogy of a natural As-rich hydrous ferric oxide coprecipitate formed by mixing of hydrothermal fluid and seawater: Implications regarding surface complexation and color banding in ferrihydrite deposits. American Mineralogist 86 (2001) 834-851
- D.G. Rancourt, P.H.J.** Mercier, D. Cherniak, **S. Desgreniers,** H. Kodama, J.-L. Robert, and E. Murad Mechanisms and crystal chemistry of oxidation in annite: Resolving the hydrogen-loss and vacancy reactions Clays and Clay Minerals 49 (2001) 455-491
- K. Lagarec, **D.G. Rancourt,** S.K. Bose, B. Sanyal, and R.A. Dunlap Observation of a composition-controlled high-moment/low-moment transition in the face centered cubic Fe-Ni system: Invar effect is an expansion, not a contraction Journal of Magnetism and Magnetic Materials 236 (2001) 107-130.
- K. Shortt,** C. Ross, J. Seuntjens, F. Delaunay, A. Ostrowsky, P. Gross and E. Leroy Comparison of dosimetric standards of Canada and France for photons at 60Co and linac energies Phys. Med. Biol. 46, 2119-2142 (2001).
- L. McCormick, C. CE Separation of Uncharged Polymers using J. Chromatography A, 924, 43-

- Desruisseaux, G. Drouin, A. E. Karger, A. E. Barron, W. N. Vreeland, **G. W. Slater** Polyelectrolyte Engines: A Theoretical Model 52 (2001)
- Axel Ekani Nkodo, Jean Marie Garnier, Bernard Tinland, Hongji Ren, Claude Desruisseaux, Laurette C. McCormick, Guy Drouin, **G. W. Slater** Diffusion Coefficient of DNA Molecules during Free-Solution Electrophoresis Electrophoresis, 22, 2424-2432. (2001)
- J.-F. Mercier, F. Tessier, **G. W. Slater** An Exactly Solvable Ogston Model of Gel Electrophoresis VIII: Nonconducting gel fibers, curved field lines, and the Nernst-Einstein relation Electrophoresis, 22, 2631-2638 (2001)
- J.-F. Mercier, **G. W. Slater** An Exactly Solvable Ogston Model of Gel Electrophoresis VII: Diffusion and Mobility of Hard Spherical Particles in Three-Dimensional Gels Macromolecules, 34, 3437-3445. (2001)
- W. N. Vreeland, C. Desruisseaux, A. E. Karger, G. Drouin, **G. W. Slater**, A. E. Barron Molar Mass Profiling of Synthetic Polymers by Free-Solution Capillary Electrophoresis of DNA-Polymer Conjugates Analytical Chemistry, 73, 1795-1803. (2001)
- C. Desruisseaux, G. Drouin, **G. W. Slater** Electrophoresis of Composite Molecular Objects, II: Competition between Sieving and Frictional Effects in Polymer Solutions Macromolecules, 34, 5280-5286. (2001)
- J. Boileau, **G. W. Slater** An Exactly Solvable Ogston Model of Gel Electrophoresis VI: Towards a Theory for Flexible Macromolecules Electrophoresis, 22, 673-683. (2001)
- C. Desruisseaux, D. Long, G. Drouin, **G. W. Slater** Electrophoresis of Composite Molecular Objects, I: The Relation Between Friction, Charge and Ionic Strength in Free-solution Macromolecules, 34, 44-52. (2001)
- G.W. Slater**, C. Desruisseaux and S. J. Hubert DNA Separation Mechanisms during Electrophoresis "Capillary Electrophoresis of Nucleic Acids, Volume 1", K. R. Mitchelson and J. Cheng, eds., Humana Press (Totowa, USA), pp. 27-41.
- Z.M. Stadnik** Pseudogap in Quasicrystals Studied with Photoemission Spectroscopy Mater. Trans. Jpn. Inst. Metals 42, 920-927 (2001).
- Z.M. Stadnik**, D. Purdie, Y. Baer, and T.A. Lograsso Absence of Fine Structure in the Photoemission Spectrum of the Icosahedral Al-Pd-Mn Quasicrystal Phys. Rev. V64, 214202-1--214202-6 (2001)
- Y.P. Varshni** Binding energy of a screened donor in a spherical quantum dot with a parabolic Superlattices Microstruct. 29, 233 (2001).

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R. Dutt, A. Mukherjee and <b>Y.P. Varshni</b>	Dipole polarizability of hydrogen atom at high pressures	Phys. Lett. A, 280, 325 (2001).
<b>Y.P. Varshni</b>	Excited States of Biexcitons	phys. stat. sol. (b) 225, R15 (2001).
A. Sinha, R. Roychoudhury and <b>Y.P. Varshni</b>	WKB quantization rules for three-dimensional confinement	Can. J. Phys. 79, 939 (2001)
<b>Y. P. Varshni</b>	Effect of intense laser field on donor impurities in spherical quantum dots	Superlattices Microstruct. 30, 45 (2001).
<b>Y. P. Varshni</b>	Relation between the energy levels of an electron bound in a screened Coulomb potential	Plasma Phys. & Controlled Fusion 43, 1119 (2001).
<b>Y.P. Varshni</b>	Trions in CuCl, CuBr and CuI	phys. stat. sol. (b) 227, 621 (2001).
<b>Y.P. Varshni</b>	Endohedral vibrations of $\text{Na}^+$ and $\text{K}^+$ in $\text{C}_{60}$	Physica B 307, 197 (2001).
<b>Y.P. Varshni</b>	Impurity bound states in a compensated quantum well Superlattices	Microstruct. 30, 159 (2001).

## OPAL PUBLICATIONS

**Carleton members:** R.K. Carnegie, M.S. Dixit, M. Donkers, P.G. Estabrooks, R.J. Hemingway, T. Junk, D. Karlen, P. Krieger, M.J. Losty, H. Mes, F.G. Oakham, K. Sachs, S. Towers, D. Waller, J. White

Genuine Correlations of Like-Sign Particles in Hadronic Z0 Decays  
G. Abbiendi et al. Phys. Letts. B523 (2001) 35-52

Search for Single Top Quark Production at LEP2  
G. Abbiendi et al. Phys. Letts. B521 (2001) 181-194

Search for lepton flavour violation in e+e- collisions at  $\sqrt{s} = 189\text{-}209$  GeV  
G. Abbiendi et al. Phys. Letts. B 519 (2001) 23-32

Measurement of the Branching Ratio for the Process  $b \rightarrow \tau \nu X$   
G. Abbiendi et al. Phys Lett B 520 (2001) 1-10

Angular Analysis of the Muon Pair Asymmetry at LEP 1  
G. Abbiendi et al. Phys. Lett. B516 (2001) 1-20

Measurement of  $V_{ub}$  using b hadron semileptonic decay  
G. Abbiendi et al. Eur. Phys. J. C21 (2001) 399-410

