

LEE SMOLIN—CURRICULUM VITAE

August 2012

PERSONAL

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Date of birth: June 6, 1955, New York City
Citizenship: U.S. citizen, Canadian permanent resident since July, 2004.
Family: Married to Dina F. Graser, one child, Kai Misha William Smolin, born August 30, 2006

EDUCATION

Ph.D. Harvard University, June 1979, (Theoretical Physics)
Advisors: Sidney Coleman and Stanley Deser
Dissertation title: "Studies in quantum gravity"

A.M. Harvard University, March 1978

B.A. Hampshire College, June 1975
Concentration: physics and philosophy
Advisor: Herbert Bernstein

EMPLOYMENT

- Founding and Senior Faculty member, Perimeter Institute for Theoretical Physics, 2001 - present
- Adjunct Professor of Physics , University of Waterloo, 2001 - present
- Graduate Philosophy Faculty (status only appointment), University of Toronto, 2009 - present
- Professor, Center for Gravitational Physics and Geometry, Pennsylvania State University, Aug. 1993 - Dec 2001
- Professor, Syracuse University, May 1991 - July 1993
- Associate Professor, Syracuse University, July 1988 - April 1991
- Assistant Professor, Yale University, July 1984 - June 1988
- Postdoctoral Fellow, Enrico Fermi Institute, University of Chicago, Aug. 1983 - Dec. 1984
- Member, Institute for Advanced Study, Princeton, Sept. 1981 - July 1983
- Postdoctoral Fellow, Institute for Theoretical Physics, Jan. 1980 - Aug. 1981
University of California, Santa Barbara, CA
- Member, Institute for Advanced Study, Princeton, Sept.- Dec. 1979

VISITING POSITIONS

- Visiting Professor of Physics, Imperial College London, Oct. 1999 - Sept. 2001
- Visitor String Theory group, Rutgers University, May 2000
- Bios Fellow, Bios Group, Santa Fe, NM, 1997 - 2001
- Associate, Center for the Philosophy of Science, University of Pittsburgh, 1998-2003
- Member, NASA Astrobiology Institute, 1998 - 2001
- Visiting Member, ITP Santa Barbara April-June 1999
- Darwin Seminar Visitor, London School of Economics, May 1997
- Visiting Scientist, Santa Fe Institute, 1996 - 1998.
- Visiting Scientist, Rockefeller University, May 1996
- Member. Institute for Advanced Study, Princeton, Jan – May 1995
- Visiting Member, Institute for Theoretical Physics (ITP), Santa Barbara, CA, April 1993
- Visiting Lecturer, SISSA, Trieste Italy, June 1994, 1995, 1996
- Visiting Scientist, Isaac Newton Institute for the Mathematical Sciences, University of Cambridge, Cambridge, UK, May 1994
- Visiting Scientist, University of Rome, Italy, May-June 1989
- Visiting Scientist, Trento University, Italy, summer 1988, 1991 & 1992
- Visiting Research Physicist, ITP, Santa Barbara, Jan - August 1986
- Special year visitor Department of Physics, Univ. of Maryland, Nov. 1981 & March 1982
- Center for Relativity Studies, University of Texas, Austin, TX, November 1980
- Nuffield workshop, Mathematical Institute, Oxford University, July - Aug. 1980

HONOURS AND AWARDS

RECENT:

- Elected to Walnut Hills High School Alumnae Hall of Fame, 2011, in first group of honorees.
- Klopsteg Memorial Award from the American Association of Physics Teachers (AAPT) for “extraordinary accomplishments in communicating the excitement of physics to the general public,” 2009.
- Named one of “100 most influential public intellectuals”, *Prospect and Foreign Policy Magazines*, 2008. Voted 21st on the list by a public internet poll of more than 500,000 readers.
- Elected Fellow of the American Physical Society, 2007.
- Majorana Prize, 2007.
- Included in the *Oxford Compendium of Modern Science Writing*. (2008)
- *The Trouble with Physics* was named by Newsweek magazine as number 17 on a list of 50 “Books for our Time”, June 27, 2009.
- Elected Fellow of the Royal Society of Canada, November 2010
- “The Culture of Science Divided Against Itself”, *Brick Magazine, Issue 88, selected for publication in The Best of Canadian Essays*, 2012.

OLDER:

- Award for Excellence in Undergraduate Teaching, College of Arts and Sciences, Syracuse University, 1993.
- Gravity Research Foundation: first award, 1986 (With Mark Bowick and L.C.R. Wijewardhana).
- Gravity Research Foundation: second award, 1985 (With Louis Crane) and 1983.
- NSF travel fellowships, August 1982 and July 1983.
- Nuffield travel fellowships, July Dec. 1980, March 1984.
- NATO travel fellowship, July 1976.

PUBLICATIONS

BOOKS:

- *The Trouble with Physics*, 2006, Houghton Mifflin and Penguin (UK). Translations published in French, German, Italian, Portuguese, Chinese, Korean, Japanese, Greek and others.
- *Three Roads to Quantum Gravity*, 2001 Weidenfeld and Nicolson (UK) and Basic Books, (New York), contribution to the Science Masters Series, plus translations in Italian, German, Spanish, Portuguese, Chinese, Japanese, Hebrew, Dutch, Polish, Czech, Turkish, Danish, and other languages.
- *The Life of the Cosmos*, 1997 Oxford University Press (in the USA), Weidenfeld and Nicolson (in the United Kingdom), plus translations in Italian, German, Polish, Japanese, Spanish, Portuguese.

PAPERS:

- 169 papers on theoretical physics, cosmology, philosophy of physics, theoretical biology, economics. These had generated 7,453 citations (Spines) and 10,091 on Google Scholar, as of August, 2012. Average of 69 citations per published paper.
- 169 David Rideout, Thomas Jennewein, Giovanni Amelino-Camelia, Tommaso F. Demarie, Brendon L. Higgins, Achim Kempf, Adrian Kent, Raymond Laflamme, Xian Ma, Robert B. Mann, Eduardo Martin-Martinez, Nicolas C. Menicucci, John Moffat, Christoph Simon, Rafael Sorkin, Lee Smolin, Daniel R. Terno, Fundamental quantum optics experiments conceivable with satellites -- reaching relativistic distances and velocities, to appear in *Classical and Quantum Gravity*, arXiv:1206.4949.
- 168 Lee Smolin, General relativity as the equation of state of spin foam, arXiv:1205.5529.
- 167 Lee Smolin, Precedence and freedom in quantum physics, arXiv:1205.3707.
- 166 Lee Smolin, A perspective on the landscape problem, Invited contribution for a special issue of *Foundations of Physics* titled: *Forty Years Of String Theory: Reflecting On the Foundations*, DOI: 10.1007/s10701-012-9652-x arXiv:1202.3373
- 165 Lee Smolin, Unification of the state with the dynamical law, arXiv:1201.2632.
- 164 Giovanni Amelino-Camelia, Laurent Freidel, Jerzy Kowalski-Glikman, Lee Smolin, OPERA neutrinos and relativity, *Mod. Phys. Lett. A*, Vol. 27, No. 10 (2012) 1250063, arXiv:1110.0521.
- 163 Lee Smolin, The black hole information paradox and relative locality, :gr-qc/ArXiv:1108.0910.
- 162 Giovanni Amelino-Camelia, Laurent Freidel, Jerzy Kowalski-Glikman, Lee Smolin, Relative locality: A deepening of the relativity principle, *Gen.Rel.Grav.* 43 (2011) 2547-2553, *Int.J.Mod.Phys. D20* (2011) 2867-2873 , arxiv:hep-th/ArXiv:1106.
- 161 Lee Smolin, A real ensemble interpretation of quantum mechanics, to appear in *Foundations of Physics*, 2012, DOI 10.1007/s10701-012-9666-4 arxiv:quant-ph/arXiv:1104.
- 160 Giovanni Amelino-Camelia, Laurent Freidel, Jerzy Kowalski-Glikman, Lee Smolin, Relative locality and the soccer ball problem, *Phys.Rev. D84* (2011) 087702 DOI: [10.1103/PhysRevD.84.087702](https://doi.org/10.1103/PhysRevD.84.087702), arxiv:hep-th/arXiv:1104.

