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CURRICULUM VITAE

Prof. Thomas S. Salisbury
York University

CONTACT INFORMATION:

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(NOTE: Also #430, Fields Institute, through June 2010)

EDUCATION:

Ph.D. in Mathematics – 1983, University of British Columbia
B.Sc. in Mathematics – 1979, McGill University

RESEARCH INTERESTS:

Brownian motion and Markov processes, Martin boundaries, superprocesses, conditioning, actuarial and mathematical finance

EMPLOYMENT:

York University: Full Professor (since 1994), Assoc. Prof. (1988–1993), Assist. Prof. (1985–1988)
University of California, San Diego: Visiting Assistant Professor (1987–1988)
Purdue University: Research Assistant Professor (1983–1985)
Visiting positions: Université de Paris XI (2009), Institut Henri Poincaré (2009), University of Auckland (Statistics Dept., 2009), Fields Institute (1997–1999, 2010), MSRI (1998), University of Edinburgh (1991), Stanford University (1986)

HONOURS & SELECTED ACTIVITIES

Mathematics:

- President, Canadian Mathematical Society (2006–2008)
- Deputy Director, Fields Institute (2003–2006)
- Chair, York Department of Mathematics & Statistics (2000–2003)
- Fellow, Institute of Mathematical Statistics (since 2003)
- Fellow, Fields Institute (since 2002)

Finance:

- Chief Probabilist & Director of Analytics, QWeMA Group (Quantitative Wealth Management Analytics), 2005–present
- Project leader, MITACS finsurance project (2008–2010)
- Instructor, Financial Engineering Diploma program, York University (since 1999)
- Instructor, QWeMA retirement risk analytics course, Fields Institute (2009, 2010)
- Instructor, PRM preparation course, PRMIA (2008)
- Organizer, Fields Institute seminar on quantitative finance (2003–2006)

Education:

- Member, Curriculum Council, Ontario Ministry of Education (2007–2009)
- Chair, Minister's task force on senior high school mathematics (2006)
- Co-chair, Fields Institute Mathematics Education Forum (2003-2006)
- Board of directors, International Mathematical Olympiad Corporation (OIM-1995-IMO) (1995–1996)

EDITORIAL

Canadian Mathematical Bulletin: Editor-in-Chief (with S. O. Kochman) (1990–1995)
Probability Theory and Related Fields: Editorial Board (1994–2000)
Fields Institute Communications & Monographs: Editorial Board (since 2003)
Potential Analysis: Editorial Board (2000–2005)
Canadian Journal of Statistics: Editorial Board (1992–1994)

CONFERENCES & PROGRAMS ORGANIZED

Education:

- Canadian Mathematics Education Forum, Fields Institute, May 6–8, 2005: local organizer
- Canadian School Mathematics Forum, UQAM, May 16–18, 2003: Working group on Mathematics Teacher Training, Algebra, and Teacher Shortages
- CMS Winter Mathematics Training Camp, York University: local organizer (2001–2003)
- 1995 International Mathematical Olympiad, York University (1995): local org. committee

Finance:

- MITACS Economic Summit on Systemic Risk, Toronto, April 27–29, 2009: Organizer, session on *Risk control in the insurance industry*
- IFID/MITACS Conference on financial engineering for actuarial mathematics, Fields Institute, Nov 9–10, 2008 (with H. Huang, M.A. Milevsky, D. Promislow, K. Moore, S. Jaimungal)
- 2nd Canada-France Math. Congress, Montreal, June 1–5, 2008: Session on Financial Math.
- MITACS-MCME Workshop on Risk Analysis, York University, Dec. 11, 2007
- CMS Summer meeting, Waterloo, June 4–6, 2005: Session on Math. of actuarial finance
- Symposium on Numerical Stochastics in Finance, Fields Inst., April 19, 1999 (with T. Lyons)

Mathematics:

- Seminar on Stochastic Processes – Principal Organizer
  - Fields Institute, March 15–17, 2007
  - Fields Institute, March 18–20, 1999
- Seminar on Stochastic Processes – Scientific program committee, Archivist
  - Univ. of Central Florida, March 2010
  - Stanford University, March 26–28, 2009
  - University of Delaware, April 3–5, 2008
  - Princeton University, March 23–25, 2006
  - University of British Columbia, May 20–22, 2004
  - University of Washington, March 27–29, 2003
  - Princeton University, March 21–23, 2002
  - University of Florida, March 8–10, 2001
- 1st CMS-SMM joint meeting, Guanajuato Mexico, Sept 21–23, 2006: Session on Probability
- Symposium on the creative & scientific legacies of Iannis Xenakis, June 8–10, 2006 (principle organizer Jim Harley)
- SSC meeting, May 26-29, 2002, Hamilton: Session on Probability.