Determination of the b Quark Mass at the Z Mass Scale

G. Abbiendi et al. Eur. Phys. J. C21 (2001) 411-422

Measurement of the Branching Ratio for  $D_s \rightarrow \tau \nu_\tau$  Decays  
 G. Abbiendi et al. Phys. Lett. B 516 (2001) 236-248

Precision Neutral Current Asymmetry Parameter Measurements from the Tau Polarization at LEP  
 G. Abbiendi et al. Eur. Phys. J.C21 (2001) 1-21

A Search for a Narrow Radial Excitation of the  $D^{*+}$ - Meson  
 G. Abbiendi et al. Eur. Phys. J.C20 (2001) 445-454

A Simultaneous Measurement of the QCD Colour Factors and the Strong Coupling  
 G. Abbiendi et al. Eur. Phys. J. C20 (2001) 601-615

Search for the Standard Model Higgs Boson in  $e+e-$  Collisions at  $\sqrt{s}=192-209$  GeV  
 G. Abbiendi et al. Phys. Lett. B499 (2001) 38-52

Precise Determination of the Z Resonance Parameters at LEP : Zedometry  
 G. Abbiendi et al. Eur. Phys. J. C19 (2001) 587-651

A Study of  $B_s$  meson oscillation using  $D_s$ -lepton Correlations  
 G. Abbiendi et al. Eur. Phys. J C19 (2001) 241-256

Charged Multiplicities in Z Decays into u, d, and s Quarks  
 G. Abbiendi et al. Eur. Phys. J. C19 (2001) 257-268

Measurement of triple gauge boson couplings from  $W+W-$  production at LEP energies up to 189 GeV  
 G. Abbiendi et al. Eur. Phys. J. C19 (2001) 1-14

Measurement of W Boson Polarisation and CP-violating Triple Gauge Couplings from  $W+W$   
 Production at LEP  
 G. Abbiendi et al. Eur. Phys. J. C19 (2001) 229-240

Measurement of the Mass and Width of the W Boson in  $e+e-$  Collisions at 189 GeV  
 G. Abbiendi et al. Phys. Lett. B507 (2001) 29-46

Two Higgs Doublet Model and Model Independent Interpretation of Neutral Higgs Boson Searches  
 G. Abbiendi et al. Eur. Phys. J. C18 (2001) 425-445

A Study of One Prong Tau Decays with a Charged Kaon  
 G. Abbiendi et al. Eur. Phys. J. C19 (2001) 653-665

Production rates of  $b\bar{b}$  quark pairs from gluons and  $b\bar{b}b\bar{b}$  events in hadronic Z Decays  
 G. Abbiendi et al. Eur. Phys. J. C18 (2001) 447-460

Bose-Einstein correlations in  $K^+K^-$  pairs from  $Z^0$  decays into two hadronic jets  
 G. Abbiendi et al. Eur. Phys J. C21 (2001) 23-32

## Publications in Refereed Conference Proceedings in 2001

Author(s)	Title	Conference/Publication
P. Lu, <b>L. Chen</b> and <b>X. Bao</b>	Pulsewidth dependence of polarization mode dispersion and polarization dependent loss for a pulse and their impacts on pulse broadening	OFC'2001 (Optical Fibre Communication) Technical Digest Series, ThA3.
D. Waddy, P. Lu, <b>L. Chen</b> and <b>X. Bao</b>	The Measurement of Fast State of Polarization Changes in Aerial Fibre	OFC'2001 (optical Fibre Communication Technical Digest Series, ThA6.
C. Huang, <b>X. Bao</b> , X. Zeng, A. Arcand, P. Sullivan	Simultaneous strain and temperature monitoring of composite curing using a Brillouin scattering based distributed fiber sensor	SPIE's 8th Annual International Symposium on Smart Structures and Materials – sensory phenomena and measurement instrumentation for smart structures and materials, 4328, 70-77 (2001)
<b>X. Bao</b> , M. DeMerchant, A. Brown and T. Bremner	Strain measurement of the steel beam with the distributed Brillouin scattering sensor	SPIE's 8 <sup>th</sup> Annual International Symposium on Smart Structures and Materials – Health Monitoring and Management of Civil Infrastructure Systems, 4337, 223-233 (2001).
C. Chhoa, <b>X. Bao</b> , T. Bremner, A. Brown, M. DeMerchant, A. Georgiades and A. Kalamkarov	Strain measurement in concrete structure using distributed fibre optic sensing based on Brillouin scattering with single mode fiber embedded in glass rod and bonded to steel reinforcing bars	SPIE's 6th Annual International Symposium on NDE for Health Monitoring and Diagnostics - health monitoring and management of civil infrastructure systems, 4337, 466-476 (2001).
W. Adam and <b>A. Bellerive</b>	Search for Single Top Production via Flavor Changing Neutral Currents: preliminary combined results of the LEP experiments	LEP Exotica WG 2001-01, contributed paper to EPS2001 (Budapest, Hungary) and Lepton-Photon 2001 (Rome, Italy).
<b>M. D'lorio</b>	A multidisciplinary approach to Organic Light Emitting Devices	CSC Annual Congress, Montreal (2001).
<b>Emery Fortin</b> and Mathieu Masse	Spatially dependent amplification of an excitonic Bose-Einstein condensate in Cu <sub>2</sub> O	Proceedings of the 200 International Conference on Excitonic Processes in Condensed Matter. World Scientific 2001, pp 33-37.

<b>S. Godfrey, P. Kalyniak</b> , and N. Romanenko	Sensitivity to Doubly Charged Higgs bosons in the process $e^- \rightarrow \gamma e^+ \mu^- \mu^-$	APS/DPF/DPB Summer Study on the Future of Particle Physics (Snowmass 2001), Snowmass, Colorado, June 30-July 21, 2001.
M. Chertok, <b>S. Godfrey, P. Kalyniak</b> et al.	Report of the Subgroup on Alternative Models and New Ideas	APS/DPF/DPB Summer Study on the Future of Particle Physics (Snowmass 2001), Snowmass, Colorado, June 30-July 21, 2001.
<b>C.L. Greenstock</b>	Health Effects and Effective Radiation Protection	Proc. of the 46 <sup>th</sup> Annual Health Physics Conference, Vol. 6-W, p.09, 2001.
<b>Hodgson, R.J.W.</b>	Memetic Algorithm Approach to Thin-Film Optical Coating Design	Proceedings of the Genetic and Evolutionary Computation Conference, (GECCO 2001), San Francisco, CA July 7-11, 2001 pp. 152-157
M.P. Wismayer and <b>P.C. Johns</b>	Measurement of Coherent Scattering Form Factors for Amorphous Biological Materials	Proceedings of 47th Annual Meeting of the Canadian Organization of Medical Physicists, 229-231 (Kelowna, July 2001)
S. Alpay, L. Lortie, W.D. Gould, <b>D.G. Rancourt</b> , B. Mayer, F. Rosa, H.K.T. Wong, S.S. Dixit, A.S. Dixit, C. Provost, and G.E.M. Hall	Diagenetic metal remobilization versus chronological metal loading in lake sediments	6th ICOBTE, Guelph, Ontario, July 29 to August 2, 2001, ICOBTE 2001 Conference Proceedings
<b>D.G. Rancourt</b> , P.-J. Thibault, and F.G. Ferris	Resolution and quantification of Fe sorbed to bacterial cell walls, biogenic ferrihydrite, and abiotic ferrihydrite by cryogenic <sup>57</sup> Fe Mössbauer spectroscopy	6th ICOBTE, Guelph, Ontario, July 29 to August 2, 2001, ICOBTE 2001 Conference Proceedings
<b>Z.M. Stadnik</b> , J. Saida, and A. Inoue	<sup>57</sup> Fe Mossbauer Study of Amorphous and Icosahedral Zr(65)Al(7.5)Ni(10)Cu(7.3)Fe(0.2)Ag(10)	Aperiodic 2000 Conference, Nijmegen, the Netherlands, 4-8 July 2000; Ferroelectrics 250, 297-300 (2001).