- 159 Laurent Freidel, Lee Smolin, Gamma ray burst delay times probe the geometry of momentum space, arxiv:hep-th/arXiv:1103.
- 158 Nima Doroud, Lee Smolin, An action for higher spin gauge theory in four dimensions, , arxiv:hep-th/arXiv:1102.
- 157 Giovanni Amelino-Camelia, Laurent Freidel, Jerzy Kowalski-Glikman, Lee Smolin, The principle of relative locality, Phys.Rev. D84 (2011) 084010
DOI: [10.1103/PhysRevD.84.084010](https://doi.org/10.1103/PhysRevD.84.084010), arxiv:hep-th/arXiv:1101.
- 156 Lee Smolin, Unimodular loop quantum gravity and the problems of time, arXiv:1008.1759, Phys.Rev. D84 (2011) 044047 DOI: [10.1103/PhysRevD.84.044047](https://doi.org/10.1103/PhysRevD.84.044047)
- 155 Lee Smolin, On limitations of the extent of inertial frames in non-commutative relativistic spacetimes, arXiv:1007.0718
- 154 A. Garrett Lisi, Lee Smolin, Simone Speziale, Unification of gravity, gauge fields, and Higgs bosons, arXiv:1004.4866, J. Phys. A: Math. Theor. 43 (2010) 445401
- 153 Lee Smolin, Classical paradoxes of locality and their possible quantum resolutions in deformed special relativity , arXiv:1004.0664, **Gen.Rel.Grav.** **43 (2011) 3671-3691** DOI: [10.1007/s10714-011-1235-1](https://doi.org/10.1007/s10714-011-1235-1)
152. Lee Smolin, Newtonian gravity in loop quantum gravity, arXiv:1001.3668.
151. Sabine Hossenfelder and Lee Smolin, Phenomenological Quantum Gravity, Nov. 2009, ArXiv:0911.2761, Physics in Canada, Vol. 66 No. 2, Apr-June, p 99-102 (2010).
150. Lee Smolin and Simone Speziale, A note on the Plebanski action with cosmological constant and an Immirzi parameter, arXiv:0908.3388, Phys.Rev.D81:024032,2010.
149. Giovanni Amelino-Camelia and Lee Smolin, Prospects for constraining quantum gravity dispersion with near term observations, arXiv:0906.3731, Phys.Rev.D80:084017, 2009.
148. Lee Smolin, The unique universe: Against the timeless multiverse, Physics World, June 2009, pp 21-26.
147. Lee Smolin, The Quantization of unimodular gravity and the cosmological constant problems, Phys.Rev.D80:084003,2009, arXiv:0904.4841.
146. Chanda Prescod-Weinstein and Lee Smolin, Disordered locality as an explanation for the dark energy, arXiv:0903.5303 [hep-th], Phys.Rev.D80:063505,2009.
145. Lee Smolin, Time and symmetry in models of economic markets, arXiv:0902.4274.
144. Sabine Hossenfelder and Lee Smolin, Conservative solutions to the black hole information problem, arXiv:0901.3156.
143. George F R Ellis and Lee Smolin, The weak anthropic principle and the landscape of string theory, arXiv:0901.2414.
142. Lee Smolin, Could deformed special relativity naturally arise from the semiclassical limit of quantum gravity?, arXiv:0808.3765.
141. Carlo R. Contaldi, Joao Magueijo and Lee Smolin, Anomalous CMB polarization and gravitational chirality, arXiv:0806.3082, Phys.Rev.Lett.101:141101,2008.
140. Sundance Bilson-Thompson, Jonathan Hackett, Lou Kauffman, Lee Smolin, Particle Identifications from Symmetries of Braided Ribbon Network Invariants, arXiv:0804.0037.
134. Joao Magueijo, Lee Smolin and Carlo R. Contaldi, Holography and the scale-invariance of density fluctuations, Class.Quant.Grav.24:3691-3700,2007, astro-ph/0611695.
135. Lee Smolin The status of cosmological natural selection, hep-th/0612185, book chapter to appear in Beyond the Big Bang, Springer Verlag, ed by Ruediger Vaas.
136. Fotini Markopoulou, Lee Smolin, Disordered locality in loop quantum gravity states, arXiv:gr-qc/0702044, Class.Quant.Grav.24:3813-3824,2007.

137. Lee Smolin and Yidun Wan, Propagation and interaction of chiral states in quantum gravity, arXiv:0710.1548, Nucl. Phys. B 796 (2008)/1-2 pp 331-359.
138. Lee Smolin, The Plebanski action extended to a unification of gravity and Yang-Mills theory, arXiv:0712.0977.
139. Lee Smolin, Matrix universality of gauge and gravitational dynamics, arXiv:0803.2926.
133. Tomasz Konopka, Fotini Markopoulou and Lee Smolin, Quantum graphity, arXiv:hep-th/0611197.
132. Lee Smolin, Could quantum mechanics be an approximation to another theory?, arXiv:quant-ph/0609109.
131. Lee Smolin, Generic predictions of quantum theories of gravity, arXiv:quant-ph/0609109hep-th/0605052, book chapter in *Approaches to Quantum Gravity - toward a new understanding of space, time, and matter*, edited by D. Oriti, published by Cambridge University Press, 2009.
130. Sundance O. Bilson-Thompson, Fotini Markopoulou, and Lee Smolin, Quantum gravity and the standard model, arXiv:hep-th/0603022, Class.Quant.Grav.24:3975-3994,2007.
129. Lee Smolin, A quantization of topological M theory, arXiv:hep-th/0503140,Nucl.Phys. B739 (2006) 169-185.
128. Lee Smolin, Falsifiable predictions from semiclassical quantum gravity, hep-th/0501091, Nucl.Phys. B742 (2006) 142-157.
127. Mohammad H. Ansari and Lee Smolin, Self-organized criticality in quantum gravity, hep-th/0412307.
126. Fotini Markopoulou and Lee Smolin, Gauge fixing in causal dynamical triangulations, hep-th/0409057, Nucl.Phys. B739 (2006) 120-130.
125. Olaf Dreyer, Fotini Markopoulou and Lee Smolin, Symmetry and entropy of black hole horizons, hep-th/0409056, Nucl.Phys. B744 (2006) 1-13.
124. Lee Smolin The relational idea in physics and cosmology, contribution to a book, *Structural realism and quantum gravity*, edited by Steve French. Preprint version: The case for background independence, hep-th/0507235.
123. Lee Smolin, The main postulates and results of loop quantum gravity. Prepared for Deserfest: A Celebration of the Life and Works of Stanley Deser, Ann Arbor, Michigan, 3-5 Apr 2004. Published in *Ann Arbor 2004, Deserfest* 266-302.
122. Lee Smolin An invitation to loop quantum gravity, arXiv:hep-th/0408048.
121. Lee Smolin Scientific alternatives to the anthropic principle,' arXiv:hep-th/0407213, Contribution to *Universe or Multiverse*, ed. by Bernard Carr et. al. published by Cambridge University Press
120. Jurek Kowalski-Glikman and Lee Smolin, Triply special relativity, arXiv:hep-th/0406276, Phys.Rev. D70 (2004) 065020.
119. Joao Maguiejo and Lee Smolin,String theories with deformed energy momentum relations, and a possible non-tachyonic bosonic string, arXiv:hep-th/0401087, Phys.Rev. D71 (2005) 026010.
118. Fotini Markopoulou and Lee Smolin, 'Quantum theory from quantum gravity,' arXiv:gr-qc/0311059, Phys.Rev. D70 (2004) 124029.
117. Laurent Freidel and Lee Smolin, The linearization of the Kodama state, arXiv:hep-th/0310224, Class.Quant.Grav. 21 (2004) 3831-3844.
116. Stephon Alexander, Justin Malecki and Lee Smolin, Quantum gravity and inflation, arXiv:hep-th/0309045, Phys.Rev. D70 (2004) 044025.
115. Laurent Freidel, Jurek Kowalski-Glikman and Lee Smolin, 2+1 gravity and doubly special relativity, Phys. Rev. D 69, 044001 (2004) [arXiv:hep-th/0307085].
114. Lee Smolin and Artem Starodubtsev, General relativity with a topological phase: An action principle, arXiv:hep-th/0311163.
113. Lee Smolin, Cosmological natural selection as the explanation for the complexity of the universe, Physica A: Statistical Mechanics and its Applications Special issue: Complexity and Criticality: in memory of Per Bak (1947–2002), Edited by P. Alstrom, T. Bohr, K. Christensen, H. Flyvbjerg, M.H. Jensen, B. Lautrup and K. Sneppen.
112. Lee Smolin, The Ground State Of Quantum Gravity With Positive Cosmological Constant, AIP Conf. Proc. 646, 59 (2003).
111. Lee Smolin, The Self-Organization of Space and Time, Nobel Symposium presentation, Philosophical Transactions: Mathematical, Physical & Engineering Sciences, 15 June 2003, vol. 361, no. 1807, pp.1081-1088(8).

110. Giovanni Amelino-Camelia, Lee Smolin and Artem Starodubtsev, Quantum symmetry, the cosmological constant and Planck scale phenomenology, with hep-th/0306134, *Class.Quant.Grav.* 21 (2004) 3095-3110.
109. Joao Maguiejo and Lee Smolin, Gravity's Rainbow, gr-qc/0305055, *Class.Quant.Grav.* 21 (2004) 1725-1736.
108. Lee Smolin, How far are we from the quantum theory of gravity?, hep-th/0303185.
107. Etera Livine and Lee Smolin, BRST quantization of Matrix Chern-Simons Theory, hep-th/0212043.
106. Lee Smolin, Quantum gravity with a positive cosmological constant, hep-th/0209079.
105. Joao Maguiejo and Lee Smolin, Generalized Lorentz invariance with an invariant energy scale, gr-qc/0207085, *Phys.Rev. D67* (2003) 044017.
104. Lee Smolin, Matrix models as non-local hidden variables theories, hep-th/0201031.
103. Joao Maguiejo and Lee Smolin, Lorentz invariance with an invariant energy scale, hep-th/0112090, *Phys.Rev.Lett.* 88 (2002) 190403
102. Stephon Alexander, Yi Ling and Lee Smolin, A thermal instability for positive brane cosmological constant in the Randall-Sundrum cosmologies, hep-th/0106097, *Phys.Rev. D65* (2002) 083503.
101. Matthias Arnsdorf and Lee Smolin, The Maldacena Conjecture and Rehren Duality, hep-th/0106073.
100. Lee Smolin, The exceptional Jordan algebra and the matrix string, hep-th/0104050.
99. Lee Smolin, The present moment in quantum cosmology: challenges for the argument for the elimination of time, published in *Time and the Present Moment*, edited by Robin Durie, (Manchester: Clinamen Press, 2000) gr-qc/0104097.
98. Yi Ling and Lee Smolin, Holographic formulation of quantum supergravity, hep-th/0009018, *Phys.Rev. D63* (2001) 064010.
97. Lee Smolin, The cubic matrix model and the duality between strings and loops, hep-th/0006137.
96. Yi Ling and Lee Smolin, Eleven dimensional supergravity as a constrained topological field theory, hep-th/0003285, *Nucl.Phys. B601*(2001) 191-208.
95. Lee Smolin, The strong and weak holographic principles, hep-th/0003056, *Nucl.Phys. B601* (2001) 209-247.
94. Lee Smolin, M theory as a matrix extension of Chern-Simons theory, hep-th/0002009, *Nucl.Phys. B591* (2000) 227-242.
93. Lee Smolin, The new universe around the next corner, Invited Essay, Special Millennial Issue, *Phys. World* 12 (1999) No. 12 79-84.
92. Fotini Markopoulou and Lee Smolin, Holography in a quantum spacetime, hep-th/9910146, Oct, 1999,
91. Yi Ling and Lee Smolin, Supersymmetric Spin Networks and Quantum Supergravity, hep-th/9904016, *Phys. Rev. D61*, 044008 (2000).
90. Lee Smolin, A candidate for a background independent formulation of M theory, hep-th/9903166, *Phys.Rev. D62* (2000) 086001.
89. Stuart Kauffman and Lee Smolin, Combinatorial dynamics in quantum gravity, hep-th/9809161, *Lect.Notes Phys.* 541 (2000) 101-129.
88. Lee Smolin, A holographic formulation of quantum general relativity, hep-th/9808191, *Phys. Rev. D61*, 084007 (2000) DW6333.
87. Lee Smolin, Towards a background independent approach to M theory, hep-th/9808192, In a special issue of *Chaos, Solitons and Fractals* on "Superstrings, M,F,S....Theory" (1998).
86. Lee Smolin, Strings as perturbations of evolving spin networks, hep-th/9801022, CGPG-98/1-1, *Nucl.Phys.Proc.Suppl.* 88 (2000) 103-113.
85. Fotini Markopoulou and Lee Smolin, Nonperturbative dynamics for abstract (p,q) string networks, , *Phys. Rev. D 58*,084033 (October 15, 1998), hep-th/9712148
84. Fotini Markopoulou and Lee Smolin, Quantum geometry with intrinsic local causality, *Phys. Rev. D 58* 084032, (October 15, 1998), gr-qc/9712067.
83. Lee Smolin, Using neutrons stars and primordial black holes to test theories of quantum gravity, astro-ph/9712189.
82. Lee Smolin, Covariant quantization of membrane dynamics, *Phys.Rev. D57* (1998) 6216-6223. hep-th/9710191.
81. Saint Clair Cemin and Lee Smolin, Coevolution of membranes and channels: A possible step in the origin of life, submitted to the *Journal of Theoretical Biology* (October, 1997), adap-org/9709004.

