

CHEP

Centre for High Energy Physics

McGill University

Annual Report 2006–2007

(June 2006 – May 2007)

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1 Introduction

Greetings! This report is a summary of the activities of our members during the 2006-2007 year. The research activities will be described here, while the actual lengthy lists of publications and seminars will be made separately available.

Usual warning: since the Centre is primarily devoted to research and the principal members all have faculty positions in the Physics Department, academic matters, teaching, funding and consulting activities are identical and will not be repeated here. *Please consult the annual report of the Physics Department for details.*

Please also note that the Centre for High Energy Physics (CHEP) is to be distinguished from the CHEP/Astro consortium. The former is our real physics research entity and the subject of this report while the latter is the association of the CHEP groups with the local McGill Astrophysics groups for managing the computer networks of all our groups under one single organization. Since the Astrophysics groups came later, they naturally joined our technical infrastructure to the advantage of all. On the physics Department webpages, both entities (CHEP and Astro) are listed together for these organisatory reasons and also because so many of the research interests overlap, although no formal integration has yet been pursued.

2 Our Centre

Subatomic physics is at the leading edge of fundamental research. It addresses essentially the structure of matter and its interactions. All the known particles of matter can be described as combinations of a very few building blocks, the quarks and the leptons, representing 2 families of 6 particles. Four types of forces have been identified in nature: gravitational, electromagnetic, strong and weak. Illustrating examples could be planetary systems, light emission from atoms, existence of nuclei or slow nuclear disintegrations, respectively. Two of the great scientific achievements of the past decades have been the discovery of the 6th quark “top”, and the unification of the electromagnetic and weak interactions as manifestations of a single electro-weak process. Further promising unification efforts are currently being done to include the strong interaction and later on gravitation.

This bold program is carried out experimentally in a few large international collaborations. Our experimental groups are involved in the foremost projects at research centers in the USA and Europe. They contribute significantly to all steps of the projects, from detector construction via detailed data analysis to interpretation and understanding of the results. The theoretical approach is also extremely strong and fully complementary. It moreover can be shown that very high energy phenomena, in astrophysics or cosmology, are ultimately but other aspects of our research axes and therefore are also investigated. The scales and complexity of the field, but also the many scientific and technical ramifications represent the unique characteristics of our Centre and strengthens its dynamics as a research entity.

Our members endeavor to use the Centre to deepen our research efforts, to create an even more stimulating environment for extended collaborations and research, to improve recruitment and formation of young researchers and graduate students, and to coordinate all our common activities. This is being achieved through seminar series, conference and visitor programs, computer network unification, sharing of laboratories and equipment, extensive exchanges of experience and know-how, and development of applications. The “McGill Centre for High Energy Physics” has an almost

20-year long tradition, was already re-structured considerably in 1995 and underwent in a few years ago another transformation as several new young faculty members joined our efforts and promoted new directions.

This mission statement is essentially identical to the one from the previous years. Several changes are of course happening continuously in the course of the research, but in our long range program they affect but little the main lines of research. For this reason, in this year's report, instead of providing major repetitions, the general outlines of our research work will be skipped altogether and only the highlights will be listed for our numerous axes of research.

3 Composition of the Centre

The Centre membership spans large areas of studies in the fields of high energy physics, particle physics, cosmology, astrophysics and many aspects of nuclear physics. In the following tables, the lists of members are presented, each roughly identified by his/her experimental (X) or theoretical (T) orientation, as well as the general domains of high-energy physics (HEP), nuclear physics (NP) or astro-particle physics (Astro).

Faculty Members

1	Barrette, Jean	McGill University	XNP
2	Brandenberger, Robert	CRC/McGill University	THEP
3	Buchinger, Fritz	McGill University	XNP
4	Cline, James M.	McGill University	THEP
5	Corriveau, François	IPP/McGill University	XHEP
6	Crawford, John	McGill University	XNP
7	Das Gupta, Subal	McGill University	TNP
8	Dasgupta, Keshav	McGill University	THEP
9	de Takacsy, Nick	McGill University	TNP
10	Dobbs, Matt	CRC/McGill University	Astro
11	Gale, Charles	McGill University	TNP
12	Grisaru, Marc	McGill University	THEP
13	Hanna, David S.	McGill University	Astro
14	Jeon, Sangyong	McGill University	TNP
15	Lee, Jonathan	McGill University	XNP
16	Moore, Guy D.	McGill University	THEP
17	Moore, Robert	McGill University	XNP
18	Patel, Popat M.	McGill University	XHEP
19	Ragan, Kenneth	McGill University	Astro
20	Robertson, Steven	IPP/McGill University	XHEP
21	Stairs, Douglas G.	McGill University	XHEP
22	Vachon, Brigitte	CRC/McGill University	XHEP
23	Warburton, Andreas	McGill University	XHEP