## Other Conference Presentations and Posters in 2001

Author(s)	Title	Conference
<b>X. Bao</b>	Interaction of PMD and PDL, SOP measurement	CIPI Annual Conference, Toronto, May 23, 2001.
<b>X. Bao</b>	Distributed Fibre Optical Sensing	Colloquium for Humboldt Fellows and -Awardees, May 19, 2001. Ottawa.
<b>X. Bao</b>	Recent progress in Brillouin sensor system	invited talk for ISIS Canada Annual Conference, May 2-4, Edmonton, 2001.
<b>X. Bao</b>	Fiber Optic Sensor Systems	invited talk for ISIS Canada Annual Conference, May 2-4, Edmonton, 2001.
<b>A. Bellerive</b>	LEP Exotica WG report	LEP Physics Jamboree, CERN (Geneva, Switzerland), July 10 2001.
<b>I.D. Calder</b>	Trends in III-V Material and Device Characterization for Optical Communications (invited)	CS-MAX, Boston (2001).
<b>I.D. Calder</b>	Trends in III-V Material and Device Characterization for Optical Communications (invited)	CSTC-10, Ottawa (2001).
A. Shen, E.M. Griswold, G. Hillier, L. Dang, A. Kuhl, R. Arès, D. Clark, and <b>I. D. Calder</b>	Determination of Structural Parameters in Heterojunction Bipolar Transistors by X-ray Diffraction with (002) Reflection	CSTC-10, Ottawa (2001).
R.P. Lu, K.L. Kavanagh, St.J. Dixon-Warren, G. Pakulski, A. Kuhl, A.J. SpringThorpe, R. Arès, R.W. Streater, and <b>I.D. Calder</b>	Scanning Spreading Resistance Microscopy of Optoelectronic Devices	STM 01, Vancouver (2001).
<b>R. Carnegie</b>	Searching for the Higgs Boson at LEP	CAP conference, University of Victoria, June 2001
<b>M. D'lorio</b>	Training Highly Qualified Personnel at NRC	CAP Division of Physics Education Workshop, Victoria, June 2001.
<b>M. D'lorio</b>	Organic Materials for Displays and Electronics	Nanotechnology Workshop, Ottawa, August 2001.

<b>M. D'lorio</b>	Significance of the Canadian Photonics Fabrication Center	Ottawa City Hall, August 2001.
Andre Merizzi, Mathieu Masse, <b>Emery Fortin</b>	Amplification of an excitonic Bose-Einstein condensate in Cu <sub>2</sub> O by sequential orthogonal excitation	American Physical Society Meeting, March 2001, Seattle
<b>C.L. Greenstock</b>	A Review of Health Effects and their Consequences	The American Radiation Safety Conference, Cleveland OH, June 10-14, 2001.
<b>P. Hawrylak</b>	Optical properties of quantum dots	plenary talk, Advanced Research Workshop on Nanostructures, Queenstown, New Zealand, Feb.2001
<b>P. Hawrylak</b>	Electrons and excitons in quantum dots	invited talk, International Workshop on Trions, Berlin, Germany, April 2001
<b>P. Hawrylak</b>	Spin and correlations in quantum dots	invited talk Pan-american Advanced Study Institute, Costa Rica, June 2001
<b>Hodgson, R.J.W.</b>	Particle Size Distributions from Static Light Scattering using Genetic Algorithms	CAP Congress, University of Victoria, June 17-20, 2001
<b>Hodgson, R.J.W.</b>	Vpython: Software for Three-Dimensional Physics Displays	CAP Congress, University of Victoria, June 17-20, 2001
Plischke, M., Vernon, D., and <b>Joós, B</b>	Viscoelasticity near the gel point: a molecular dynamics study	APS Meeting Seattle WA, March 2001, Bull. Of APS, <u>46</u> , p.713, 2001
Fournier, L. and <b>Joós, B.</b>	A lattice model for the kinetics of membrane rupture	APS Meeting Seattle WA, March 2001, Bull. Of APS, <u>46</u> , p.889, CAP Congress, Victoria, Physics in Canada, <u>57</u> , no.3, p. 46
<b>Joós, B.</b> and Plischke M.	Vibrational modes and the onset of rigidity in network glasses	APS Meeting Seattle WA, March 2001, Bull. Of APS, <u>46</u> , p.954
<b>Joós, B.</b>	Signatures of the Rigidity Transition in Disordered Networks: Viscoelasticity near the Gel Point	<i>Symposium no. 7, International Materials Research Congress, Cancun 2001, Aug. 26-30</i>
<b>D. Karlen</b>	Prospects for a future e+e- linear collider	CAP congress, University of Victoria, June 18, 2001
<b>D. Karlen, R. Carnegie,</b> M. Dixit, P. Elahi, H. Mes, J.P. Martin and E. Neuheimer	TPC GEM readout R&D	APS Snowmass Summer Study on the Future of Particle Physics, Snowmass Colorado, July 14, 2001
<b>D. Karlen, R. Carnegie,</b> J. Dubeau, M. Dixit, H.	GEM R&D for TPC readout	RHIC detector workshop, Brookhaven National Laboratory,