80. Stuart Kauffman and Lee Smolin, A possible solution to the problem of time in quantum cosmology, gr-qc/9703026.
79. Lee Smolin, Chern-Simons theory in 11 dimensions as a non-perturbative phase of M theory, hep-th/9703174.
78. Fotini Markopoulou and Lee Smolin, Causal evolution of spin networks gr-qc/9702025, with Fotini Markopoulou, Nuclear Physics B 508 (1997) 409-430.
77. Lee Smolin, The future of spin networks in The Geometric Universe (1997), Oxford University Press, 1998, ed. S. A. Huggett et al. gr-qc/9702030.
76. Lee Smolin, Galactic Disks as Reaction Diffusions Systems. Preprint cgpg-96/11-5, astro-ph/9612033.
75. Lee Smolin, Three Dimensional Strings as Collective Coordinates of Four Dimensional Non-Perturbative Quantum Gravity, preprint cgpg- 96/9-3, gr-qc/9609031.
74. Lee Smolin, The classical limit and the form of the hamiltonian constraint in nonperturbative quantum gravity preprint CGPG-96/9-4, gr-qc/9609034.
73. Roumen Borissov, Seth Major and Lee Smolin, The geometry of quantum spin networks, Classical and quantum gravity, 13 (1996) 3183-3196. gr-qc/9512043.
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71. Seth Major and Lee Smolin, Mixmaster quantum cosmology in terms of physical observables.
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69. Carlo Rovelli and Lee Smolin, Spin networks and quantum gravity, Physical Review D 52 (1995) 5743-5759, gr-qc/9505006.
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67. Julian Barbour and Lee Smolin, Variety, complexity and cosmology, hep-th/9203041.
66. Lee Smolin, Cosmology as a problem in critical phenomena in *Proceedings of the Guanajuato Conference on Complex systems and binary networks*, (Springer, 1995), eds. R. Lopez-Pena, R. Capovilla, R. Garcia-Pelayo, H. Waalebroeck and F. Zertuche. gr-qc/9505022.
65. Lee Smolin, Linking topological quantum field theory and nonperturbative quantum gravity J. Math. Phys. 36 (1995) 6417 gr-qc/9505028, CGPG-95/4-5, IASSNS-95/29.
64. Lee Smolin, Experimental Signatures of Quantum Gravity in *Proceedings of the Fourth Drexel Conference on Quantum Nonintegrability, International Press*, ed. D. H. Feng and B. L. Hu, Cambridge: International Press, 1997. gr-qc/9503027.
63. Carlo Rovelli and Lee Smolin, Discreteness of area and volume in quantum gravity, Nuclear Physics B 442 (1995) 593, gr-qc/9411005. (erratum Nucl Phys B 456 (1995) 753-4).
62. Seth Major and Lee Smolin, Cosmological Histories for the New Variables, Physical Review D 51 (1995) 5475-5482, gr-qc/9402018.
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60. Lee Smolin, Finite diffeomorphism invariant observables for quantum gravity, Physical Review D 49 (1994) 4028, gr-qc/9302011.
59. Lee Smolin, Fermions and Topology Submitted to Nuclear Physics B, gr-qc/9404010, CGPG-93/9-4.
58. Ola Bostrom, Mark Miller and Lee Smolin, A new discretization for classical and quantum gravity, gr-qc/9304005, CGPG-94/3-3.
57. Carlo Rovelli and Lee Smolin, The physical hamiltonian for non-perturbative quantum gravity, with Carlo Rovelli, Phys. Rev. Lett. 72 (1994) 446-449, gr-qc/9308002.
56. Lee Smolin, Time, measurement and information loss in quantum cosmology in *Directions in general relativity, vol. 2 Papers in honor of Dieter Brill* ed. B. L. Hu and T. A. Jacobson (Cambridge University Press, Cambridge, 1993), gr-qc/9301016.
55. Lee Smolin, Time, structure and evolution in cosmology in the proceedings of a conference Tempo nella scienza e nella filosofia ed. E. Agazzi (in Italian translation), to appear in the original English in the Festschrift for John Stachel, ed. Petra Schroeter.
54. Lee Smolin, What can we learn from the study of nonperturbative quantum gravity? in *General Relativity and Gravitation 1992*, ed. R. J. Gleiser, C. N., Kozameh and O. M. Moreschi (Institute of Physics Publishing, Bristol, 1993) and in *Topics on Quantum Gravity and Beyond, Essays in Honor of*

- Louis Witten on his Retirement*, ed. F. Mansouri and J. J. Scanio (World Scientific, Singapore, 1993); gr-qc/9211019.
53. Abhay Ashtekar, Carlo Rovelli and Lee Smolin, Weaving a classical metric with quantum threads with Abhay Ashtekar and Carlo Rovelli, *Physical Review Letters* 69 (1992) 237- 240.
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 51. Lee Smolin, Non-perturbative quantum gravity: The emergence of discrete structure at the planck scale, in *Particles, Strings and Cosmology: Proceedings of the 1991 PASCOS (Particles, Strings and Cosmology) Conference* held at Northeastern University, March 1991. (World Scientific, Singapore, 1992).
 50. Lee Smolin, The $G \rightarrow 0$ limit of euclidean quantum gravity, *Classical and Quantum Gravity*, 9 (1992) 883-893.
 49. Abhay Ashtekar, Carlo Rovelli and Lee Smolin, Self-duality and quantization, *J.Geom.Phys.*8:7-27, 1992, hep-th/9202079.
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 46. Lee Smolin, Summary of the new variables workshop at GR12 in *Proceedings of GR12*, edited by N. Ashby et. al. (1991).
 45. Lee Smolin, Nonperturbative quantum gravity via the loop representation, in *Conceptual Problems in Quantum Gravity* ed. A. Ashtekar and J. Stachel, (Birkhauser, Boston, 1991).
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 32. Ted Jacobson and Lee Smolin, Covariant action for Ashtekar's form of canonical gravity, with Ted Jacobson, *Classical and Quantum Gravity* 5 (1988) 583-594.
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 30. Lee Smolin, Exact solutions to the quantum hamiltonian constraint and Knot theory, loop space and the diffeomorphism group, in *New Perspectives in Canonical Gravity*, A. Ashtekar (Bibliopolis, Naples, 1987).