Post-Docs and Research Associates

1	Biswas, Tirhabir	McGill University	Postdoc	THEP
2	Chaudhuri, Gargi	McGill University	Postdoc	TNP
3	de Rham, Claudia	McGill University	RA	THEP
4	Firouzjahi, H.	McGill University	Postdoc	THEP
5	Frey, A.	McGill University	Postdoc	THEP
6	Gulik, Sidney	McGill University	RA	XNP
7	Kanno, S.	McGill University	Postdoc	THEP
8	Kildea, John	McGill University	RA	Astro
9	Kim, Hojeong	McGill University	RA	THEP
10	Knauf, A.	McGill University	Postdoc	THEP
11	Koh, S.	McGill University	Postdoc	THEP
12	Trevor Lanting	McGill University	Postdoc	Astro
13	Maier, Gernot	McGill University	RA	Astro
14	Notari, Alessio	McGill University	Postdoc	THEP
15	Potter, Chris	McGill University	RA	XHEP
16	Saremi, O.	McGill University	Postdoc	THEP
17	Shi, Lijun	McGill University	Postdoc	TNP
18	Snihur, Robert	McGill University	RA	XHEP
19	Stoica, Horace	McGill University	Postdoc	THEP
20	Topor Pop, Vasile	McGill University	RA	XNP
21	Torrieri, Giorgio	McGill University	Postdoc	TNP
22	Santamaria, Cibran	McGill University	RA	XHEP
23	Walsh, Roberval	McGill University	RA	XHEP

Visitors (Researchers)

1	Prof. S. Alexander	Penn State Univ.
2	Dr. R. Allahverdi	Univ. of Waterloo and Perimeter Institute
3	Dr. Pavel Bolokhov	Univ. of Victoria
4	Prof. R. Brout	Perimeter Institute and Univ. Libre, Bruxelles
5	Dr. G. Calcagni	Sussex Univ.
6	Prof. S. Das	Univ. of Kentucky
7	Prof. A.-C. Davis	DAMTP, Univ. of Cambridge
8	Dr. Joel Giedt	Rensselaer Polytechnic Institute
9	Dr. S. Hellerman	IAS, Princeton
10	Prof. A. Jevicki	Brown Univ.
11	Prof. J. Karczmarek	UBC
12	Prof. J. Khoury	Perimeter Institute
13	Dr. Marcia Knutt	McGill MacDonald Campus
14	Prof. A. Lawrence	Brandeis Univ.
15	Dr. Peter Loch	Arizona University
16	Prof. R. Mansouri	Sharif Univ., Tehran, Iran
17	Prof. A. Mazumdar	Nordita, Denmark
18	Dr. A. Nayeri	Harvard Univ.
19	Dr. Pierre Petroff	LAL
20	Dr. S. Rasanen	CERN
21	Dr. G. Rigopoulos	Utrecht Univ.
22	Prof. S. Sethi	Univ. of Chicago
23	Prof. S. Sheikh-Jabbari	IPM, Tehran, Iran
24	Dr. A. Tolley	Princeton Univ.
25	Dr. S. Watson	Univ. of Toronto

Professionals and Technicians

1	Mercure, Paul	McGill University	System manager
2	Nikkinen, Leo	McGill University	Technician

Graduate Students

1	Aubin, François	McGill University	Ph.D.	Astro
2	Barnaby, Neil	McGill University	Ph.D.	THEP
3	Bélanger-Champagne, Camille	McGill University	M.Sc.	XHEP
4	Berndsen, Aaron	McGill University	Ph.D.	THEP
5	Bettefeld, Thorsten	Brown University	Ph.D.	THEP
6	Blomeley, Laura	McGill University	M.Sc.	XNP
7	Bourque, François-Alex	McGill University	Ph.D.	TNP
8	Buzatu, Adrian	McGill University	Ph.D.	XHEP
9	Campbell, Benjamin	McGill University	Ph.D.	XHEP
10	Caron-Huot, Simon	McGill University	Ph.D.	THEP
11	Chen, Fang	McGill University	M.Sc.	THEP
12	Cyr-Racine, Francis	McGill University	M.Sc.	THEP
13	Danos, Rebecca	McGill University	Ph.D.	THEP
14	Dorais, Vincent	McGill University	Ph.D.	THEP
15	Dufour, Marc-Andre	McGill University	M.Sc.	XHEP
16	Elliot, Joshua	McGill University	M.Sc.	THEP
17	Fillion-Gourdeau, François	McGill University	Ph.D.	TNP
18	Fortin, Pascal	McGill University	Ph.D.	Astro
19	Gagnon, Jean-Sébastien	McGill University	Ph.D.	TNP
20	Gianfrancesco, Omar	McGill University	Ph.D.	XNP
21	Gwyn, Rhiannon	McGill University	Ph.D.	THEP
22	Harnois-Deraps, Joachim	McGill University	M.Sc.	XHEP
23	Heredia-Ortiz, Roberto	McGill University	Ph.D.	TNP
24	Hoi, Loison	McGill University	Ph.D.	THEP
25	Kennedy, James	McGill University	M.Sc.	Astro
26	Kertzscher, Gustavo	McGill University	M.Sc.	XHEP
27	Klemetti, Miika	McGill University	M.Sc.	XHEP
28	Lachapelle, Jean	McGill University	M.Sc.	THEP
29	Lashkari, Nima	McGill University	M.Sc.	THEP
30	Laycock, D.	McGill University	M.Sc.	THEP
31	Li, Gang	McGill University	M.Sc.	XNP
32	Lindner, Thomas	McGill University	Ph.D.	Astro
33	Liu, Chuanlei	McGill University	Ph.D.	XHEP
34	MacDermid, Kevin	McGill University	M.Sc.	Astro
35	MacLeod, Audrey	McGill University	M.Sc.	XHEP
36	Martineau, Patrick	McGill University	Ph.D.	THEP
37	McCann, Andrew	McGill University	Ph.D.	Astro
38	McCutcheon, Michael	McGill University	Ph.D.	Astro
39	McLachlin, Sheila	McGill University	Ph.D.	XHEP
40	Mia, Mohammed	McGill University	M.Sc.	TNP
41	Mueller, Carsten	McGill University	Ph.D.	Astro
42	Patil, Subodh	McGill University	Ph.D.	THEP
43	Piche, R.	McGill University	Ph.D.	THEP
44	Qin, Guanyou	McGill University	Ph.D.	TNP
45	Rahman, Tanvir	McGill University	Ph.D.	XNP
46	Rhéaume, Pascal	McGill University	Ph.D.	XHEP
47	Roy, Philippe	McGill University	M.Sc.	XHEP
48	Shuhmaher, Natalia	McGill University	Ph.D.	THEP
49	Schwartz, Jason	McGill University	M.Sc.	XHEP
50	Stewart, Andrew	McGill University	M.Sc.	THEP
51	Turbide, Simon	McGill University	M.Sc.	TNP
52	Valcarcel, Luis	McGill University	Ph.D.	Astro
53	Vincent, A.	McGill University	M.Sc.	THEP
54	Williams, Greg	McGill University	Ph.D.	XHEP
55	Yamamoto, Yoshihisa	McGill University	Ph.D.	Astro
56	Yamashita, Hiroki	McGill University	M.Sc.	THEP
57	Zhou, Changyi	McGill University	Ph.D.	XHEP