Mes		New York, November 14, 2001
Moh'd Rezeq and <b>M. A. R. LeBlanc</b>	Evolution of the Magnetization of Polycrystalline Type II Superconductors with Temperature in Static Magnetic Fields	CAP annual Congress 2001, University of Victoria, Victoria, BC
<b>M. A. R. LeBlanc</b> and Moh'd Rezeq	Role of the Return Field of the Magnetized Grains in $I_c$ Hysteresis of Polycrystalline High $T_c$ Samples	CAP annual Congress 2001, University of Victoria, Victoria, BC
<b>L'Heureux, I.</b> and Fowler, A.D.	Model for the formation of banding patterns in Mississippi Valley-type sphalerite	Conference on spatio-temporal patterns in the Earth, Kongsberg (Norway), May 9-11, 2001.
<b>L'Heureux, I.</b> and Jamtveit, B.	Modelling the oscillatory zoning observed in synthetic (Ba,Sr)SO <sub>4</sub> crystals	Annual congress of the Canadian Association of Physicists, Victoria (BC), June 17-20, 2001
<b>L'Heureux, I.</b> and Jamtveit, B.	Model of oscillatory zoning pattern in (Ba,Sr)SO <sub>4</sub> solid solution	International Conference on Statistical Physics, Cancun (Mexico), July 15-21, 2001.
Katsev, S., Fowler, A.D. and <b>L'Heureux, I.</b>	Banding pattern formation in natural sphalerite by means of coarsening waves	International Conference on Statistical Physics, Cancun (Mexico), July 15-21, 2001
<b>L'Heureux, I.</b>	Reactive-transport geochemical modelling	Invited to the "Metals in the Environment Project" meeting, Geological Survey of Canada, Ottawa, December 13-14, 2001.
<b>Longtin, A.</b>	The challenges of memory effects in neurodynamical systems.	<b>Invited talk:</b> Workshop on Computational Challenges in Dynamical Systems, Fields Institute, U. Toronto, December 2001
<b>Longtin, A.</b>	Challenges in stochastic biodynamics: ants, reading and neural computation	<b>Invited talk:</b> Workshop on Computational Biology, Fields Institute, U. Toronto, November 2001
<b>Longtin, A.</b>	Biophysical modeling of correlated firing and gain control in the electrosensory system	<b>Invited talk:</b> Neuronal Coding IV, Plymouth, UK, September 10-14 2001
<b>Longtin, A.</b>	Scaling vs shifting inputs: neural gain control via delayed feedback	<b>Invited talk:</b> Intern. Conf. on Impulsive, Discrete and Continuous Dynamical systems, Session on Neural Networks, London, Ontario, July 2001
<b>Longtin, A.</b>	Biophysical modeling of correlated firing, bursting and gain control in the electrosensory system	<b>Invited talk:</b> Biophysical modeling of correlated firing, bursting and gain control in the electrosensory system
<b>Longtin, A.</b>	The effect of noise on bumps of neural activity.	<b>Invited talk:</b> Can. Applied and Industrial Math. Soc. Annual Meeting, Symposium on Neural Networks, Victoria, British Columbia, June 2001

<b>Longtin, A.</b>	Effect of correlations and feedback on information processing in neurons	<b>Invited talk:</b> Max Planck Institute for Complex Systems, Workshop on Physics of Information and Synchronization in Stochastic Systems, Dresden, Germany, April 2-5, 2001
<b>Ng, C.E.</b> , Raaphorst, G.P., Payant, C. and Mazaheri, H	Evaluation of cell survival, DNA double strand breaks and DNA synthesis during concurrent camptothecin and X-radiation treatments	48 <sup>th</sup> Annual Radiation Research Society Meeting, pg. 149, San Juan, Puerto Rico, 2001
Qutob, S.S., Q. Liu, R. Walker and <b>Ng, C.E</b>	Camptothecin potentiates the fractionated X-radiation response in human colorectal tumor cells	48 <sup>th</sup> Annual Radiation Research Society Meeting, pg. 148, San Juan, Puerto Rico, 2001.
Raaphorst, G.P., Cybulski, S., Sobol, R. and <b>Ng, C.E.</b>	Response of human breast tumor cell lines with altered polymerase beta levels for cisplatin and radiation	48 <sup>th</sup> Annual Radiation Research Society Meeting, pg. 89, San Juan, Puerto Rico, 2001
Niedbala, M., <b>Ng, C.E.</b> and Raaphorst, G.P.	Evaluation of pulsed dose rate irradiation with and without mild hyperthermia using two breast carcinoma cell lines	48 <sup>th</sup> Annual Radiation Research Society Meeting, pg. 127, San Juan, Puerto Rico, 2001.
<b>D.G. Rancourt</b>	Magnetism of Earth, planetary, and environmental nanoparticles	Nanoparticles and the Environment, J.F. Banfield and A. Navrotsky (editors), Reviews in Mineralogy and Geochemistry 44 (2001) 217-292 (Chapter 7). MSA Workshop, December 7-9, 2001, UC-Davis, CA, USA.
J.B. Percival, J.M. Aylsworth, <b>D.G. Rancourt</b> and A. Fritz	Analysis of colour rhythmites in sensitive marine clays (leda clay) from Eastern Canada	12th International Clay Conference (ICC-12), July 22-28, 2001, Bahia Blanca, Argentina.
R. James Evans, <b>D.G. Rancourt</b> , J.S. Tse, and M. Grodzicki	Theoretical quadrupole splitting distributions of octahedral Fe <sup>2+</sup> in layer silicates	ICAME-2001, September 2-7, 2001, Oxford, UK
<b>K. Shortt</b> , C. Ross and J. Seuntjens	The role of comparisons in confirming the accuracy of dosimetric standards	<b>Invited talk:</b> Recent developments in accurate radiation dosimetry, international workshop, held at McGill University, Montreal, October 11-13, 2001.
<b>K. Shortt</b>	Fricke Dosimetry Fundamentals	<b>Invited talk</b> : DOSEGEL 2001, 2nd International Conference on Radiotherapy Gel Dosimetry, held at Queensland University of Technology, Brisbane, Australia, November 18-21, 2001
<b>G. W. Slater</b>	Single-Molecule Microfluidics: from the Lab to the Supercomputer	<b>INVITED TALK</b> at the <i>High Performance Computing Virtual Laboratory Symposium</i> , Queen's