29. Ted Jacobson and Lee Smolin, The left handed spin connection as a variable for quantum gravity, *Phys. Lett. B* 196 (1987) 39.
28. Mark J. Bowick, Lee Smolin and L.C.R. Wijewardhana Does string theory solve the puzzles of black hole evaporation?, First award, 1986, Gravity research foundation essay, *General Relativity and Gravitation* 19 (1987) 113-119.
27. Lee Smolin, Quantum gravity in the self-dual representation, *Proceedings of the American Mathematical Society Conference on general relativity*, June, 1986, edited by James Isenberg
26. John Dell, Jorge de Lyra and Lee Smolin Quantization of a gauge theory with independent metric and connection fields, *Phys. Rev. D* 34 (1986) 3012-3024.
25. Mark J. Bowick, Lee Smolin and L.C.R. Wijewardhana, Role of string excitations in the last stages of black hole evaporation, with *Phys. Rev. Lett.* 58 (1986) 424.
24. Lee Smolin, Quantum fluctuations and inertia, *Physics Letters* 113A (1986) 408.
23. Lee Smolin, Quantum gravity and the statistical interpretation of quantum mechanics, *International Journal of Theoretical Physics* 25 (1986). 215.
22. Louis Crane and Lee Smolin, Renormalizability of general relativity on a background of spacetime foam, *Nuclear Physics* B267 (1986) 714-757.
21. John Dell and Lee Smolin, Unification of gravitation with particle physics via metric-connection theories, in *Innerspace/Outerspace* , *Proceedings of a Conference held at Fermilab, May 2-5 1984*, edited by R. Kolb, M. Turner *et al.* (University of Chicago Press, Chicago, 1986) p. 489-492.
20. Lee Smolin, On the nature of quantum fluctuations and their relation to gravitation and the principle of inertia *Classical and Quantum Gravity*, 3 (1986) 347-359.
19. Louis Crane and Lee Smolin, Spacetime foam as the universal regulator, Second award, Gravity Research Foundation 1985, *General Relativity and Gravitation*, 17 (1985) 1209.
18. Lee Smolin, On the intrinsic entropy of the gravitational field, *General Relativity and Gravitation*, 17 (1985) 417.
17. Lee Smolin, Stochastic mechanics, hidden variables and gravity in *Quantum Concepts in Space and Time* ed. C.J. Isham and R. Penrose (Oxford University Press, 1985).
16. John Dell and Lee Smolin, Composite Higgs bosons from an extended gauge symmetry, Enrico Fermi Institute preprint, December 1983, revised, December 1984.
15. Lee Smolin, Failure of the superposition principle in the presence of gravitational fields essay submitted to the Gravity Research Foundation, April 1984 (Awarded honorable mention), also E.F.I. preprint.
14. Lee Smolin, High energy behavior and second class constraints in quantum gravity, *Nuclear Physics* B247 (1984) 511-532.
13. Lee Smolin, A new class of renormalizable and asymptotically free gauge theories, *Physical Review* D30 (1984) 2159-2166.
12. Lee Smolin, A geometry for non-Abelian tensor gauge theories, *Physics Letters* 137B (1984) 379.
11. Lee Smolin, The thermodynamics of gravitational radiation, Gravity Research Foundation award essay, second prize 1983, *Gen. Rel. and Grav.*, 16 (1984) 205.
10. Lee Smolin, On quantum gravity and the many worlds interpretation of quantum mechanics in *Quantum theory of gravity* (the DeWitt Festschrift) ed. Steven Christensen (Adam Hilger, Bristol, 1984).
9. Lee Smolin, Derivation of quantum mechanics from a deterministic non-local hidden variable theory, I. The two dimensional theory, IAS preprint, August 1983.
8. Lee Smolin, The behavior of the gravitational field at extremely short distances, Gravity research foundation essay, IAS preprint, March 1982. (Awarded honorable mention.)
7. Lee Smolin, A fixed point for quantum gravity, *Nuclear Physics* B208 (1982) 439.
6. Lee Smolin, Superspace unmasked: The physical interpretation of supergravity theory, *Annals of Physics*, 131 (1981) 398-425.
5. Lee Smolin, Gravitational radiative corrections as the origin of spontaneous symmetry breaking, *Physics Letters* 93B (1980) 95-100.
4. Lee Smolin, What is the problem of quantum gravity?, Introduction to Phd. thesis, also IAS preprint, September 1979.
3. Lee Smolin, Towards a theory of spacetime structure at very short distances, *Nuclear Physics* B160, (1979) 253-268.

2. John Dell and Lee Smolin, Graded manifold theory as the geometry of supersymmetry, *Commun. in Math. Phys.*, 66 (1979) 197-221.
1. Lee Smolin, Quantum gravity on a lattice, *Nuclear Physics B*148 (1979) 333-372.

ESSAYS AND POPULAR WRITING:

36. "The Culture of Science Divided Against Itself", *Brick Magazine, Issue 88, 2012*.
37. Thinking in Time Versus Thinking Outside of Time, in *This Will Make You Smarter*, ed John Brockman, Harper Perennial, 2012.
38. Embracing Nature's Imperfection, review of *A TEAR AT THE EDGE OF CREATION*: by Marcelo Gleiser. *American Scientist*, November-December 2010
39. No eternal truths, just divine advancements: review of *The Self-Awakened* by Roberto Mangabeira Unger, *Times Higher Education Supplement*, 31 August 2007
35. With string, science has tied itself in knots, *Times Higher Education Supplement*, August 10, 2007.
34. The other Einstein, *The New York Review of Books*, Volume 54, Number 10 June 14, 2007.
33. Quantum gravity faces reality, *Physics Today*, November 2006, pages 44-48.
32. On my mind, *Forbes*, September 18, 2006, page 46.
31. Do the laws of nature last forever?, *New Scientist*, 21 September 2006, issue 2570.
30. Darwinism All the Way Down, contribution to *Intelligent Thought*, edited by John Brockman, May 2006.
29. The crisis in fundamental physics, *Update*, magazine of the New York Academy of Sciences, January/February 2006.
28. Review of *The Road to Reality: A Complete Guide to the Laws of the Universe*, by Roger Penrose, *Physics Today*, 2006.
27. Why No 'New Einstein' ?" *Physics Today*, June 2005, page 56.
26. In Search of Einstein , invited contribution to *My Einstein*, edited by John Brockman, 2006
25. Comments on A theory of everything? G. 't Hooft et al. 2005. 3pp. *Nature* 433:257-259,2005.
24. A strange beautiful girl in a car, invited contribution in *Curious Minds: How a Child Becomes a Scientist*, edited by John Brockman, Pantheon Books, New York, 2004.
23. Einstein's lonely path, *Discover*, August 2004.
22. Unravelling space and time, review of Brian Greene's "The Fabric of the Cosmos, *American Scientist*, July-August 2004, p 371-3.
21. Atoms of space and time, *Scientific American* 290N1, 56 (2004)], *Spektrum Wiss.* 2004N3, 54 (2004).
20. Democracy, science and the universities, *New Scientist*, March 2, 2002. no. 2332 pp 41-43.
19. Art, science and democracy, essay for the catalogue of an exhibition of the sculptor Elizabeth Turk, Contemporary Arts Center, Santa Barbara, California.
18. Beautiful Science, Essay for a catalogue of the drawings of Sir Roger Penrose, the Drawing Center, Oxford University.
17. Debate on the future of physics, in *Prospect Magazine* with Sir John Maddox, editor emeritus of *Nature*, published in the December 2000 issue.
16. On Physics Pedagogy, *Physics World*, October 1999.
15. Before the Big Bang, in a book commemorating the opening of the new Hayden Planetarium at the American Museum of Natural History, ed. S. Soter.
14. Review of Per Bak's *How Nature Works* and Stuart Kauffman's *At Home in the Universe*, *Times Literary Supplement*, 2001.
13. Review of Paul Davies' *The Fifth Miracle*, *New York Times Book Review*, April 18, 1999.
12. Pluralism from a scientific point of view, in Italian translation in *Montag*, Fall 1998.
11. The future of science: one practitioner's view, in *Oxymoron*, volume 2, 1998.
10. The future of fundamental physics in French translation in *La Recherche*, December 1997.
9. All the worlds a stage in "The New Age of Discovery" a special issue of *TIME Magazine*, Winter 1997/98 p 172.
8. A theory of a whole universe in *The Third Culture*, edited and compiled from interviews by John Brockman., (Simon and Schuster, 1995)
7. What is time? in *How Things Are Edited* by John Brockman and Katinka Matson (Little Brown,1995).

6. Einstein's revenge? A layperson's introduction to quantum mechanics, general relativity and the question of their ultimate unification" Draft of a book based partially on the Spring 1984 Compton Lectures, (First two chapters available.)
5. Mesons, Contribution to the 1986 edition of *The World Book Encyclopedia* vol 13, p 345.
4. Spinors and spacetime, Vol 1: Two-spinor calculus and relativistic fields, by R. Penrose and W. Rindler a review, in *American Scientist* 74, March-April 1986, page 198.
3. General relativity, by Robert M. Wald, a review, in *American Scientist* 74, January-February 1986, page 82.
2. Philosophy of a folk hero (A review of *The philosophy of Niels Bohr* by Henry J. Folse), *New Scientist*, 12 September, 1985.
1. What is quantum mechanics really about?, *New Scientist*, 24 October, 1985.

RESEARCH FUNDING

- 2011-2014 Templeton Foundation grant \$25,000/year.
- 2011-2014 FQXi grant \$25,000/year
- 2010-2015: NSERC Discovery grant \$25,000/year
- 2005-2010: NSERC Discovery grant \$30,000/year
- 2000-2002: Gifts of the Jesse Phillips Foundation \$300,000/year.
- 1997-1999: Gifts of the Jesse Phillips Foundation, \$240,000.
- 1996-2001: National Science Foundation (NSF) to Pennsylvania State University, with Ashtekar and Penrose, \$320,000/year
- 1993-7: National Science Foundation (NSF) to Pennsylvania State University, with Professors Ashtekar and Penrose, \$ 249,000/year.
- 1988-93: National Science Foundation (NSF), U.S.- Italy Cooperative Research grant, with Prof. Ashtekar \$18,000
- 1988-93: National Science Foundation (NSF) to Syracuse University, with Professors Ashtekar and Penrose, \$215,000/year.
- 1985-1988: National Science Foundation (NSF) to Yale University, with Professor Moncrief, \$120,000/year.
- 1985: Research Corporation, \$5,283.

WORKSHOPS CHAIRED:

- | | |
|---------------|---|
| July 2000 | "New developments in Planck scale physics," Ninth Marcell Grossman Meeting, Rome Italy. |
| May 1999 | Panel discussion organizer and chair, <i>Minnowbrook Symposium on the Structure of Space-Time</i> , Blue Mountain Lake, NY. |
| Dec. 1993 | "Loop representation", <i>Cornelius Lanczos International Centenary Conference</i> , Raleigh, NC. |
| May 1993 | "Quantum Gravity" Directions in General Relativity, Univ. of Maryland, College Park, MD. |
| July 1989 | "New Hamiltonian Variables", 12th International Conference on General Relativity and Gravitation, Boulder, CO. |
| December 1987 | "Quantum Gravity" (co-chair), 13 th International Conference on General Relativity and Gravitation, Goa, India. |

CONFERENCE ORGANIZATION

July 2013	Organizing committee, Loops 13 conference PI
October 2012	Organizing committee, Experimental Search for Quantum Gravity: the hard facts_, conference, PI
May 2012	Organizing committee, Conformal nature of the universe conference, PI
October 2011	Organizing committee, Emergence and effective field theory conference PI
June 2011	Content team for Waterloo Global Science Initiative conference on Energy futures
July 12-16 2010	Experimental Search for Quantum Gravity, NORDITA, Stockholm, organizing committee.
May 1-4 2009	The economic crisis and the science of economics, Perimeter Institute for Theoretical Physics, Waterloo, ON.
Dec 2007 and 2008	Young Researchers Conference, Perimeter Institute for Theoretical Physics, Waterloo, ON.
Nov 18-20 2006	Emergence of spacetime workshop, Perimeter Institute for Theoretical Physics, Waterloo, ON.
Aug 16-18 2006	Principal Organizer Evolving Laws workshop, Perimeter Institute for Theoretical Physics, Waterloo, ON.
May 2004	Member of the Organizing Committee, workshop on Loop Quantum Gravity, Marseille, May 2004.
October 2005	International Organizing Committee, <i>LOOPS 05</i> , Max Planck Institute, Potsdam, Germany.
June 2007	International Organizing Committee, <i>Loops '07</i> , Universidad Nacional Autonoma de México, Morelia Mexico.
June 2008	International Organizing Committee, <i>QG2 '08. Quantum Geometry and Quantum Gravity Conference</i> , University of Nottingham, Nottingham, UK.
July 2003:	Member of the International Organizing Committee for the <i>10th Marcell Grossman Meeting</i> , Rio, Brazil.
July 2000:	Member of the International Organizing Committee for the <i>9th Marcell Grossman meeting</i> , Rome, Italy.
November 1996	Organizer of the <i>4th Penn State Relativity Conference</i> , University of Pennsylvania, University Park, PA
June 1992	Member of the Organizing Committee for the 13th International Conference on General Relativity and Gravitation, Cordoba, Argentina.