Undergraduate Students (incomplete list)

1	Amsel, Stephen	McGill University	Summer student	THEP
2	Berger, Joshua	McGill University	Summer student	THEP
3	Chapleau, Bertrand	McGill University	Summer student	XHEP
4	Cohalan, Claire	McGill University	Summer student	THEP
5	Dufour, Marc-Andre	McGill University	Summer student	XHEP
6	Dyda, Sergei	McGill University	Summer student	THEP
7	Hartung, Kurt	McGill University	Semester student	THEP
8	Kamin, Kareem	McGill University	Semester student	THEP
09	Mukherjee, Rajat	McGill University	Semester student	THEP
10	Najih, Mohamed	McGill University	Summer student	THEP
11	Perras, Joel	McGill University	Summer student	XHEP
12	Sharman, Jonathan	McGill University	Summer student	THEP
13	Simic, Dusan	McGill University	Summer student	THEP
14	Sutton, Julie	McGill University	Summer student	XHEP

4 Highlights of the Year (excerpts only)

Workshops

1. *First Canadian Geant4 Tutorial/Workshop*, A. Warburton as Principal organizer (with Frank Verhaegen, Medical Physics, McGill), 80 participants (both Canadian and international), McGill University, 2006.09.25-28.
2. *CDF Simulation group and Monte Carlo production*, A. Warburton as co-leader for the Collider Detector at Fermilab. Convened or assisted in the organization of approximately 20 bi-weekly meetings containing technical presentations by graduate students, postdoctoral researchers, and faculty at the Fermi National Accelerator Laboratory in Batavia, IL, USA. Responsible for international coordination of off-site (non-Fermilab) large-scale production of Monte Carlo simulation data on 9 computing farms in Asia, Europe, and North America. In this capacity, co-convened representatives from the major CDF physics groups (bottom, electroweak, exotics, Higgs, QCD, and top); coordinated privileged access to remote super-computer farms for high-priority Monte Carlo production.
3. *3rd ATLAS North American Physics Workshop*, B. Vachon, Member of the scientific program committee, 26-28 July 2006, Boston (<http://physics.bu.edu/atlas2006/>).
4. *TRIUMF Summer school 2006*, B. Vachon, Member of the scientific organising committee, 10-21 July 2006, Vancouver. In addition, participation in the summer school as discussion leader.
5. *ATLAS mini-workshop on jet reconstruction*, B. Vachon, Organization, McGill University, 24-25 July 2006.
6. *First ATLAS physics workshop of the Americas*, B. Vachon, Member of the program committee, held at SLAC (<http://www-conf.slac.stanford.edu/atlas2007/>) (20-23 August 2007).

7. *International Conference on Computing in High Energy and Nuclear Physics*, B. Vachon, Member of the scientific committee, 2-7 Sept 2007, Victoria BC. Program track leader and session chair for "Event processing" track (2007).
8. *BABAR simulation workshop*, S. Robertson, Principal organizer, SLAC, Feb 26, 2006.
9. *GEANT4 workshop*, S. Robertson, Local organizer, <http://www.medphys.mcgill.ca/~geant4/Welcome.html> (McGill, September 25-28, 2006).
10. *BABAR collaboration meeting*, S. Robertson, Principal local organizer, McGill, June 20-24 2006.
11. *Experimental High Energy Physics and Astroparticle Physics Wednesday Meetings*, F. Corrivéau, Coordinator since October 2006. This series is targetted to our HEP graduate students. See <http://www.hep.mcgill.ca/XHEP/HEPmeetings/Wedsgrad.html>
12. *Workshop on New Ideas at the Interface of String Theory and Cosmology*, R. Brandenberger, Jan. 2006, McGill Univ. (main organizer)
13. *Workshop on Singularity Resolution in String Theory*, R. Brandenberger, Sept. 22 - 24, 2006, McGill Univ. (main organizer)
14. *The Quantum Nature of Spacetime Singularities*, R. Brandenberger, KITP Mini-Program, Jan. 2007 Member of the Organizing Committee.
15. *Research in Teams Program at Banff International Research Station*, J. Cline, H. Firouzjahi, K. Dasgupta, C. Burgess, Organizers for Research "Inflation from String Theory", 8-22 July 2006