<b>G. W. Slater</b> , M. Gauthier, J.-F. Mercier	Diffusion and Electrophoresis in Gels: Going Beyond Standard Ogston and Free Volume Models	University, 1 November 2001 <b>INVITED PLENARY TALK</b> at the 18th Annual Joint Meeting of The Electrophoresis Society and the American Institute of Chemical Engineers, Reno (Nevada), 4-9 November 2001
W. N. Vreeland, C. Desruisseaux, A. E. Karger, G. Drouin, <b>G. W. Slater</b> , A. E. Barron	Free-Solution Conjugate Electrophoresis: A Methodology for High-Resolution Microscale Separation of Polymers	Oral presentation at the 18th Annual Joint Meeting of The Electrophoresis Society and the American Institute of Chemical Engineers, Reno (Nevada), 4-9 November 2001
<b>G. W. Slater</b> , Frédéric Tessier	Separation of polymeric topoisomers in microchannel devices: a Monte Carlo study	Poster presentation at the Gordon Research Conference "The Physics and Chemistry of Microfluidics", July 29- August 3, 2001, Queen's College, Oxford University.
<b>G. W. Slater</b> , S. J. Hubert, M. P. Pépin	Polymers in strong flows : deformation, stretching and relaxation	<b>INVITED TALK</b> at the "University/Industry Opportunities in Polymer Science" workshop, University of Guelph, 23-24 May. 2001
L. C. McCormick, <b>G. W. Slater</b> , A. E. Karger, W. N. Vreeland, A. E. Barron, C Desruisseaux and G. Drouin	Free solution conjugate electrophoresis for the determination of polymer solution polydispersity	Oral presentation at the "University/Industry Opportunities in Polymer Science" workshop, University of Guelph, 23-24 May. 2001
Jean-François Mercier, <b>G. W. Slater</b>	On the validity of the Ogston obstruction model for diffusion and electrophoresis in gels	Poster presentation at the "University/Industry Opportunities in Polymer Science" workshop, University of Guelph, 23-24 May. 2001
Frédéric Tessier, <b>G. W. Slater</b>	Separation of polymeric topoisomers in a microchannel device: a Monte Carlo study	Poster presentation at the "University/Industry Opportunities in Polymer Science" workshop, University of Guelph, 23-24 May. 2001
<b>G. W. Slater</b> , B. Tinland, A. Ekani Nkodo, J.-M. Garnier, L. C. McCormick, C. Desruisseaux, G. Drouin	The diffusion coefficient of DNA fragments during free-flow electrophoresis	<b>INVITED TALK</b> at the <i>International Council of Electrophoresis Societies (ICES) 2001 Congress</i> , Verona, Italy (June 10-14).
<b>G. W. Slater</b>	DNA and microfluidic devices: the role of entropy and hydrodynamics	<b>INVITED TALK</b> at the Fourth Annual University/Industry Workshop: <i>Biofunctional Systems and Polymers at Interfaces</i> , organized by the Garcia Centre (State University of New York, Stony Brook) and the Deutsche Sonderforschungsbereich 563 (Munich), Munich, Germany (20-22 June, 2001).
<b>G. W. Slater</b> , S. J. Hubert, M. P. Pépin	Étirement et relaxation de l'ADN : Étude par Dynamique Moléculaire	Congrès 2001 de la Société Française de Physique, Strasbourg, 9-13 juillet. 2001
<b>G. W. Slater</b>	Entropic and hydrodynamic effects in micro- and nano- fluidic systems	<b>INVITED TALK</b> at the 222 <sup>nd</sup> American Chemical Society National Meeting, August, Chicago, 2001

W. N. Vreeland, C. Desruisseaux, A. E. Karger, G. Drouin, <b>G. W. Slater</b> , A. E. Barron	Molar mass profiling of synthetic polymers by free-solution capillary electrophoresis of DNA-polymer conjugates	Poster presentation at the 222 <sup>nd</sup> American Chemical Society National Meeting, August, Chicago 2001
F. Tessier and <b>G. W. Slater</b>	Separation of long polyelectrolytes in a molecular-size microfluidic channel with periodic constrictions: a Monte Carlo study	<b>INVITED TALK</b> at the <i>Symposium on Modeling and Simulation techniques for Microfluidic Applications</i> , a symposium at the <i>Sixth U.S. National Congress on Computational Mechanics</i> , August, 2001, Dearborn, Michigan
L. C. McCormick, <b>G. W. Slater</b> , A. E. Karger, W. N. Vreeland, A. E. Barron, C. Desruisseaux and G. Drouin	Free solution conjugate electrophoresis for the determination of polymer solution polydispersity	Oral presentation at the Annual Congress of the Canadian Association of Physicists, University of Victoria, Victoria, June, 2001
J.-F. Mercier, <b>G. W. Slater</b>	On the validity of the Ogston obstruction model for diffusion and electrophoresis in gels	Poster presentation at the March Meeting of the American Physical Society, Seattle, 2001
F. Tessier, <b>G. W. Slater</b>	Separation of polymeric topoisomers in a microchannel device: a Monte Carlo study	Poster presentation at the March Meeting of the American Physical Society, Seattle, 2001
<b>G. W. Slater</b> , S. J. Hubert, M. P. Pépin	Stretching and relaxation of polymer molecules: a Molecular Dynamics study with an explicit fluid	Oral presentation at the March Meeting of the American Physical Society, Seattle, 2001
C. Desruisseaux, W. Vreeland, A. Karger, G. Drouin, A. E. Barron, <b>G. W. Slater</b>	CE separation of uncharged polymers using charged molecular engines: A theoretical model	Oral presentation at the 14 <sup>th</sup> International Symposium on Microscale separations and Analysis (HPCE 2001), Boston, January
W. Vreeland, C. Desruisseaux, A. Karger, G. Drouin, <b>G. W. Slater</b> , A. E. Barron	Mass spectrometry of synthetic polymers by free-solution capillary electrophoresis of DNA-polymer conjugates	Poster presentation at the 14 <sup>th</sup> International Symposium on Microscale separations and Analysis (HPCE 2001), Boston, January.
<b>Z.M. Stadnik</b>	Electronic Structure of Quasicrystals Studied by Spectroscopic Methods	20th European Crystallographic Meeting, 25-31 August 2001, Krakow, Poland

## Other Presentations in 2001

Speaker(s)	Title	Location
<b>A. Bellerive</b>	Tests of the Standard Model	Laval University (October 9, 2001), Bishop University (October 10, 2001), CEGEP de Trois-Rivieres (October 11, 2001), University of Montreal (November 16, 2001, and University of Ottawa (November 29, 2001).
<b>Ian Cameron</b>	Diffusion in MR Imaging	Ottawa Medical Physics Institute, Carleton, Feb. 2001
<b>Ian Cameron, Andra Smith</b>	fMRI: A Window into the Working Brain	Department of Radiology Research Day, U of Ottawa, April 2001
<b>R. Carnegie</b>	IPP Director report	IPP Annual General Meeting, University of Victoria, June 2001.
<b>C.L. Greenstock</b>	Radiation Protection Statistics, Operational and Compliance Measures, and Trend Analysis	Safety, Environmental & Radiological Protection Dept., Chalk River Laboratories, June 25, 2001
<b>C.L. Greenstock</b>	The Radiation Protection Index and its Application as a Performance Tool	Site Safety & Health Committee, Chalk River Laboratories, December 17, 2001
<b>C.L. Greenstock</b>	Tritiated Water and Air-borne Hazards, Instrumentation for their Detection and Risk Estimation	Chalk River Laboratories, May 2001
<b>P. Hawrylak</b>	Nanotechnology: a semiconductor perspective	Physics Colloquium, Technical University of Wroclaw, Poland, (April 2001).
<b>P. Hawrylak</b>	Spin and correlations in quantum dots	Condensed Matter Seminar series, University of Antwerp, Belgium (April 2001)
<b>P. Hawrylak</b>	Nanotechnology and semiconductors	Physics Colloquium, University of Alberta, Edmonton, Canada (November 2001).
<b>R.J.Hemingway</b>	OPAL celebrates the Standard Model	seminar, McGill University, January 10, 2001
<b>R.J.Hemingway</b>	Electroweak Physics at LEP2	Lectures at the Lake Louise Winter Institute, 18-24 February 2001