LECTURES

INVITED PHYSICS CONFERENCE TALKS:

- Oct 28 2011 "Does Time Emerge from Timeless Laws, or do Laws of Nature Emerge in Time?"
[Emergence and Effective Field Theories Conference](#) , PI
- Nov 11, 2011, "A real ensemble interpretation of quantum mechanics" 5th International Heinz von Foerster Conference | November 11th–13th 2011, invited plenary talk by video link
- July 8 2011 "*A real ensemble interpretation of quantum mechanics*", plenary talk via video link to Templeton conference on quantum foundations
- May 26, 2011 "*The principle of relative locality*", Plenary talk, Loops 11 conference Madrid.
- May 25, 2011 "*Loop quantum gravity at 25*", Loops 11 conference Madrid,
- March 10, 2011 "*A real ensemble interpretation of quantum mechanics*", plenary talk via video link to New Frontiers in Quantum Foundations, CUPI, Clemson.
- July 14, 2010 "On the issue on non-locality in deformed special relativity, plenary talk, Experimental Search for Quantum Gravity, NORDITA, Stockholm
- May 20, 2010 "*Laws and time in cosmology*", in *Laws of Nature: Their Nature and Knowability*, PI
- Nov 6, 2009 "*Asymptotic safety and deformed symmetry*", in *Asymptotic Safety-30 Years After*
- Aug 11, 2009 "*Reconstructing quantum theory from Brownian motion: an assessment*", Reconstructing Quantum Theory Conference, Perimeter Institute.
- July 27, 2009 "*The role of the scientific public intellectual*", AAPT plenary talk Ann Arbor Michigan.
- May 27, 2009 "*The quantization of unimodular gravity and the cosmological constant problem*", New Prospects for Solving the Cosmological Constant Problem, Perimeter Institute.
- June 5, 2009 "*Unimodular gravity and the cosmological constant problem*", Abhayfest, Penn State University.
- May 25, 2009 "*Darwinism in cosmology*", Darwin Conference, McMaster University, Hamilton, ON.
- Oct 10, 2008 "*On the reality of time and the evolution of laws*", The Clock and the Quantum: Time and Quantum Foundations, Perimeter Institute, Waterloo, ON.
- Sept 10, 2008 "*Science as an ethical community*", Science in the 21st Century conference, Perimeter Institute.
- Sept 4, 2008 "*How to Make Testable Multiverse Theories*", A Debate in Cosmology: The Multiverse, Perimeter Institute.
- Aug 27, 2008 "*Can observation determine whether spacetime is emergent?*" Emergent gravity conference, MIT, Boston, MA
- July 15, 2008 "*How to test multiverse theories*" The Search for Variations of Fundamental Couplings and Mass Scales conference, Perimeter Institute

- Oct 15, 2007 “*Time and the nature of law in cosmology*”, Arrow of time symposium, New York Academy of Sciences, New York, NY.
- Sept 26, 2007 “*Background independent quantum theories of gravity*”, XXVIII Encontro Nacional de Física de Partículas e Campos, Brazil.
- June 29 2007 “*Chiral excitations of quantum geometry as elementary particles*”, Loops 07 conference, Morelia Mexico.
- June 18 2007 “*What have we learned from the search for quantum gravity?*” Canadian Association of Physicists plenary talk, Saskatoon, Sask.
- June 2, 2007 Debate on string theory and quantum gravity, Meeting of Dutch Theoretical Physics, Dalfsen, The Netherlands.
- May 30 2007 “*Background independent approaches to quantum gravity: Lessons and quandaries*”, Colloquium Ehrenfest, Leiden, The Netherlands
- Sept 5, 2006 “*Insights from background independent approaches to quantum gravity*”, Natural Ultraviolet Cutoffs In Expanding Space-Times, Perimeter Institute.
- July 15, 2006 “*Quantum gravity and the standard model*”, Invited talk at Symposium in honor of Gerard 't Hooft, Holland.
- April 22, 2006 “*Quantum gravity and the standard model*”, Invited talk APS meeting, Dallas Texas
- Oct 11 2005 “*Persistent puzzles in background independent approaches to quantum gravity*”, Invited Plenary Talk, Loops '05, Berlin, Germany.
- May 23 2005 “*Quantum gravity and the origin of quantum theory*”, Invited talk, Quantum Physics of Nature Conference, Vienna, Austria.
- April 11 2005 “*The phenomenology of quantum gravity*”, Invited talk, A Century After Einstein Conference, Institute of Physics, UK.
- March 12, 2005, “*Physics from loop quantum gravity*”, Invited presentation, IOP Physics 2005 meeting, Warwick, UK.
- Nov 23-26 2004 “*Introduction to Loop quantum gravity*”, two lectures given at Mexican Winter School on gravitation, Playa del Carmen, Mexico.
- Oct 30, 2004 “*Quantum gravity in the Americas*”, invited plenary talk, Non-locality in loop quantum gravity, Perimeter Institute.
- Sept 19, 2004 “*Quantum gravity and inflation*”, invited workshop presentation, COSMOS conference, Toronto
- Aug 17, 2004 “*An invitation to loop quantum gravity*”, invited plenary talk, PASCOS conference, Boston, MA,
- Jul 19,-20 2004 “*Low energy limit of quantum gravity*”, “+ A DSR string”, workshop presentations at GR17, the 17th International Conference on General Relativity and Gravitation, Dublin, Ireland.
- May 3, 2004 “*Non-locality in loop quantum gravity*”, invited plenary talk, Loop quantum gravity and spin foams meeting, Marseille, France.

- April 3, 2004. *"An invitation to loop quantum gravity"*, invited plenary talk, Deser Fest, University of Michigan, Ann Arbor, MI.
- February 2004 *"Three lectures on Experimental Predictions from Loop Quantum Gravity"*, Quantum Gravity Phenomenology Workshop, Ladek Zdroj, Poland.
- Sept. 2003 *"An invitation to loop quantum gravity"*, Opening plenary talk, QTS3 conference, University of Cincinnati.
- Sept 25, 2002 *"A non-local hidden variables theory"*, Foundations of QM meeting, Temple University.
- Sept 13, 2002 *"Quantum gravity with a positive cosmological constant"*, Quantum theory meeting, Kings College, London, UK.
- Aug. 26, 2002 *"The self-organization of space and time,"* Nobel Symposium of self organization, Stockholm, Sweden.
- June 12, 2002 *"Quantum gravity with a positive cosmological constant"*, CIAR Cosmology meeting, Vancouver Island, BC.
- May 17 2002 *"Quantum gravity with a positive cosmological constant"*, MRST meeting, Waterloo, ON.
- March 17, 2002 *"Two paradigms of quantum gravity"*, Wheeler Symposium, Princeton NJ.
- Oct 19 2001 *"Matrix models and hidden variables"*, East coast gravity meeting, University of Waterloo, Waterloo ON.
- Sept 6, 2001 *"The duality of string and loops"*, Space-time and information symposium Madrid, Spain.
- Aug 31, 2001 *"Cosmological natural selection: A falsifiable theory of fine tuning"*, Anthropic Principle meeting, Cambridge University, UK.
- July 6, 2001 *"Matrix Chern-Simons theory as a background independent formulation of M/string theory"*, Tohwa string theory symposium, Fukuoko, Japan.
- Feb 23, 2001 *"New ideas in quantum gravity phenomenology"*, London evening meetings on quantum gravity and quantum theory.
- Feb 12-14, 2001 *"Background independent quantum gravity"*, three lectures at the Karpacz winter school on high energy physics, Poland.
- Feb 7, 2001 *"Cubic matrix model and M theory"*, SPG meeting, Kings College, London
- Nov 10, 2000 *"Issues in Time and Cosmology"*, Templeton/Pontifical Academy of Sciences meeting in the Vatican on the Future of Cosmology, Rome.
- Sept 29, 2000 *"The cubic matrix model and string/loop duality"* European Network on random geometry meeting, Copenhagen, Denmark.
- Sept 11 2000 *"The cubic matrix model"*, Strings and Quantum Field Theory meeting, Kolymbari, Crete.
- July 4, 8, 2000 *"The duality between loops and strings"* and *"The cubic matrix model"*, invited talks at the Ninth Marcell Grossman Meeting, Rome, Italy.
- June 30, 2000 *"The cubic matrix model"*, Peresq cosmology meeting, France.