Conferences, Invited Lectures and Talks

1. *Collider Physics at the Highest Energies*, A. Warburton, introductory high-energy physics talk given to visiting high-school students as part of McGill Explorations 2006 Day, McGill, 2006.07.17.
2. *First Evidence for Single Top Quark Production with the D0 Experiment*, B. Vachon, (invited speaker), Winter Institute for Nuclear and Particle Physics Conference, Banff, Alberta, 16-18 February 2007.
3. *Search for W' boson in top quark decay using the D0 experiment*, B. Vachon (on behalf for the D0 Collaboration), Division of Particle and Fields, Honolulu, Hawaii, 29 October-3 November 2006.
4. *A walk on the wild side: Physics at the energy frontier with the ATLAS experiment*, B. Vachon, (invited talk), Canadian Association of Physicists Congress, St. Catharines, Ontario, 11-14 June 2006.
5. *A walk on the wild side: Physics at the energy frontier with the ATLAS experiment*, B. Vachon, Physics colloquium McMaster University, Hamilton, Ontario, 11 April 2007.
6. *A walk on the wild side: Physics at the energy frontier with the ATLAS experiment*, B. Vachon, High Energy Physics Seminar, Penn State University, State College, Pennsylvania, 4 April 2007.

7. *Truth and Consequences: Introducing the Top Quark*, B. Vachon, Departmental colloquium, Queen's University, Kingston, Ontario, 1 March 2006.
8. *B Physics*, S. Robertson, TRIUMF Summer Institute, (July 12-15 2006).
9. *$B \rightarrow l\nu(\gamma)$, $B \rightarrow K(^*)\nu\nu$ and $B^0 \rightarrow l+l(\gamma)$ with 1ab-1*, S. Robertson, BABAR 1ab-1 Workshop, (SLAC, December 7, 2006). Moscow, July 26 - Aug 2 2006; hep-ex/0607110.
10. *Experimental prospects for $b \rightarrow s\nu\nu$ and $B \rightarrow l\nu(\gamma)$* , S. Robertson, Flavour in the Era of the LHC, 2nd workshop, (CERN, May 15-17 2006).
11. *"Charged Higgs*, S. Robertson, ATLAS Canada Physics Meeting (Victoria, Dec 11-15 2006).
12. *ZEUS for Beginners*, F. Corriveau, HEP seminar, Department of Physics, McGill University, 30 November 2006.
13. *Particle Colliders*, F. Corriveau, Invited Lecture, Dawson College, Montreal, 28 February 2007.
14. *Conceptual Problems of Inflationary Cosmology and a New Approach to Cosmological Structure Formation*, R. H. Brandenberger, arXiv:hep-th/0701111, invited plenary talk at "Inflation + 25, 22^{ème} Colloque de l'IAP", June 26 - 30, 2006, to be publ. in the proceedings (Springer, Berlin, 2007).
15. *Topics in cosmology*, R. Brandenberger, arXiv:hep-th/0701157, invited lectures at School on Particle Physics, Gravity and Cosmology: 1. Interface Between Cosmology and Particle Physics. 2. Particle Physics, Gravity and String Theory, Dubrovnik, Croatia, 21 Aug - 2 Sep 2006. publ. in the proceedings (Proceedings of Science).
16. *String Gas Cosmology and Structure Formation: A Brief Review*, R. Brandenberger, arXiv:hep-th/0702001, Invited talk at International Symposium on Cosmology and Particle Astrophysics (CosPA 2006), Taipei, Taiwan, China, 15-17 Nov 2006, to be publ. in the proceedings (Int. J. Mod. Phys. D).
17. *Strings, Space-Time Non-Commutativity and Structure Formation*, R. Brandenberger, arXiv:hep-th/0703173, invited talk at the 21st Nishinomiya-Yukawa Memorial Symposium on Theoretical Physics "Noncommutative Geometry and Quantum Spacetime in Physics", Nov. 11 - 15, 2006, to be publ. in the proceedings (Prog. Theor. Physics Suppl.).
18. *Towards an Alternative to Inflation*. R. Brandenberger, Invited Talk, Banff Workshop "Frontiers in String Theory", Feb. 11 - 16, 2006
19. *Les Supercordes et l'Origine de l'Univers*. R. Brandenberger, Conferencier Invite, Colloque de Physique des Particules, Le Savoir: Trame de la Modernité", 74^{ème} Congres de l'ACFAS May 15, 2006, McGill University
20. *String Gas Cosmology and Structure Formation*. R. Brandenberger, Invited Speaker, Workshop on Superstring Cosmology, Perimeter Institute, June 6-7 2006
21. *New Views on Space-Time from Superstring Theory*. R. Brandenberger, Invited Speaker, "Second International Conference on the Ontology of Space-Time", Concordia University, Montreal, June 9 - 11 2006