- Annual meeting of Canadian Mathematics Department Chairs
  - Fields Institute (2002). Organizer (with H. Gaskill, R. Erdahl)
  - University of Ottawa (2001). Organizer (with G. Bluman, H. Gaskill)
- CMS Winter meeting, December 2001, Toronto – Meeting Director
- AMS meeting, September 23-24, 2000, Toronto: Session on Probability (with N. Madras, G. OBrien, D. Salopek)
- Workshop on Num. Methods & Stochastics, Fields Inst, Apr 19–23, 1999 (with T. Lyons)
- Fields Institute thematic programme on *Probability and its Applications*, Fields Institute, August 1998 - June 1999: Principal Organizer (with D. Dawson, N. Madras, G. Slade)
- SSC-IMS joint meeting, Montreal, July 9-13, 1995: Session on Probability and Analysis
- 21st Bernoulli Society Conference on Stochastic Processes and their Applications, York University June 14–19, 1992 (with G. OBrien, N. Madras, D. Tanny)
- York/McMaster Probability Day, York Univ.: 7th (1996), 5th (1994), 3rd (1992), 1st (1990)
- 84th Ontario Mathematics Meeting, York University (1989): Special Session on Probability

MEDIA

- In: "Research mathematicians gather to examine retirement issues and pensions", by Dave MacLean, Telegraph Journal, Saint John NB, June 1, 2009
- In: "Lady Luck smiles on too many in 6-49 draw as 239 2nd prize tickets cut payout", by Michelle Mcquigge, The Canadian Press, March 20, 2008
- *The Nature of Things*, CBC TV: *Everyday Einstein* (segment on Brownian motion) – D. Zuckerbrot producer, June 18, 2006
- OMNI TV: profile of the Fields Institute (segment on math & music) – 2005
- IMO Press Conferences – July 1995
- *Metro Morning*, CBC Radio, Toronto (IMO segment), July 20, 1995

INVITED CONFERENCE LECTURES

Finance:

- AFIR Colloquium (International Actuarial Association Financial Risks Section), Munich, Sept. 9-11, 2009. Session on Pensions – managing accumulations and decumulations sl Valuation, hedging and demand for ruin-contingent life annuities (RCLA)
- MITACS Annual meeting, Plenary speaker, Fredericton, June 3, 2009: *Insurance and Modern Finance*
- Mindpath Conference, 3rd Investment Strategies Symposium, Toronto, Oct 20, 2008: *The Retirement Income Time-Bomb – Risks & Challenges*
- Manulife Investments, Best Practices Symposium III, Quebec City (Oct 30, 2006), Montreal (Nov 1, 2006): *Pour traverser la zone à risque pour la retraite, il faut plus que la répartition de lactif*
- SIAM Conference on Financial Mathematics & Engineering, Boston, July 9–12, 2006. Session on Mathematics of Insurance: *Pricing and hedging of Guaranteed Minimum Withdrawal Benefits*
- Fields Institute, Quantitative Finance seminar, Oct. 25, 2006: *GMWBs*
- Sociedad Matemática Mexicana Meeting, Mexico City, Oct. 24, 2005. CMS-SMM session: *Options, Hedging, and Actuarial Finance*
- Canadian Institute of Actuaries, 2003 Investment Symposium, Toronto, Nov. 9-11, 2003: *Capital Markets Hedging for Insurance Products* (co-presenter M.A. Milevsky)
- Annual Winter Meeting of the Canadian Mathematical Society, Ottawa, 2002. Special Session on Financial Mathematics: *Liquidity premiums for variable annuities*

- Fields Institute workshop on Options in Financial Products: Approaches to Valuation, Toronto, December 2001: *The Real Option to Lapse a Variable Annuity: Can Surrender Charges Complete The Market?* (co-presenter with M.A. Milevsky)
- Summer Meeting of the Canadian Mathematical Society (MATH 2000), Hamilton, 2000. Session on Financial Mathematics: *Knockout Baskets and Survivorship Bias*

Mathematics:

- Symposium in honour of Donald A. Dawson's work, on the occasion of his 70th birthday, Carleton, June 5–8, 2007. *Conditioned super-Brownian motion*
- 1st CMS-SMM joint meeting, Guanajuato Mexico, Sept 21–23, 2006. Session on Probability
- CMS Winter meeting, Victoria, Dec 10-12, 2005. Session on probability: *Singular stochastic integral equations*
- Banff International Research Station, Banff, Sep 27–Oct 2, 2003. Conference on stochastic partial differential equations:
- Mathematisches Forschungsinstitut Oberwolfach, Conference on Branching Processes, Oberwolfach Germany, July 6–12, 2003. *Conditioned super-Brownian motion*
- 4th Annual meeting of Canadian Mathematics Department Chairs, Toronto 2002. *The Department of Mathematics and Statistics at York University*
- Probability Conference in honour of David Blackwell and Lester Dubins, Berkeley, 2002, *The complement of the planar Brownian path*
- 3rd World Congress of Nonlinear Analysts, Catania, Sicily 2000. Session on Aspects of Stochastic Calculus: *Conditioned Super-Brownian Motion*
- First China-Canada Congress of Mathematical Sciences, Beijing 1999. Special Session on Probability Theory: *Conditioned Super-Brownian Motion*
- Annual Winter Meeting of the Canadian Mathematical Society, Kingston 1998 Special Session on Probability: *The Complement of the Planar Brownian Path*
- International Conference on Stochastic Models, Ottawa 1998: *On the Conditioned Exit Measures of Super Brownian Motion*
- 924th Meeting of the American Mathematical Society, Montreal 1997. Session on Potential Theory: *Minimal Parabolic Functions*
- 3rd World Congress of the Bernoulli Society, Chapel Hill 1994. Session on Brownian Motion and Analysis: *Brownian Spirals*. Directions in Probability Workshop: *Heat Kernel Estimates and Extremal Problems arising in studying Brownian Motion and Conditional Brownian Motion* (for R. Banuelos)
- Annual Winter Meeting of the Canadian Mathematical Society, Montreal 1992. Session on Stochastic Analysis: *Spiralling Brownian Motions*. Session on Potential Theory: *Parabolic Martin Boundaries*
- Mathematisches Forschungsinstitut Oberwolfach, Conference on Stochastic Analysis, Oberwolfach Germany, 1992: *Parabolic Martin Boundaries*
- Mathematical Sciences Institute, Workshop on Stochastic Analysis, Ithaca 1992: *Conditioned Brownian Motion*
- 19th Conference on Stochastic Processes and their Applications, Haifa Israel 1991. Plenary Lecture: *Conditioned Brownian Motion*
- Annual Meeting of the Statistical Society of Canada, Ottawa 1989¿ Session on Stochastic Processes: *Path Intersections*
- Mathematical Sciences Institute, Workshop on Markov Processes in Functional Spaces, Ithaca 1989: *The Maximum Principal for Bi Brownian Motion*
- Rochester Syracuse Probability Day, Rochester 1989: *Path Intersections and Non Intersections*

- Seminar on Stochastic Processes 1988, Gainesville Florida 1988: *Capacity for Multiparameter Markov Processes*
- Annual Winter Meeting of the Canadian Mathematical Society, Vancouver 1987. Special Session on Probability: *Capacity and Potential Theory for Several Markov Processes*
- 838th Meeting of the American Mathematical Society, Los Angeles 1987. Session on Stochastic Processes: *Pathologies of Conditioned Brownian Motion*
- 201st Meeting of the Institute of Mathematical Statistics, San Francisco 1987. Session on Markov Processes: *Conditioning a Pair of Markov Processes*
- Annual Winter Meeting of the Canadian Mathematical Society, Ottawa 1986. Special Session on Probability: *Connecting Brownian Paths*
- AMS IMS SIAM Joint Summer Research Conference in the Mathematical Sciences, on Time Reversal of Markov Processes and Potential Theory, Santa Cruz 1986: *Connecting Brownian Paths*
- Pacific Northwest Probability Meeting, Vancouver 1985: *An Increasing Diffusion*
- 817th meeting of the American Mathematical Society, Chicago 1985: Session on Stochastic Analysis and Related Topics. *An Increasing Diffusion*

STUDENTS & POSTDOCTORAL FELLOWS

Postdoctoral Supervision:

- Fouad Marri (co-supervised with E. Furman), 2009/10
- Xianhua Peng (co-supervised with A. Kuznetsov), Fields-Ontario PDF, 2009/11
- Deniz Sezer (co-supervised with N. Madras), 2005/08. [Univ. of Calgary]
- Min Kang (co-supervised with N. Madras & G. O'Brien), 1998/99. [N. Carolina State Univ.]
- Stas Volkov (co-supervised with N. Madras & G. O'Brien), 1998/99. [Univ.of Bristol]
- Rami Atar (co-supervised with N. Madras & G. O'Brien), 1998/99. [Technion]
- John Verzani, 1995/96. [CUNY, Staten Island]

PhD Supervision:

- Yun Qiao (since 2006)
- Michael Moras (2004–2008): *Conditioned Super Brownian motion in Denjoy Domains and Strips*. [Lecturer, Univ. of Toronto]
- Yumin Wang (2002–2008): *Mathematical Finance Related to Insurance Contracts Quantile Hedging and Efficient Hedging for Guaranteed Minimum Death Benefits*. [Postdoc, Wayne State]

Masters Supervision:

- *Survey Papers*
  - Mohamed Abdelghani (2007–2008): Introduction to filtering theory with applications to finance
- *Financial Engineering research projects*
  - Francois Ouegnin (2008): Linear bi-level programming and optimal allocation problem
  - Gul Oye Ege (2003–2004)
  - Romana Danicic (2002–2003): Calculating the Liquidity Premium for Fixed Annuities When Interest Rate Follows a Stochastic Process
  - Yumin Wang(2001–2002): Quantile hedging for Bermudan Options
  - Asrat Gashaw (2001–2002): Credit Risk methodologies
  - Shannon Kennedy (2001–2002): Liquidity premiums for variable annuities

NSERC undergraduate summer research supervision:

- Jenny Du (2004)

- Gerald Lebovic (2000): Hyperbolic self avoiding walks (co-supervised with N. Madras)
- Ana Duff (1994): Best constants in capacitary inequalities for Markov chain pairs: numerical analysis via simulated annealing

GRANTS

Current funding:

NSERC research grant (2005–2010) *Super Brownian motion, conditioning, finance*,
5 year grant: $22,000 per year
MITACS seed project (2008–2010) *Finsurance* (with H. Huang, S. Jaimungal), $60,000 per year
IFID Centre grant (2007–2010) (with D. Promislow): yearly amounts: $15,000 / $11,475 / $10,000

RECENT PROFESSIONAL SERVICE

- Fields Institute Industrial Advisory Board (since 2004)
- NSERC Mathematics liaison committee (2005–2006, 2010–2011)
- NSF/DMS Committee of visitors (2010)
- IMS Committee on nominations (2008–2009)
- CRM committe consultatif scientifique (2006–2008)
- Univ. of Toronto: program appraisal: *Mathematical Finance Program* (2008)
- IFID Secretary and Treasurer (2000–2008)

PUBLICATIONS

Books edited

(1) *Numerical Methods and Stochastics* (with T.J. Lyons). Proceedings of a workshop held April 20–23, 1999. Fields Institute Communications **34**, AMS, Providence RI (2004)

Finance papers

(2) Mortality Derivatives: Valuation and Hedging of the Ruin-Contingent Life Annuity (RCLA). (with H. Huang & M.A. Milevsky). Submitted to J. Derivatives (2009)
(3) A Different Perspective on Retirement Income Sustainability: The Blueprint for a Ruin Contingent Life Annuity (RCLA). With H. Huang & M.A. Milevsky). J. of Wealth Management **11** (2009), pp. 89–97
(4) Financial valuation of guaranteed minimum withdrawal benefits (with M.A. Milevsky). Insurance: Mathematics and Economics **38** (2006), pp. 21–38
(5) Probabilistic investing: or how to win the Globe and Mails Stock Picking Contest (50% of the time). With M.A. Milevsky, Financial Services Review **14** (2005), pp. 197–211
(6) Asset Allocation and the Liquidity Premium for Illiquid Annuities (with S. Browne and M.A. Milevsky). Journal of Risk and Insurance **70** (2003), pp. 509–526
(7) The Real Option to lapse a variable annuity: can surrender charges complete the market? (with M.A. Milevsky). Proc. XIth AFIR Colloquium **2**, Can. Inst. of Actuaries (2001), pp. 537–561