- June 15, 2000 *"The cubic matrix model"*, SPG string theory meeting, Queen Mary College, London
- Dec 8, 1999 *"Quantum cosmology and the weak anthropic principle"*, conference on Key tests of cosmogenic theories, Isaac Newton Institute for the Mathematical Sciences, Cambridge, UK.
- Oct. 8, 1999 *"What physics can learn from biology"*, keynote address, Institute for Molecular Pathology recess, Vienna Austria.
- Sept 15, 1999 *"A proposal for the background independent form of M theory"*, Quantum Gravity 99, Sardinia, Italy.
- July 14, 1999 *"Natural selection in Physics and Cosmology"*, Keynote address: International meeting on genetic algorithms, Orlando Florida.
- June 24, 1999 *"A proposal for the background independent form of M theory"*, String theory and cosmology conference, IHES, Paris.
- June 21, 1999: *"What determines the parameters of the standard models of particle physics and cosmology?"*, String theory and cosmology conference, IHES, Paris.
- Feb. 7-12, 1999 *"A background independent formulation of string theory"*, Four lectures given at XXXV Winter School of Theoretical Physics, Polanica, Poland.
- Nov. 24, 1998 Templeton Foundation Conference on cosmology, Nassau, The Bahamas.
- Oct. 17, 1998 *"Did the laws of nature evolve?"* Keynote speaker, SURF undergraduate research conference, Cal Tech
- Oct. 5-10, 1998 Science Week lecturer in Holland, sponsored by Stadium Generale, scientific talks: Groningen and Amsterdam.
- Aug. 1998 *"Three lectures"*, Summer school on the Spontaneous Organization of Life, Neils Bohr Institute, Copenhagen.
- June 18, 1998 *"Common themes on the frontiers of physics and biology"*, Scripps Institute Society of Fellows Lecture, La Jolla, CA
- January 8, 1998 *"Strings as perturbations of evolving string networks"*, AMS meeting, Baltimore, MD, quantum gravity session.
- August 6, 1997 *"Causal evolution of spin networks"*, Santa Fe Workshop on New directions in simplicial quantum gravity, Los Alamos, NM.
- July 14-18 1997 *"Critical behavior in astronomy and cosmology"*, Three lectures at workshop, "From the big bang to the origin of life" , El Escorial, Spain.
- June 5, 1997 *"Causal dynamics of spin networks"*, Warsaw workshop on canonical quantum gravity, Warsaw, Poland.
- May 28 1997 *"Natural selection and cosmology"*, University of Edinburgh, Scotland.
- May 20, 1997 *"Experimental predictions of quantum theories of gravity"*, Workshop on Fundamental Physics at the Birth of the Universe, Rome, Italy.

- August 1996 *"Self-organized critical systems in astrophysics and cosmology"*, two lectures at the summer school in biological sciences, Niels Bohr Institute, Copenhagen, Denmark.
- June 1996: *"Spin Networks as the link between quantum gravity, topological field theory and conformal field theory"*, Invited talk, Symposium in honor of Roger Penrose, Oxford University, Oxford, UK.
- April 1996 *"The link between quantum gravity and string theory"*, Plenary talk at the Quantum gravity in the Southern Cone Conference, Uruguay.
- March 30, 1996 *"Did the laws of nature evolve?"* at Symposium on the Limits of Science, Santa Fe Institute, Santa Fe, New Mexico.
- Oct. 2-8 1995 *"Examples of critical phenomena in astronomy"*, invited seminar, Gamma-ray burst program, ITP, Santa Barbara.
- June 1995 Eight lectures: *"Introduction to quantum gravity"*, Guest course, SISSA, La Scuola Internazionale Superiore di Studi Avanzati di Trieste, Trieste Italy.
- May 1995 Three lectures on non-perturbative quantum gravity, Warsaw Workshop on Canonical quantum gravity.
- May 1995 Two lectures on quantum gravity, International School of Cosmology and Gravitation: 14th Course, Erice, Italy.
- January 1995 Four lectures on applications of self-organized criticality to cosmology, complexity and spiral structures in galaxies, Conference on Complexity and Binary Networks, Guanajuato Mexico.
- Sept. 1994 *"The physics of the Planck scale"* Symposium on Quantum/Classical Correspondence, Drexel, PA.
- July 5, 1994 *"The physics of the Planck scale"*, London Mathematical Society Symposium on quantum gravity, Durham, England.
- June 1994: Eight lectures on *"Recent progress in non-perturbative quantum gravity"* Guest course, SISSA, La Scuola Internazionale Superiore di Studi Avanzati di Trieste, Trieste Italy.
- June 1993 *"Non-perturbative quantum gravity"*, Invited talk at conference on constrained systems, Montepolciano, Italy.
- June 1993 *"Non-perturbative quantum gravity"* and *"Conference Summary: The present situation in quantum gravity"* Invited talks at Italian Quantum Gravity meeting, Trento Italy,
- April 1993 *"Knot theory in quantum gravity"* Invited talk at the KSU conference on knot theory and TQFT
- July 4, 1992 *"Did the Universe Evolve?"* Invited workshop talk at GRG 13, Cordoba, Argentina.
- July 4, 1992 *"Weaving a classical geometry with quantum threads"*, Plenary talk at the 13th meeting of the International Society for General Relativity and Gravitation, Cordoba, Argentina
- June 3-8, 1991 Five lectures on nonperturbative quantum gravity, GIFT International Seminar on Theoretical Physics, Sant Feliu, Spain.
- March 27, 1991 *"Nonperturbative quantum gravity"*, Invited talk at Particles, Strings and Cosmology meeting, Northeastern University

- Feb.15 1991 *"Quantum gravity: Present status and future prospect"* Invited talk to special session of AAAS meeting, commemorating 75 years of general relativity.
- May 4, 1989 *"Did the universe evolve?"*, Invited workshop talk, Meeting in honour of E. T. Newman
- June 20, 1989 *"Quantum field theory, topology and knots"* and *"Loop representation in 2+1 dimensional quantum gravity"* Invited talks at the Johns Hopkins meeting, Florence, Italy.
- Sept. 1, 1988 *"Quantum Gravity in the Loop Representation"*, Invited talk at the 8th Italian Conference on General Relativity, Cavalese, Italy
- May 17-18, 1988 Invited talks on the loop representation and on the problem of time in quantum cosmology, Osgood Hill Quantum Gravity Conference, Andover MA.
- Jan 1-3 1988 Three lectures on new variables in relativity, Calcutta general relativity workshop, Jadavpor University, Calcutta, India.
- Dec 24-30, 1987 Six lectures on canonical quantum gravity, Delhi quantum gravity workshop, Delhi University
- Dec 15, 1986 *"Quantum gravity in the self-dual representation"*, Invited workshop talk, Texas Symposium on Relativistic Astrophysics
- June 23, 1986 *"Exact solutions to the Hamiltonian constraint of quantum gravity"*, AMS meeting on General Relativity, Santa Cruz, CA.
- June 20, 1986 *"Quantum gravity: Current status and future hopes"*, summary talk, Approaches to Quantum Gravity Conference, Santa Barbara CA.
- April 19, 1985 *"Spacetime Foam and the Problem of Renormalizability"*, Syracuse Discussion Conference
- March 1984 *"Stochastic quantization, hidden variables and quantum gravity"*, Quantum gravity discussion conference, Oxford, England.
- July 1983 *"Conceptual problems in quantum gravity"*, GR10:10th International Conference on General Relativity and Gravitation, Padua, Italy.
- Dec. 1980 *"Quantum gravity on a lattice"*, Lattice theory and gravity meeting, Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge, Cambridge, England.

INVITED TALKS AT PHILOSOPHY CONFERENCES AND DEPARTMENTS

- April 14, 2012 "Does law emerge from time or time from law?"
Conceptions of truth conference, Notre Dam Institute for Advanced Studies, invited plenary talk
- Nov 3, 2011 "The principle of relative locality" University of Toronto philosophy department seminar.
- April 11, 2008 "*Remarks on the Reality of Time in Physics and Cosmology*",
University of Pittsburgh, Center for Philosophy of Science Annual Lecture Series
- Jan 31, 2008 "*The reality of time and the nature of laws in cosmology*",
University of Toronto Philosophy Dept Seminar
- Oct 11th, 2007 "*The Nature of Time and Law in Cosmology*",
Colloquia on the History and Philosophy of Science and Technology, Stanford University
- Nov 14, 2006 "*Could quantum mechanics be an approximation to another theory?*"
Boston University Philosophy of Science talk.
- June 19, 2006 Annual Public Lecture, "*Science and democracy: the essential partnership*"
Centre for Philosophy of Natural and Social Science, London School of Economics.
- June 14, 2006 Invited lecture, "*Against symmetry*" Centre De Recherche en Epistmologie Appliqué,
Paris.
- Oct 6, 2005 "*Can the laws of physics vary in time?*"
Philosophy of science seminar, University of Toronto
- March 3 2005 Keynote address, "*The relational idea in physics and cosmology*"
Philosophy Graduate Student Association conference, PI
- July 9, 2004 Invited plenary talk, "*Relational quantum theories of gravity*"
British Association for the Philosophy of Science, Canterbury, UK
- Nov 8, 2002 Invited presentation for session on Structural Realism and loop quantum gravity "*Open issues in quantum gravity*", PSA meeting, Milwaukee,
- Nov 2002 "*Relational theories of space and time and loop quantum gravity*"
Boston University, Philosophy of physics talk
- May 11, 2002 "*Space and time according to loop quantum gravity*"
Philosophy of physics meeting, University of Western Ontario
- May 3, 2002 "*A non-local hidden variables theory*"
Foundations of quantum theory meeting, University of Maryland
- May 23, 2001 "*Why cosmology requires time*"
Oxford University Philosophy of Science Colloquium
- Nov. 11, 1999 "*The Life of the Cosmos in perspective*",
Humanities/Science seminar, Humanities Center, Yale University
- Sept. 17, 1999 "*The weak holographic principle*",
8th UK Foundations meeting, London, UK
- June 17, 1999 "*How close are we to the quantum theory of space and time?*"

Conference on the physics and philosophy of spacetime, Vancouver

- May 14, 1998 “*What do we know about space and time?*”
Princeton/Rutgers symposium on the philosophy of space and time
- March 27, 1998 Invited talk: “*The scientists' response to postmodernism*”,
Humanities Center Celebration, SUNY Stonybrook.
- May 29 1997 “*Natural selection and cosmology*”, Darwin Seminar,
London School of Economics, London, UK
- Feb. 28 1997 “*Problems confronting cosmology*”
Joint Seminar in the History of Science, Harvard University, Boston, MA.
- March 14, 1996 “*Cosmological Natural Selection: A Falsifiable Theory*”
Conference on the Changing Metaphysics of Science, Vienna, Austria.
- July 1995 Invited talk: “*Pluralistic quantum cosmology*”
conference on “Quantum theory without observers”, Beilefeld Germany
- Sept 1994 “*What can we ask of a theory of cosmology?*”
Symposium in honor of the retirement of Abner Shimony, Boston University