22. *Les Supercordes et l'Origine de l'Univers*. R. Brandenberger, Invited Public Lecture, IAP, Paris, June 27 2006
23. *String Gas Cosmology and Structure Formation*. R. Brandenberger, Invited Speaker, 22nd IAP Colloquium: “Inflation + 25”, IAP, Paris, June 26 - 30 2006
24. *Cosmology*. R. Brandenberger, Invited Lecturer, Triumph Summer School on Particle Physics, Triumph, Vancouver, July 10 - 21 2006
25. *String Gas Cosmology and Structure Formation*, R. Brandenberger, Invited Lecturer, “Time-Dependent Backgrounds and the Cosmological Singularity in String and M-Theory” conference, Center for Theoretical Cosmology, Cambridge University, August 21 - 25, 2006
26. *Topics in Modern Cosmology*. R. Brandenberger, Invited Lecturer, Dubrovnik Summer School on Particles, Strings and Cosmology, August 21 - Sept. 1, 2006
27. *String Gas Cosmology and Structure Formation* R. Brandenberger, Invited Speaker, Workshop on Ultraviolet Cutoffs in Cosmology, Sept. 5 - 8, 2006, Perimeter Institute
28. *String Theory, Space-Time Non-Commutativity and Structure Formation*. R. Brandenberger, Invited Lecturer, 21st Nishinomiya-Yukawa Memorial Symposium Noncommutative Geometry and Quantum Spacetime in Physics”, Kyoto, Nov. 11 - 15 2006
29. *String Gas Cosmology and Structure Formation*. R. Brandenberger, Invited Lecturer, COSPA Conference, Nov. 15 - 17 2006, NTU, Taiwan
30. *String Gas Cosmology and Structure Formation*. R. Brandenberger, Invited Speaker, “Workshop on High Energy, Cosmology and Strings”, Institut Henri Poincare, Paris, Dec. 11 - 15, 2006
31. *String Theory and the Birth of the Universe*. R. Brandenberger, Physics Colloquium, University of Notre Dame, Feb. 1, 2006
32. *Towards an Alternative to Inflation*. R. Brandenberger, Pizza Seminar, McGill University, March 1 2006,
33. *String Theory and the Birth of the Universe*. R. Brandenberger, Physics Colloquium, University of Tennessee, April 3 2006
34. *String Gas Cosmology and Structure Formation*. R. Brandenberger, Theory Seminar, Yukawa Institute, Kyoto University
35. *String Gas Cosmology and Structure Formation*. R. Brandenberger, Theory Seminar, CERN, July 6 2006
36. *String Gas Cosmology and Structure Formation*, R. Brandenberger, Theory Seminar, University of Kentucky, October 23 2006
37. *String Gas Cosmology and Structure formation*, R. Brandenberger, Seminar, Leiden University, Dec. 11, 2006
38. *Plasma Instabilities in the QGP*, G. Moore, Strong and Electroweak Matter 2006: Brookhaven NY, May 10-13.

39. *Plasma Instabilities in Hot QGP*, G. Moore, Theory Canada 2006: Perimeter Institute, June 7-10.
40. *Numerical Studies of Quark-Gluon Plasma Instabilities*, G. Moore, Workshop on Classical Field Theory & Solitons, Cambridge University, Cambridge, England, July 3-6 2006.
41. *Dependence of Plasma Instabilities on the Level of Anisotropy*, G. Moore, INT workshop on nonequilibrium quark-gluon plasma, Institute for Nuclear Theory, Seattle Washington, September 21-25 2006.
42. *Comparing QCD and $N=4$ Super-Yang-Mills: Shear Viscosity*, G. Moore, McGill University seminar, 12 September 2006.
43. *Plasma Instabilities in QCD?*, G. Moore, Carleton University seminar, 24 October 2006.
44. *Plasma Instabilities in QCD?*, G. Moore, Laval University seminar, 15 December 2006.
45. *Viscosity, QGP, SYM, etc.*, G. Moore, Joint Univ. North Carolina/Duke/North Carolina State University nuclear theory seminar, 3 April 2007.
46. *Plasma Instabilities in QCD*, G. Moore, Universidad Autonoma Barcelona seminar, 24 April 2007.
47. *Baryogenesis*, James M. Cline, Sep 2006. 63pp. Lectures given at Les Houches Summer School - Session 86: Particle Physics and Cosmology: The Fabric of Spacetime, Les Houches, France, 31 Jul - 25 Aug 2006. e-Print: hep-ph/0609145
48. *String Cosmology*, James M. Cline, MCGILL-02-06, Dec 2006. 47pp. Lectures given at Advanced Summer Institute on New Trends in Particle Physics and Cosmology, Sheffield, England, 19-23 Jun 2006. e-Print: hep-th/0612129
49. *Imprints of Tachyonic Preheating on the CMB Spectrum*, James M. Cline, CERN, 16 August 2006
50. *Inflation from String Theory*, James M. Cline, presented to McGill Society of Physics Students, 2 Feb. 2006
51. *511 keV emission from galactic center*, James M. Cline, McGill Astro Tea, 13 May 2006
52. *Aspects of brane-antibrane inflation*, James M. Cline, Oct 2005. 6pp. presented at Theory Canada 1, Vancouver, British Columbia, Canada, 2-5 Jun 2005. Published in Can.J.Phys.84:447-452,2006. e-Print: hep-th/0510018
53. *Nongaussianity from tachyonic preheating in hybrid inflation*, James M. Cline, IAP 2006 Inflation +25 conference, Institute d'Astrophysique de Paris, 29 June 2006 and at Theory Canada 2 Conference, 9 June 2006, Perimeter Institute, Waterloo, Ontario
54. *Deployment of the VERITAS observatory*, S. LeBohec et al Workshop on Physics at the End of the Galactic Cosmic Ray Spectrum, Aspen, Colorado, 26-30 Apr 2005. Published in J.Phys.Conf.Ser.47:232-237,2006.
55. *VERITAS: Status c.2005*, T.C. Weekes et al Particles and Nuclei International Conference (PANIC 05), Santa Fe, New Mexico, 24-28 Oct 2005. Published in AIP Conf.Proc.842:1001-1003,2006.