<b>R.J.Hemingway</b>	LEP is dead ... long live the Standard Model of Particle Physics	Colloquium, University of Toronto, 15 March 2001
<b>R.J.Hemingway</b>	LEP is dead ... long live the Standard Model of Particle Physics	Colloquium, Carleton University, 19 March 2001
<b>R.J.Hemingway</b>	LEP is dead ... long live the Standard Model of Particle Physics	Colloquium, Guelph University, 10 April 2001
<b>R.J.Hemingway</b>	OPAL celebrates the Standard Model	<b>invited talk</b> , CAP Congress, University of Victoria, 18 June 2001
<b>R.J.Hemingway</b>	Status of Monte Carlo tuning	<b>invited talk</b> , WW Physics Workshop, Cetraro, Italy, 12-17 October, 2001
<b>P.C. Johns</b> and M.P. Wismayer	Measurement of Coherent Scattering Form Factors for Radiology	87th Annual Meeting of the Radiological Society of North America, Chicago, Presentation # 462 (26 November 2001).
<b>B.Joos</b>	Entropic Rigidity	University of Cincinnati, January 2001
<b>D. Karlen</b>	Linear Collider: The Next Mega-Science Project?,	University of Victoria, August 29, 2001.
<b>D. Karlen</b>	TPC Research and Development for a Future Linear Collider	University of Victoria, August 31, 2001
Laing, C., Doiron, B., <b>Longtin, A.</b> and Maler, L.	Ghostbursting: A novel burst mechanism in pyramidal cells	Computation NeuroScience Meeting, Monterey, Calif., July 2001
Guillouzic, S., <b>Longtin, A.</b> and <b>L'Heureux, I.</b>	Metastability in delayed and stochastically-driven single-well potentials	American Physical Society Annual meeting. March 2001.
Doiron, B., Noonan, L., Turner, R.W., <b>Longtin, A.</b> and Maler, L.	Shifting burst threshold with dendritic conductances	31st Proceedings Soc. for Neurosciences, San Diego, November 2001.
Chacron, M.R., <b>Longtin, A.</b> and Maler, L.	Correlation-enhanced information transfer and signal detection in P-type electroreceptors	31st Proceedings Soc. for Neurosciences, San Diego, November 2001.
<b>C.E. Ng</b>	Review of chemoradiation treatments involving camptothecin and radiation	Rad. Oncol. and Physics rounds, ORCC, Jan. 2001.
<b>C.E. Ng</b>	Understanding the genetic basis of radiation resistance	Rad. Oncol. and Physics rounds, ORCC, Nov. 2001.



<b>D.G. Rancourt</b>	Study of Fe sorbed to bacterial cell walls, biogenic ferrihydrite, and abiotic ferrihydrite using <sup>57</sup> Fe Mössbauer spectroscopy	Faculty of Earth Sciences, Utrecht University, The Netherlands, August 28, 2001
<b>D.G. Rancourt</b>	Magnetism of Earth, planetary, and environmental nanomaterials	Department of Physics, University of Ottawa, December 5, 2001.
<b>D.G. Rancourt</b>	Physical characterizations of lake sediments	Geological Survey of Canada, Metals in the Environment (MITE), Point Sources Subprogram, Lake Sediment Studies, Phase II, Project Meeting, Ottawa, December 13-14, 2001.
<b>D.G. Rancourt</b>	A physicist's mid life crisis: Invar, mud, graduate students from hell, PDFs from Holland, finite planet, and radical professionalism.	O.C.I.P. Xmas talk, Ottawa, December 18, 2001
<b>G.W. Slater</b>	<u>An "Exact" numerical approach to calculating diffusion coefficients in chemistry and biology</u>	Instituto de Fisica, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil, 3 April 2001
<b>G.W. Slater</b>	Life, one molecule at a time: sorting, moving and teasing biopolymers	Centro de Biotecnologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil, 6 April 2001
<b>G.W. Slater</b>	Life, one molecule at a time: sorting, moving and teasing biopolymers	Instituto de Ciencias Basicas da Saude – Bioquimica, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil, 4 April 2001
<b>G. W. Slater</b>	Five one-hour lectures on DNA electrophoresis. Topics: <u>1. DNA gel electrophoresis; 2. Electrophoresis in polymer solutions; 3. Free solution separations and ELFSE; 4. Channels and Microchips; 5. Computer simulation methods; 6. Novel separation ideas.</u>	Summer school " <i>Cursos sobre Teoria Basica e Modelos de Electroforese</i> ", Universidade Feredal do Rio Grande do Sul, Porto Alegre, Brazil. March 29-April 11, 2001

## Technical Reports (unpublished) in 2001

<b>Author(s)</b>	<b>Report</b>
<b>I.D. Calder</b>	Analysis of Photoreflectance Spectra, Nortel Networks (2001).
<b>T. Abe, S. Godfrey, M. Dixit, D. Karlen, P. Kalyniak et al.</b>	Linear Collider Physics Resource Book for Snowmass 2001 American Linear Collider Working Group hep-ex/0106055-58, May 2001.
<b>R.-D. Heuer, S. Godfrey, M. Dixit, D. Karlen, P. Kalyniak et al.</b>	TESLA Technical Design Report Part III: Physics at an $e^+e^-$ Linear Collider. March 2001
<b>C.L. Greenstock</b>	Exit Monitoring of Personnel and Equipment for Tritium Contamination. AECL Report BSP-4202, R1, 2001
<b>C.L. Greenstock</b>	Bioassay Requirements for Combined Electrolysis and Catalytic Exchange Upgrading and Detritiation AECL Report BSP-4204, R1, 2001
<b>C.L. Greenstock</b>	Radiation Protection Program Review for 2000-2001. AECL Report AECL-SRC44, 2001.
<b>C.L. Greenstock</b>	Radiological Zoning Plan for the Water Deionization Plant and Decommissioning and Site Renewal Building. AECL Report ZP-72, R0, 2001
<b>D.G. Rancourt</b>	Speciation and mineralogy of copper in sediments (contract). For Noranda Inc., 73 pages.