RESEARCH SEMINARS AND COLLOQUIA, 2000 - 20011 (PARTIAL LIST):

- May 3, 2011 “*A real ensemble interpretation of quantum mechanics,*”, PI quantum foundations seminar.
- March 7, 2011 “The principle of relative locality”, Columbia University, high energy seminar.
- Feb. 23 2011 “The principle of relative locality”, PI colloquium
- April 2, 2010 “Using the universe as a probe of the Planck scale”, Physics colloquium, University of Wisconsin, Milwaukee.
- July 8 2009 “*The Plebanski and Ashtekar formulations of gravity*”, PI cosmology seminar
- Feb 26, 2009 “*Experimental prospects for testing quantum gravity*” UCSD colloquium
- Feb 26, 2009 “*Testing parity breaking in quantum gravity with inflation*” UCSD astrophysics colloquium
- Oct 21, 2008 “*Possibly observable cosmological consequences of quantum gravity*”, International loop quantum gravity seminar
- May 2, 2007 “*Loop quantum gravity: Basic results and present directions*”, University of Rochester
- April 3, 2007 “*Emergent chiral excitations of quantum geometries: progress report*”, International loop quantum gravity seminar
- April 10, 2007 “*Chiral matter as excitations of quantum Geometry*”, University of Florida
- Nov 14 2006 “*Quantum Gravity and the Standard Model*”, Boston University Physics Colloquium
- Oct 26, 2006 “*What have we learned about quantum gravity?*” University of Toronto

Oct 11, 2006 *"Could quantum mechanics be an approximation to another, cosmological, theory?"*
Perimeter Institute Colloquium

June 21 2006 *"Quantum Gravity and the Standard Model"*, DAMTP, Cambridge

June 20 2006 *"Quantum Gravity and the Standard Model"*, Imperial College, London

June 15 2006 *"Quantum Gravity and the Standard Model"*, College de France, Paris

April 4 2006 *"Quantum Gravity and the Standard Model"*, UC Santa Barbara

April 3 2006 *"Quantum Gravity and the Standard Model"*, Berkeley seminar

March 31 2006 *"Quantum Gravity and the Standard Model"*, Simon Fraser colloquium

March 30 2006 *"Quantum Gravity and the Standard Model"*, UBC colloquium

March 29 2006 *"Quantum Gravity and the Standard Model"*, University of Victoria colloquium

March 27 2006 *"Quantum Gravity and the Standard Model"*, Cal Tech

Dec 5 2005 *"Quantum Gravity and the Standard Model"*, University of Barcelona

May 19 2005 *"Experimental predictions from quantum gravity"*, Harvard Smithsonian

Feb 18, 2005 *"Predictions from loop quantum gravity"*, Columbia University

Dec 2 2004 *"An invitation to loop quantum gravity"*, MIT Physics Colloquium

Nov 30, 2004 *"Evolutionary dynamics in physics"* Harvard center for evolutionary dynamics

May 25, 2004 *"Topics in loop quantum gravity"*, University of Chicago

April 20, 2004 *"An invitation to loop quantum gravity"* University of North Carolina colloquium

May 26, 2004 *"Experimental predictions of quantum gravity"*, University of Chicago Astronomy colloquium

Feb 2004 *"Quantum Gravity and Phenomenology"*, University of Warsaw

March 18, 2004 *"Recent progress in quantum gravity"*, University of Pennsylvania

Nov. 2003 *"Two talks on Quantum Gravity"*, University of Michigan

March 2003 *"Three talks on quantum gravity"*, Stanford University

January 2003 *"Three talks on quantum gravity"* KEK, Japan

Nov. 2002 *"Two talks on quantum gravity"* Harvard University

July 2002 *"Quantum gravity with a positive cosmological constant"* University of Marseille

March 8, 2002 *"A non-local hidden variables theory"*, Tutte Colloquium, Waterloo

Feb 25, 2002 *"The Physics of the Planck scale"*, York University Physics Colloquium

- Feb 1, 2002 *"Physics of the Planck scale"*, Applied Math Colloquium, University of Waterloo
- Oct 3, 2002 *"Physics of the Planck scale"*, Physics Dept Colloquium, McMaster University
- Feb 19, 2001 *"The cubic matrix model"*, String theory seminar, AEI/MPI Potsdam
- Oct. 31 2000 *"Reaction diffusion model of galactic disks"*, Astrophysics, Oxford University
- Oct. 18, 2000 *"Physics at the Planck scale"* Physics Dept. Colloquium, Imperial College
- Oct 13, 2000 *"Loop quantum gravity"*, University of Waterloo Physics Colloquium
- May 23, 2000 *"The cubic matrix model and string theory"*, CUNY Mathematics
- May 5, 2000 *"Background independence in quantum gravity"*, DAMTP Colloquium, University of Cambridge
- March 15, 2000 *"Spin networks and string theory"*, Mathematical Physics, University of Nottingham
- March 4, 2000 *"On the spin-geometry theorem"*, Saturday twistor meeting, University of Oxford
- March 3, 2000 *"Spin networks, quantum gravity and strings"*, Mathematics Institute, Oxford University
- Feb 22, 2000 *"Background independent approach to M theory"*, Albert Einstein Institute, Potsdam
- Feb 17, 2000 *"The weak and strong holographic principle"*, Philosophy of Science, Oxford University
- Feb 11, 2000 *"Background independent approach to M theory"*, Seminar, University of Durham
- Feb 10, 2000 *"Predictions from quantum theories of gravity"*, Colloquium, University of Durham
- Feb 4, 2000 *"A reaction diffusion model of galactic disks"*, Astrophysics, University of Sussex
- Jan 24, 2000 *"Physical predictions in quantum gravity"* Colloquium, Queen Mary College

COLLOQUIA (1986-99):

DAMPT, Cambridge, Durham, Georgia Tech, New York University, Rochester University, Virginia Polytechnique Institute, Penn State University, Queen Mary College, UC Santa Barbara, SUNY Stonybrook, Syracuse University, York, and Yale Universities.

RESEARCH SEMINARS (1986-99):

The University of Amsterdam, Brandeis University, University of Buenos Aires, UBC Vancouver (2), Boston University, Brown University, Cal Tech (3) , UC Berkeley, UC Santa Barbara (3) , University of Chicago(3), CUNY graduate center, CCNY (2), University of Colorado at Boulder, Cornell University (2), University of Connecticut, University of Florida, Gainesville, Harvard University(2), Imperial College, London (2), The Institute for Advanced Study, Princeton (2) , The Institute for Theoretical Physics, Santa Barbara (2), The International Center for Theoretical Physics, Trieste Italy, Johns Hopkins University, Kings College, London, MIT, University of Maryland (4), The University of Marseille, University of Montevideo, Uruguay(3), New York University (2), Newton Institute, Cambridge, The Niels Bohr Institute, Copenhagen, (2) Nottingham University, Oxford University (2), Pennsylvania State University (6),University of Pittsburgh (3), Center for Philosophy of Science, U of Pittsburgh, Rockefeller University (2), Rutgers University(2), Queen Mary College, London(2), Raman Institute, University of

Rome(2), University of Sao Paolo, Brazil, SISSA (3), Southern Methodist University, SLAC (2), Stanford University, SUNY Stonybrook (3), Syracuse University (6), University of Texas at Austin (2), Trento University, Utrecht, University of Washington and Yale University.

RESEARCH SEMINARS 1977-85:

Cal Tech, UC Berkeley, UC Los Angeles, UC San Diego, UC Santa Barbara, Cambridge University, University of S. Carolina, University of N. Carolina, University of Chicago, University of Cincinnati, University of Colorado, Fermilab, Harvard University, IAS, Imperial College (London), University of Maryland, MIT, Oxford University, University of Penn., Princeton University, SLAC, Syracuse University, University of Texas at Austin, University of Wisconsin at Milwaukee, Yale University.

PUBLIC LECTURES (PARTIAL LIST):

- June 10, 2012 Einstein on the beach, panel discussion, Sony Centre Toronto
- Nov 11 2011 Treehouse talk, Toronto "Is time real?"
- Oct. 14 2011 "The Intersection of the Arts and Science" Subtle technologies/PI event
- June 17, 2011 "Time is real", Idea City, Toronto
- April 30 2011 "The science of saving (or harming) the world", public conversation with James Gleick and Thomas Homer-Dixon, Globe and Mail Open House Festival, Toronto.
- April 29 2011 "You are not a gadget and neither is the universe", performance/dialogue with Jaron Lanier, Ottawa Writers Festival.
- March 7 2011 Asimov debate, American Museum of Natural History, New York City.
- Feb 10, 2011 "How does Technological Innovation Happen? A conversation with W. Brian Arthur on The Nature of Technology" Wici public lecture, PI
- Jan 18 2011 A public conversation with Richard Panek, Rubin Museum of Art, New York City
- Oct 18 2009 "*Seeing science through fiction*", Quantum to Cosmos festival public discussion with Jaron Lanier and Neil Stephenson
- July 11, 2009 "*Songs from space*", with Janna Levin, and "*Issues in economics*" with Brian Arthur and David Wolper, SciFoo, The Googleplex, Mountain View, CA
- June 14, 2009 "*The Lawful Universe?*" Dialogue with artist Katie Paterson, t opening event for Universal Code exhibition at The Powerplant, Toronto, ON
- June 13, 2009 "*Illuminations*", Dialogue with director Marianne Weems, Luminato and Subtle Technologies festivals
- Nov. 8, 2008 "*Complex systems in cosmology*", Santa Fe Institute conference
- Aug. 8-10 2008 SciFoo, the Googleplex, Mountain View, CA
- April 4, 2008 "*Using the universe as a microscope to probe the micro-structure of space and time*", 2008 Rustgi Lecture, University of Buffalo
- Jan 15, 2008 "*Using the universe as a microscope to probe the micro-structure of space and time*", The Cutting Edge: Royal Society Lectures in Science, McGill University, Montreal
- Oct 10, 2007 "*The unfinished revolution: space, time and the quantum*" Pacific Institute for Theoretical Physics, University of British Columbia
- Aug 3-5, 2007 "*Debate on mathematics and time*" with Jaron Lanier and Neal Stephenson, "*Debate on the multiverse*" with Martin Rees and Franck Wilczek, SciFoo, The Googleplex, Mountain View, CA
- June 6, 2007 "*The Trouble with physics*", debate with Prof. Thibault Damour, Cité des Sciences de Paris, France
- Oct 17, 2006 Panel on Intelligent Design, Cooper Union, NYC