56. *Whipple Telescope Observations of LS I +61 303: 2004-2006*, A. Smith et al The Multi-Messenger Approach to Unidentified Gamma-Ray Sources: 3rd Workshop on the Nature of Unidentified High-Energy Sources, Barcelona, Spain, 4-7 Jul 2006. Submitted to *Astrophys.Space Sci.* e-Print: astro-ph/0609697
57. *Ground-based Gamma-ray Astronomy with VERITAS*, D.H. Hanna, invited talk at the 61st Canadian Association of Physicists Congress, Brock University, June 14, 2006
58. *Digital Frequency Domain Multiplexer for mm-Wavelength Telescopes*, M. Dobbs and Eric Bissonette, presented May 2, 2007 at the IEEE NPSS Real Time Conference, Fermilab, IL.
59. *Bolometer Array Systems for Detection of the Cosmic Microwave Background*, M. Dobbs, Invited Talk, American Physical Society April meeting, April 22, 2006 in Dallas, Texas.
60. *Developments in Frequency Domain Multiplexing for Large Arrays of Transition Edge Sensor Bolometers*, M. Dobbs et al., Invited Talk, presented at the National Radio Science Meeting, Boulder, Colorado, Jan 2006.
61. *Mapping the history of the universe from the bottom of the planet: The story of the south pole telescope*, M. Dobbs, McGill Medical Physics unit Noon-time Seminar, April 13, 2007.
62. *Technology and Science Potential for New Microwave Background Experiments*, M. Dobbs, Invited Seminar presented at Carleton University Oct 17, 2006.
63. *Next Generation Cosmic Microwave Background Experiments*, M. Dobbs, Invited Seminar, Universit de Montral, presented April 27, 2006.
64. *Probing Inflation and Dark Energy with the Cosmic Microwave Background Radiation*, M. Dobbs, Invited Colloquium, University of Pittsburgh / Carnegie Mellon University, presented Feb 20, 2006.
65. *APEX-SZ First-Light and Instrument Status*, M. Dobbs, N. Halverson et. al., *New Astronomy Reviews* 50 (2006) 960-968.
66. *Frequency-domain readout multiplexing of transition-edge sensor arrays*, T.M. Lanting, K. Arnold, H-M. Cho, J. Clarke, M. Dobbs, W. Holzapfel, T. Lee, M. Lueker, P.L. Richards, D. Smith and H.G. Spieler, *proceedings of Low Temperature Detectors 11*, *Nucl. Instr. and Meth. A* 559, (2006), 793-795.

Special Publications

1. *The Standard Model: a Primer*, Cliff P. Burgess and Guy D. Moore, Book, Cambridge University Press, 542 pages, copyright January 2007.
2. *As Chair of the CDF Godparenting committee*, A. Warburton, Committee for an analysis of relative $\chi_c(1,2)$ charmonium meson hadroproduction rates; convened and chaired 8 Godparent meetings and oversaw release of two drafts to the CDF collaboration, submission to *Phys. Rev. Lett.*, and treatment of referee comments; gave Godparent chair's update talk at CDF B-group meeting, 2007.01.11; manuscript submitted 2007.03.10; accepted for publication by *Phys. Rev. Lett.* on 2007.05.03.

3. *Datasets for Fully Reconstructed Decays of B_0 , B_s , and Λ_{cb} Hadrons using the Two-Track Trigger (TTT)*, Philippe Roy, Rob Snihur, Rick Tesarek, Elena Vataga, and Andreas Warburton, CDF Internal Note CDF-8805, 2007.05.11.
4. *Inclusive b -jet Cross Sections*, Rob Snihur, Greg Williams, and Andreas Warburton, CDF Internal Note CDF-8807, 2007.05.15.
5. *A Second Look at Bayesian Neural Networks in the Search for Single Top Quarks in 1 fb-1 of Data*, V.M. Abazov et al. [D0 Collaboration], D0 Note 5361, 5 March 2007.
6. *Combining results from single top cross section measurements using the BLUE method*, V.M. Abazov et al. [D0 Collaboration], D0 Note 5342-CONF, 20 February 2007.
7. *A Neural Network Search for Single Top Quarks in 1 fb-1 of Data*, V.M. Abazov et al. [D0 Collaboration], D0 Note 5289, 16 November 2007.
8. *Observation of Biases in Jet Trigger Efficiency Measurements*, C. Blanger-Champagne, B. Vachon, D0 Note 5217, August 2006.
9. *Certification of Level 3 Jets for RunIIB*, C. Blanger-Champagne, C. Potter, B. Vachon, D0 Note 5130, May 2006.
10. *Computing limits using a Bayesian approach in the package top statistics*, S. Jain, H.B. Prosper, B. Vachon, R. Schwienhorst and D. Kau, D0 Note 5123, May 2006.
11. *The Rejection of Spurious Low ET Level 3 Jets Found in RunIIa*, C. Potter, B. Vachon, D0 Note 5092, April 2006.
12. *A search for the $B_0 \rightarrow e^+e^-\gamma$ and $B_0 \rightarrow \mu^+\mu^-\gamma$ decays*, B. Aubert et al., (BABAR Collaboration), Conference paper submitted to XXXIII International Conference on High Energy Physics, Moscow, July 26 - Aug 2 2006 ; hep-ex/0607058.
13. *A search for the decays $B^+ \rightarrow e^+\nu_e$ and $B^+ \rightarrow \mu^+\nu_\mu$ using hadronic-tag reconstruction*, B. Aubert et al., (BABAR Collaboration), Conference paper submitted to XXXIII International Conference on High Energy Physics,