## Members of the Institute in 2001

J.C. Armitage	High Energy Physics, Instrumentation	(C)
Xiaoyi Bao	Fiber Optics	(O)
A. Bellerive	Experimental High Energy Physics	(C)
Ian Calder	Semiconductor Physics	(O- Adjunct)
Ian Cameron	Medical Physics	(C-Adjunct)
R.K. Carnegie	Experimental High Energy Physics	(C)
Sylvain Charbonneau	Semiconductor Physics	(O-Adjunct)
Liang Chen	Photonics	(O)
R.L. Clarke	Medical Physics	(C-Adjunct)
Joanna Cygler	Medical Physics	(C-Adjunct)
Robert deKemp	Medical Physics	(C-Adjunct)
Serge Desgreniers	High Pressure Physics	(O)
Marie D'lorio	Semiconductor Physics	(O-Adjunct)
Madhu Dixit	Experimental High Energy Physics	(C-Adjunct)
Simon Fafard	Semiconductor Physics	(O-Adjunct)
Emery Fortin	Semiconductor Physics	(O)
L.H. Gerig	Medical Physics	(C-Adjunct)
Stephen Godfrey	Theoretical Particle Physics	(C)
C.L. Greenstock	Medical Physics	(C-Adjunct)
C.K. Hargrove	Experimental High Energy Physics	(C-Adjunct)
Pawel Hawrylak	Theoretical Condensed Matter	(O-Adjunct)
R.J. Hemingway	Experimental High Energy Physics	(C)
R.J.W. Hodgson	Condensed Matter Theory	(O)
B.J. Jarosz	Medical Physics	(C)
P.C. Johns	Medical Physics	(C)
Béla Joós	Theoretical Condensed Matter	(O)

Pat Kalyniak	Theoretical Particle Physics	(C)
Dean Karlen	Experimental High Energy Physics	(C)
Gilles Lamarche	Low Temperature Physics	(O-Adjunct)
M.A.R. LeBlanc	Superconductivity	(O)
Ivan L'Heureux	Non-linear Dynamics	(O)
B.A. Logan	Nuclear Physics	(O)
André Longtin	Nonlinear Dynamics, Biophysics	(O)
Barry McKee	Medical Physics	(C-Adjunct)
H.J.A.F. Mes	Experimental High Energy Physics	(C-Adjunct)
R. Munger	Medical Physics	(O-Adjunct)
Cheng Ng	Medical Physics	(C-Adjunct)
Tony Noble	Experimental High Energy Physics	(C-Adjunct)
F.G. Oakham	Experimental High Energy Physics	(C)
Peter Piercy	Surface Physics	(O)
G.P. Raaphorst	Medical Physics	(C-Adjunct)
D.G. Rancourt	Earth and Planetary Materials	(O)
Sylvain Raymond	Experimental Condensed Matter	(O-Adjunct)
D.W.O. Rogers	Medical Physics	(C-Adjunct)
Giles Santyr	Medical Physics	(C)
Ken Shortt	Medical Physics	(C-Adjunct)
W.D. Sinclair	Solar Neutrino Physics	(C)
G.W. Slater	Polymer Physics	(O)
A.K.S. Song	Condensed Matter Theory	(O)
Z.M. Stadnik	Experimental Condensed Matter	(O)
M.K. Sundaresan	Theoretical Particle Physics	(C)
John Tse	Computational Physics	(O-Adjunct)
Y.P. Varshni	Theoretical Solid State, Astrophysics	(O)
T. Waker	Medical Physics	(C-Adjunct)
P.J.S. Watson	Theoretical Particle Physics	(C)

Robyn Williams

Semiconductor Physics

(O-Adjunct)

J.C. Woolley

Semiconductor Physics

(O)

## Graduate Students at the Institute in 2001

<b>Student</b>	<b>Registered</b>	<b>Supervisor(s)</b>	<b>Completed</b>
Adeluyi, Adeola	(C) PhD Sep-01	Godfrey	
Allen, Claudine	(O) PhD Jan-01	Fafard, Raymond	
Al-Qadi, Khalid	(O) PhD Sep-01	Bao	Completed MSc
Belanger, Guillaume	(C) MSc Sep-00	Oakham	
Boileau, Justin	(O) MSc May-99	Slater	
Buckley, Lesley	(C) PhD Sep-01	Rogers	
Bueti, Diego	(O) MSc Sep-00	Longtin	
Carlone, Marco	(C) PhD Sep-00	Raaphorst	
Chacron, Maurice	(O) PhD Sep-98	Longtin	
Chen, Ou	(O) MSc Sep-01	Bao	
Crisan, Simona	(O) MSc Sep-00	Slater	
Dalnoki-Veress, Ferenc	(C) PhD Sep-95	Hargrove	
Doiron, Brent	(O) PhD May-01	Longtin	
Donkers, Michael	(C) PhD Sep-97	Hemingway	
Evans, James	(O) PhD May-01	Rancourt	Completed MSc
Feagan, Carey	(C) MSc Sep-99	Ng	Completed Dec.
Ferrier, Graham	(O) MSc Sep-00	Bao	
Flacau, Roxana	(O) MSc Sep-01	Desgreniers	
Fournier, Luc	(O) MSc Sep-00	Joós	
Gao, Zhanrong	(C) PhD Sep-01	Gerig	Comp. MSc. Aug
Gauthier, Michel	(O) MSc Jan-01	Slater	
Gherase, Mihai	(C) PhD Sep-01	Santyr	
Girard, Jean-François	(O) MSc Sep-01	Williams	
Gorjanc, Timothy	(O) PhD Jan-99	D'Iorio	
Grant, Darren	(C) PhD Sep-98	Noble	
Hasan, Ziaul (Mohammed)	(C) MSc Sep-01	Johns	

Haysom, Joan	(O) PhD Sep-97	Charbonneau	Completed
Hinzer, Karin	(O) PhD Sep-98	Charbonneau, Fafard	Completed
Hou, Weimin	(O) MSc May-00	Desgreniers	
Hubert, Sylvain	(O) PhD Sep-96	Slater	
Jelveh, Salomeh	(C) MSc Sep-99	Jarosz	
Kalach, Nina	(C) MSc Sep-99	Rogers	Completed
Katsev, Sergei	(O) PhD May-99	L'Heureux	
Kenward, Martin	(O) PhD May-01	Slater	
Knight, Gary	(O) PhD Sep-00	Hodgson, Smy	
Korkusinski, Marek	(O) PhD Sep-01	Hawrylak	
Labrie, Josée	(O) MSc Sep-98	Slater	Completed
Lagarec, Ken	(O) PhD Jan-96	Rancourt	Completed
Lam, Jennifer	(O) PhD Sep-97	D'Iorio	Withdrew
Leblanc, Pierre	(O) MSc Sep-01	Fortin	
Lu, Ping	(O) PhD Sep-00	Bao, Chen	Completed - Dec
Martinez, Jose	(C) PhD Sep-01	Jarosz	
Masse, Mathieu	(O) MSc May-99	Fortin	Completed
McCormick, Laurette	(O) PhD May-01	Slater	
McDonald, Mark	(C) MSc Sep-98	Santyr	Completed-Jan
Mercier, Jean-Francois	(O) PhD May-99	Slater	
Mercier, Patrick	(O) PhD Sep-96	Rancourt	
Merizzi, Andre	(O) MSc Sep-00	Fortin	Completed-Dec
Middleton, Jason	(O) PhD Sep-01	Longtin	
Mullins, Dana	(C) MSc Sep-01	Ng	
Myint, Kenji	(C) PhD Sep-01	Raaphorst	Comp. MSc Aug
Nezamzadeh, Marzieh	(C) Msc May-01	Cameron	
Niedbala, Malgorzata	(C) PhD Jan-99	Raaphorst	
Nixon, Grant	(O) PhD Sep-94	Slater	
Nkongchu, Ken	(C) PhD Sep-01	Santyr	Comp. MSc Aug.
Olariu, Elena	(C) MSc Sep-00	Cameron	