Mathematics papers

(8) Random walks in degenerate random environments (with M. Holmes). In preparation (2010)
(9) Pathwise uniqueness for catalytic stochastic partial differential equations (with L. Mytnik). In preparation (2010)
(10) Diameters of complementary domains for planar Brownian motion (with S. Nacu & Y. Peres). In preparation (2010)

(11) Blowup and conditioning of ψ-super-Brownian exit measures (with S. Athreya). In preparation (2010)
(12) Degenerate random environments (with M. Holmes). Submitted to PTRF (2009)
(13) Conditioning super-Brownian motion on its boundary statistics; fragmentation and a class of weakly extreme X-harmonic functions (with D. Sezer). Submitted to Ann. Probab (2009)
(14) Non-degenerate conditionings of the exit measure of super Brownian motion (with J. Verzani). Stochastic Processes and their Applications **87** (2000), pp. 25–52
(15) On the conditioned exit measures of super Brownian motion (with J. Verzani), Probability Theory and Related Fields **115** (1999), pp. 237–285
(16) On minimal parabolic functions and time-homogeneous parabolic h-transforms (with K. Burdzy), Transactions of the AMS **351** (1999), pp. 3499–3531
(17) Hausdorff Capacity and Lebesgue Measure (with J. Steprans), Real Analysis Exchange **22** (1996/97), pp. 265–278
(18) Energy, and Intersections of Markov Chains. In *Random Discrete Structures* (Aldous, Pemantle editors), IMA volumes in mathematics and its applications **76** (1996), pp. 213-225
(19) Martin Boundaries of Sectorial Domains (with M.C. Cranston), Arkiv för Matematik **31** (1993), pp. 27–49
(20) $2D$ Brownian Motion in a System of Traps: Application of Conformal Transformations (with K. Burdzy and R. Holyst), Journal of Physics A **25** (1992), pp. 2463–2471
(21) A Low Intensity Maximum Principle for Bi Brownian Motion. Illinois Journal of Mathematics **36** (1992), pp.1–14
(22) Capacity and Energy for Multiparameter Markov Processes (with P.J. Fitzsimmons), Annales de l'Institut Henri Poincaré **25** (1989), pp.325–350
(23) Brownian Bitransforms. In *Seminar on Stochastic Processes 1987*, Birkhauser Boston (1988), pp. 249–263
(24) Connecting Brownian Paths (with Burgess Davis), Annals of Probability **16** (1988), pp. 1428–1457
(25) Three Problems from the Theory of Right Processes, Annals of Probability **15** (1987), pp. 263–267
(26) An Increasing Diffusion. In *Seminar on Stochastic Processes 1984*, Birkhauser Boston (1986) pp. 173–194
(27) Construction of Right Processes from Excursions, Probability Theory and Related Fields **73** (1986), pp. 351–367
(28) On the Itô Excursion Process, Probability Theory and Related Fields **73** (1986), pp. 319–350
(29) A Martin Boundary in the Plane, Transactions of the American Mathematical Society **293** (1986), pp. 623–642

Other publications

(30) Retirement income planning roundtable (with E. Bederman, D. Conick, R. Norman, D. Richards). Advisors Edge **10** (supplement), April 2007.
Translated as: La planification du revenu de retraite. Objectif Conseiller **8** (supplement), May 2007
(31) Asset Allocation and the Transition to Income: The Importance of Product Allocation in the Retirement Risk Zone (with M.A. Milevsky). IFID Working Paper (2006). Sponsored by Manulife Financial.
(32) Report of the Ministers task force on senior high school mathematics. (with B. Farahani, A. Ladouceur, M. Lemonde, H. Panju). Ontario Ministry of Education (2006)
(33) How to win The Globe and Mail's One-and-Only contest (with M.A. Milevsky). The Globe and Mail, January 6, 2005

(34) Review of *Multidimensional Brownian Excursions and Potential Theory*, by K. Burdzy, Pitman Res. Notes in Math. **164**, Longman Sci. and Technical, Essex New York. In Bulletin of the American Mathematical Society **21** (1989), pp. 152 157

(35) Review of *Potential Theory: an Analytic and Probabilistic Approach to Balayage*, by J. Bliedtner and W. Hansen, Universitext series, Springer Verlag Berlin 1986. In Journal of the American Statistical Association **82** (1987), p. 1198

(36) Construction of Strong Markov Processes from Excursions, and a Related Martin Boundary, PhD thesis, UBC (1983) – supervisor, John B. Walsh