Outreach

1. *Anges et Démons de Dan Brown: réalité et fiction*, by Prof. B. Vachon, at Cégep Sorel-Tracy, April 26th, 2006.
2. *Anges et Démons de Dan Brown: réalité et fiction*, by Prof. B. Vachon, at Vanier College, April 12 2006.
3. *Angels and Demons: Facts and Fiction*, by Prof. B. Vachon, Invited keynote speaker at the annual banquet of the Montreal chapter of the Sigma Xi Society, April 21st, 2006.
4. *La Physique des Particules*, Prof. B. Vachon, CEGEP de Beauceville, 5 February 2007.
5. *Experimental Particle Physics*, Prof. B. Vachon, Marianopolis CEGEP, 29 March 2007.
6. *Angels and Demons: Facts and Fiction*, Prof. B. Vachon, Dawson College, Montreal, 25 April 2007.
7. *Homer Physics Lecture*, Prof. B. Vachon, McGill Physics Department, 9 March 2007.

Research awards

1. *T2 Canada Research Chair in Astro-particle physics*, Prof. M. Dobbs, McGill University, stating in 2006.
2. *NSERC, Canada Research Chair (Tier 1)*, Prof. R.H. Brandenberger, effective 01/10/2004

International Collaborations

1. *Leadership of the Canadian CDF collaboration*, A. Warburton, with collaborators from McGill University, the University of Toronto, and the University of Alberta.
2. *Group leader of McGill ATLAS research group*, B. Vachon, Scientific activities within ATLAS international collaboration: Group leader of McGill ATLAS research group (2004-present)
3. *Leader for the jet reconstruction in the ATLAS high-level trigger*, B. Vachon,
4. *Participation in ATLAS HLT Technical runs*, B. Vachon,
5. *Member of the search committee for the next chair of the ATLAS Trigger-DAQ institutional board*, B. Vachon,
6. *Canadian representative on the ATLAS TDAQ Resource board*. B. Vachon,
7. *Member of search committee for the next ATLAS physics coordinator*, B. Vachon,
8. *Member of the ATLAS spokesperson search committee*. B. Vachon,
9. *Institutional Board representative for the D0 Canadian consortium of 4 university groups (2004-2006)*. B. Vachon,
10. *BABAR Physics Analysis Coordinator search committee*, S. Robertson, Member (June 2006).
11. *BABAR Simulation development coordinator*, S. Robertson, (2004-June 2006)
12. *BABAR analysis review committee "Search for $B \rightarrow j D^{*l} \nu$ narrow states"*, S. Robertson, (June 2006)
13. *The CALICE Collaboration for the International Linear Collider*, F. Corriveau, Member of the Steering Board.
14. *ZEUS/McGill Research Group*, F. Corriveau, Local contact person and administrator of the group.
15. *ZEUS/Canada McGill representative*, F. Corriveau.

Committees

International

1. *Nobel Prize Committee for Physics (Stockholm): Evaluator of the nominations for the discovery of Neutrino Oscillations*, Prof. D.G. Stairs.

2. *Nuclear Physics: Physical Review Letters*, Divisional Associate Editor (continuing), Prof. J. Barrette.
3. *Service de Physique Nuclaire, DAPNIA, CEA/Saclay, France*, Members on Conseil Scientifique et Technique (continuing), Prof. J. Barrette.
4. *International Advisory Committee, Institute for Physics and Mathematics (IPM), Tehran, Iran*, Prof. R.H. Brandenberger, Member.

National

1. *NSERC Long Range Planning Committee*. Active participation by Profs K. Ragan (Chair) and A. Warburton. This committee is charged with establishing the roadmap for Canadian Sub-Atomic Physics for the next decade.
2. *Association of Canadian Universities for Research and Astronomy*. roadmap for Canadian Sub-Atomic Physics for the next decade. D. Hanna is the McGill representative at ACURA and member of its board of management.
3. *Institute of Particle Physics of Canada: President of the Board of Trustees*, Prof. D.G. Stairs, since 2002.
4. *Institute of Particle Physics of Canada*, J. Cline, elected Council member, 2005-2008.
5. *HEPnet/Canada advisory committee*, member of committee for computer wide-area networking in Canadian subatomic physics research, Prof. A. Warburton.
6. *Canadian Association of Physicists Director of Academic Affairs*, Prof. K. Ragan. Primary responsibility: chair of the CAPNSERC Liaison Committee. In this role he also participated in the national roundtable on the proposed Major Science Investment Panel (MSIP), and coordinated the CAP response to the MSIP proposal.
7. *SNOlab Experiments Advisory Committee*, Prof. K. Ragan, member.
8. *Joint Committee on Space Astronomy*, Prof. M. Dobbs, science advisory committee to the Canada Space Agency, member since March 2006.
9. *Representative for the North and West regions of Quebec on the Canadian Association of Physicists Council*, A. Warburton, on a two-year term running 2005 - 2007; launched a faculty membership campaign within McGill Physics; set up electronic visibility for CAP on departmental web pages.
10. *Member of the Council of the Canadian Institute of Particle (IPP) of Canada*, A. Warburton, on a three-year term running 2005 - 2008; this year conducted an international search for a new IPP Research Scientist.
11. *Member of advisory committee for HEPnet/Canada*, A. Warburton, (computer wide-area networking in Canadian subatomic physics research).
12. *Supercomputing consortium representatives on the National Steering Committee*, A. Warburton, for the CFI-funded Canadian TRIUMF Tier-1 Data Analysis Centre for the ATLAS Experiment at CERN.