Parra Robles, Juan	(C) PhD Jan-00	Santyr	
Prévoost, Jean-Paul	(O) PhD Jan-01	Rancourt	
Ramsay, Jamie	(O) MSc Sep-00	Williams	
Rezeq, Moh'd	(O) PhD May-99	LeBlanc	
Riel, Bruno	(O) PhD Sep-97	Piercy	
Simionescu, Razvan	(C) PhD Sep-00	Santyr, Cameron	
St-Hilaire, Martin	(O) MSc Jan-98	Longtin	
Tchoko, Flavie Yamako	(C) MSc Sep-01	Cameron	
Tessier, Frederic	(O) PhD Sep-99	Slater	
Valdes, Marcelo	(C) MSc Sep-97	Sundaresan	
Walker, Robert	(O) MSc Sep-01	Bao	
Waller, David	(C) PhD Sep-97	Karlen	
Wang, Pu	(O) MSc Jan-01	Stadnik	
Wassenaar, Richard	(C) MSc Sep-99	deKemp	
Wismayer, Matthew	(C) MSc Sep-99	Johns	Completed-Nov
Yu, Qinrong	(O) PhD Jan-01	Chen, Bao	
Zeng, Xiaodeng	(O) MSc Sep-00	Bao	



## Research Associates at the Institute in 2001

Name	Period	Supervisor(s) or Group
Albert Cross		G. Santyr
Mei-Zhen Dang	2000 -	D. Rancourt
Jacques Dubeau	January 1995 -	M. Dixit
Jacques Farine	January 1998 -	D. Sinclair
Steve Guillouzic	Jan – Dec 2001	G.W. Slater
Huang, C.	1999 - 2001	L. Chen / X. Bao
Tom Junk	April 1998 -	OPAL/Carleton
Mohsen Khakzad	September 2000 -	G. Oakham
Peter Krieger		G. Oakham
Leonid Kulyuk	May 2001	E. Fortin
Carlo Laing		A. Longtin
Ilan Levine	June 1997 -	D. Sinclair
Dongfeng Liu	November 2001 – December 2002	X. Bao
Andrey Nossov		G. Santyr
Darryl Roberts	September 2001 -	D. Rancourt
Nikolai Romanenko	October 2000 -	S. Godfrey and P. Kalyniak
Kirsten Sachs	April 2000 -	OPAL/Carleton
N. Starinski		D. Sinclair
Shahraam Afshar Vahid	October 2001 – September 2002	X. Bao / L. Chen
Claar van der Zee	October 2001 -	D. Rancourt
David Waddy	May 2001 – April 2002	X. Bao, L. Chen
Julia Wallace		G. Santyr
G. Wu	August 2001 – July 2002	X. Bao

Hongyan Zhou

Jan – Oct 2001

G.W. Slater

## Funding in 2001

Name	Source	Amount per year
X. Bao	NCE – ISIS	130,000
	NCE-CIPI	62,000
	NSERC operating	42,000
	Concrete Canada	3,800
	U of Ottawa	20,000
	Photonics Research Ontario (with L. Chen)	100,000
	PREA	50,000
Ian Cameron	NSERC (with G. Santyr)	96,000
L. Chen	U Ottawa	5,000
	NSERC operating	13,300
J.E. Cygler	ORCC Foundation	8,000
S. Desgreniers	NSERC operating	25,500
M. D'lorio	NSERC operating	12,000
	NRC univ/ind. Partnership with J.-P. Dodelet (INRS), A.S. Hay (McGill) and Luxell Technologies	120,000
	NCIT with W. Wang operating	100,000
	NCIT with W. Wang equipment	177,333
S. Fafard	NSERC operating	14,500
E. Fortin	NSERC operating	40,000
L. Gerig	ORCC Foundation	10,000
	ORCC Research Grant	25,000
	Siemens Industrial Research Grant	5,000
S. Godfrey	NSERC operating	44,000
R.J.W Hodgson	NSERC operating	5,800
B.J. Jarosz	NSERC operating	20,790
P.C. Johns	NSERC operating	19,300
B. Joós	NSERC operating	30,000
P. Kalyniak	NSERC operating	33,000
D. Karlen	NSERC MFA	187,859
	NSERC IOF with Carnegie, Dixit, Godfrey, Kalyniak, Mes, Mattison	40,500

G. Lamarche	NSERC operating	6,930
I. L'Heureux	NSERC operating	25,000
A. Longtin	NSERC operating	28,350
	Ontario govt. PREA	36,000
	Canadian Institutes of Health (with L. Maler)	92,000
C.E. Ng	NCIC (PI)	45,000
	NCIC (PI)	99,000
P. Piercy	NSERC operating	12,000
G.P. Raaphorst	NCIC (PI)	91,000
D. Rancourt	NSERC operating	34,650
	NSERC SPG (with 7 co-applicants)	160,217
	NSERC (equipment)	31,660
	Noranda	7,400
G. Santyr	NSERC Collaborative Health Research Grant with Cameron	96,000
	NSERC operating	26,500
	Canadian Breast Cancer Research Initiative	35,000
	Heart and Stroke Foundation	68,000
	ORDCF	50,000
G.W. Slater	Applied Biosystems with Guy Drouin, Dept. of Biology	203,000
	NSERC operating	49,203
	Univ. Research Fund, UofO (Equip)	4,500
	Faculty Development Fund, UofO (Equip)	2,250
	Departmental Develop. Fund, UofO (Equip)	2,250
	Geninex (Geneva)	15,000
K.S. Song	NSERC operating	15,000
Z.M. Stadnik	NSERC operating	27,489
M.K. Sundaresan	NSERC operating	16,000
Y.P. Varshni	NSERC operating	10,400
ATLAS Collaboration:	NSERC operating	252,816
J. Armitage, M.S. Dixit, F.G. Oakham	NSERC MIG	300,000

OPAL Collaboration: R.K. Carnegie, R.J Hemingway, D. Karlen, M.S. Dixit, C.K. Hargrove, M. Losty, H. Mes, F.G. Oakham	NSERC operating	281,916
SNO Collaboration: C.K. Hargrove, A. Noble, D. Sinclair	NSERC operating	311,000
J.Armitage M.S. Dixit, C.K. Hargrove, M. Losty, H. Mes, A. Noble F.G. Oakham D.Sinclair	NSERC MFA	130,000
	<b>TOTAL for 2001</b>	<b>3,903,778</b>