13. *Faculty advisor to the Canada-America-Mexico 2007 (CAM'07)*, A. Warburton, Graduate Physics Conference, held at McGill in August 2007; financially responsible for the conference, which is obtaining funds from McGill, the CAP (institutional contributions), and TRIUMF (registration revenues).
14. *Canadian Academies consultation on Canada's strengths in science and technology*, B. Vachon, Participant in Council, online survey.
15. *CAP Particle Physics Division best presentation*, B. Vachon, Judge for the event. Annual CAP Congress, St. Catherines, Ontario (11-14 June 2006).
16. *Canada Research Chair Gender Representation*, B. Vachon, Participant in discussions, Ottawa (14th March 2006).
17. *CAP-PPD: Particle Physics Division of the CAP*, F. Corriveau, Manager of the web site of the Particle Physics Division of the Canadian Association of Physicists
<http://www.physics.mcgill.ca/~ppd>.
18. *IPP Principal Research Scientist*, F. Corriveau, One of the 8 Research Scientists of the Institute for Particle Physics across Canada.
19. *IPP Research Scientist*, S. Robertson, One of the 8 Research Scientists of the Institute for Particle Physics across Canada.
20. *Joint Committee on Space Astronomy*, M. Dobbs, Appointed (April 2006) to this science advisory committee to the Canada Space Agency.
21. *Cosmic Microwave Background (CMB) related space astronomy research*, M. Dobbs, Organized of this Canada-wide research effort for Cosmic Microwave Background (CMB) related space astronomy research. Obtained funding from the Canada Space Agency for annual face-to-face meetings and monthly telecons. Dobbs is chair of this group which includes membership from every faculty member in Canada who is presently active in CMB research.

Provincial

1. *Québec astrophysics regroupement stratégique*, Prof. K. Ragan, Adjunct Head.
2. *CAP College and Cegep Examination Prize 2006*, Coordination by Prof. F. Corriveau of the annual prize by the Canadian Association of Physicists (as the Québec regional coordinator).
3. *McGill Physics department outreach committee*, chaired by Prof. B. Vachon.
4. *FQRNT doctoral scholarship program*, B. Vachon, Member of the evaluation committee.

Referee Work

Several of our members serve as referees for publications in the main journals, societies or large experiments in the field:

- Physics Letters B
- Physics Review Letters

- Physical Review D
- Nuclear Physics B
- Physical Review C
- Journal of High Energy Physics
- Journal of Cosmology and Astro-Particle Physics
- Institute of Physics
- Institute of Physics Journal of Physics G: (Nuclear and Particle Physics)
- Internal editor for CDF experiments
- Internal editor for the D0 experiment
- Grant Referees NSERC
- Grant Referees NSF (US National Science Foundation)

5 Seminars 2006-2007

The Centre sponsors five interleaving seminar series instrumental in the training of researchers:

- A formal seminar series within the Centre attracts speakers from across Canada, the United States and European visitors to North America. The seminars are an integral component of our activity and are of great value to all members of the Centre, especially to our students and postdoctoral researchers. They are also organized jointly with the Particle Physics group of the Université de Montréal, so that further exchanges are generated.
- A popular series is the weekly “pizza lunch” seminar, usually featuring a Centre theory member discussing his or her current research in an informal atmosphere encouraging student participation.
- Another series is the “Wednesday Meetings” seminar, where all members of our experimental teams get together and discuss their research.
- Our nuclear physics theory colleagues also maintain frequent seminars where guests from outside are invited to present and share their research.
- Finally, a few major workshops and large meetings are now being initiated by members of our Centre on outstanding topics.

These seminars also provide a familiar setting in which graduate students and postdoctoral researchers gain valuable experience in presenting their work. All of our students, as well as most of our visitors give at least one of these talks sometime during their programme. Our permanent members are also contributing to the series.

The list of seminars are available on the web under

http://www.physics.mcgill.ca/chep/reports/chep_20062007_seminars.html

6 Publications (2006)

Publications, together with the training of our students and postdocs, are one of the most important elements of research, because they stimulate, guide and set goals to our undertakings.

The publications are available on the web under

http://www.physics.mcgill.ca/chep/reports/chep_20062007_publications.html

7 Honours, Awards and Prizes

Please refer to the annual report of the Physics Department.

8 Consulting Activities

Please consult the annual report of the Physics Department.