Oct 7, 2006 Mensa Colloquium, Albany NY

Oct 6, 2006 *"The trouble with physics"*, Adler Planetarium, Chicago, IL

Oct 1, 2006 *"The trouble with physics"*, Ottawa International Writers Festival, Ottawa ON

Sept 29, 2006 *"The trouble with physics"*, Pacific Science Center, Seattle, WA

Sept 29, 2006 *"The trouble with physics"*, Microsoft, Seattle, WA

Sept 25, 2006 *"The trouble with physics"*, Hayden Planetarium space theater, New York, NY

Sept 20, 2006 *"The trouble with physics"*, Innis Town Hall, University of Toronto, Toronto, ON

June 15, 2006 Cite de Sciences 20th anniversary symposium public lecture, Paris, France

Nov 30 2005 *"The new humanism"*, Symposium with Marc D. Hauser, Lee Smolin, Robert Trivers, Eduard Punset, John Brockman at Kosmopolis 05: The Third Culture in Barcelona, Spain

Nov 12 2005 *"The unfinished revolution: Finishing what Einstein started"*, Public talk, Urania Berlin

Nov 9 2005 *"Why Science is Necessary for Democracy, and Vice-Versa"*, Keynote Address at STAN: Science, Technology Awareness Network Conference, Toronto

May 22 2005 *"The unfinished revolution: finishing what Einstein started"*, QUPON Public lecture, Vienna Austria

May 19 2005 *"What is space? What is time?"*, Harvard Smithsonian Public Lecture

May 2, 2005 Panel on Einstein, PI public lecture and Rogers cable

March 9, 2005 Panel on Einstein, York University and Quirks and Quarks, Toronto, ON

June 20, 2003 *"Science. Art and Democracy"*, IDEA CITY, Toronto, ON

June 3, 2003 *"How does Science Work?"*, Perimeter Institute Public Lecture, Waterloo, ON

May 24, 2003 *"Science, Art and Democracy"*, Subtle Technologies conference, Toronto, ON

Feb 26, 2003 *"Space-time-democracy"*, TED conference, Monterrey, CA

Feb 2003 *"Art, science and democracy"*, Nerenberg Lecture, University of Western Ontario, London, ON

March 6, 2002 *"First contact"*, York University Symposium, broadcast on CBC, Toronto, ON

April 17, 2001 *"Three Roads to Quantum Gravity"*, Edinburgh Science Festival evening lecture, Edinburgh, Scotland

Jan 30, 2001 Debate with the sculptor Mark Quinn in the series *Flesh, not Meat*, Institute for Contemporary Arts, London, UK

June 3, 2000 Debate with Paul Davies and Martin Rees, Hay Literary Festival, Hay on Wye, UK

April 9, 2000 Sermon in Edinburgh cathedral for opening ceremony and evening lecture, "A Revolution in Time" Edinburgh Science Festival

April 3, 1999 "Time: the present moment", debate with Jaron Lanier, UU Event, New York, NY

Oct. 5-10,1998 Science Week lecturer in Holland, sponsored by Stadium Generale, public lectures in Groningen, Twente and Maastricht, the Netherlands

May 18, 1998 "Complexity and fundamental physics", Santa Fe Institute, Santa Fe, NM

April 28, 1998 "Remarks on the future of cosmology", Bard College Symposium, Annandale-on-Hudson, NY

Nov. 19, 1997 Debate on science and the humanities, Rutgers University

Nov. 15, 1997 "The Life of the Cosmos", Austin College, Dallas Texas

July 3, 1997 "The Life of the Cosmos", University of Cincinnati, public lecture

June 26, 1997 "The Life of the Cosmos", Smithsonian Museum, Washington D.C.

June 24 1997 "The Life of the Cosmos", American Museum of Natural History, New York, NY

May 31 1997 "Why is the universe hospitable to life?" Hay Literary Festival, Wales

May 27 1997 "Why is the universe hospitable to life?" Royal Museum, Edinburgh

May 12, 1997 "The End of Science?" Debate with John Horgan and Roger Penrose, London England

Dec. 3 1996 "Why is the universe hospitable to life?" Collegium Budapest

January 1995 Graduate School of Art Lecture in the Art and Human Knowledge series, Columbia University, New York, NY.

April 21,1994 "Why is the universe hospitable to life?" The 1994 Sister Mary Charles Weschler Lecture, Mercyhurst College, Girard, PA

Jan. 1993 "The problems of cosmology", The Reality Club, NYC

April-June 1984 "Einstein's Revenge" 1984 Compton Lectures, ten lectures on quantum theory, general and relativity, Enrico Fermi Institute, University of Chicago, Chicago, IL

SUPERVISION

POSTDOCTORAL FELLOWS:

At Perimeter Institute:

- 27 postdocs hired so far in the quantum gravity group.

At Imperial College London:

- Ntina Savvidy, Antony Valentini →visiting member, Perimeter Institute

At Penn State:

- Roumen Borissov, Senior Scientist, Bios Group, President, Bios-Eastern Europe
- Surya Das, postdoc Winnipeg
- Laurent Freidel, permanent staff, CRNS, Leon + Perimeter Institute
- Amit Gosh, postdoc, Penn State
- Viqar Husain, assistant professor, Winnipeg
- Renata Loll, Associate Professor, University of Utrecht and Spinoza Institute
- Eric Martinez, unknown
- Fotini Markopoulou, postdoc, AEI, Potsdam-> Long term researcher Perimeter Institute
- Roberto DePierri, postdoc, Marseille, France and Parma, Italy
- Raymond Putzio, Visiting Assistant Professor, University of Southern Mississippi
- Mike Reisenberger, Professor, Univ. of Montevideo
- Chopin Soo, permanent staff, the Center for Theoretical Sciences, Taiwan
- Thomas Thiemann, long term researcher, Perimeter Institute + AEI
- Steve Weinstein, Asst Prof Philosophy, University of Waterloo

At Syracuse University

- Jerzy Lewandowski, Professor , Warsaw University
- Jorma Luoko, Lecturer, Nottingham
- Don Marolf, Assistant Professor, Syracuse
- Jorge Pullin, Assoc. Prof. Penn State
- Joseph Samuel, Permanent Staff, Raman Institute
- Kristen Schleich, Assistant Professor, University of British Columbia
- Charles Torre, Professor, Utah State University
- Don Witt, senior research position, University of British Columbia

At Yale University

- Victor Szczyrba, consultant, IBM

PH.D. SUPERVISION:

Present Ph.D. Students (at Perimeter and the University of Waterloo):

- Nima Duroud (with Jaume Gomis)

Ph.D. students graduated, with present positions:

- Jeff Hersh (Yale, 1986), →medical school
- Jorge De Lyra (Yale, 1987) Professor, University of Sao Paolo
- Paul Renteln (Harvard,1988), Professor, California State University, San Bernadino
- Viqar Husain (Yale,1990) Assistant professor, University of New Brunswick.
- Bernd Bruegmann (Syracuse,1992) Permanent Staff, Albert Einstein Institute
- Madhavan Varadarajan (Syracuse,1994) Permanent Staff, Raman Institute
- Seth Major (Penn State, 1997) Assistant Professor, Hamilton College
- Eli Hawkins (Penn State,1999) Math Ph.D. program, Penn State→SISSA, postdoc
- Daniel Cartin, (2000) World Scientific, editor

- Sameer Gupta (2000) Silicon Valley, consultant
- Yi Ling, (2002) Institute for Theoretical Physics, Beijing.
- Artem Starodubtsev (Univ. of Waterloo,2005) →University of Utrecht
- Mohammad Ansari (2008) →University of Waterloo, Applied Math
- Yidun Wan (2009) →Osaka
- Chanda Prescod Weinstein (2010) → NASA → MIT
- Sean Gryb (2011) → NSERC postgrad fellowship to Utrecht
- Jonathan Hackett (2011) → management consultant
- Linqing Chen
- Andrzej Banbursky
- Nima Doroud

TEACHING

At the University of Waterloo/Perimeter Institute:

Winter 2011	5 informal lectures on loop quantum gravity for PSI students
Winter 2008:	The problem of time in quantum cosmology
Winter 2006:	Introduction to Quantum Gravity
Winter 2002 and Fall 2003:	Advanced general relativity

At Imperial College London:

Spring 2000 and 2001:	10 lectures on quantum gravity to the Msc program
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At The Pennsylvania State University:

Spring 1999:	Quantum Gravity
Spring 1998:	Introductory Physics for biologists (phys 215)
Fall 1998:	Undergraduate quantum mechanics
Fall 1997:	Undergraduate quantum mechanics
Spring 1997:	Black hole thermodynamics and quantum gravity
Fall 1995 and 1996:	General relativity
Spring 1996:	String theory
Spring and Fall 1994:	Relativity and quantum theory for poets (200 students/semester)
Fall 1993:	Introduction to physics (a pilot course for engineers)

At Syracuse University:

Fall 1990, 1991 and 1992:	Descriptive Astronomy. (600 students/semester)
Fall 1988 and Spring 1989:	Graduate quantum mechanics
Spring 1988:	Graduate statistical mechanics
Fall 1987:	The Scientific Method.

At Yale University:

Spring 1988:	Modern Physics (introduction to quantum mechanics)
Fall 1987:	Mathematical Methods for Physics.
Spring 1987:	Canonical quantum gravity
Fall 1986:	General Physics I
Spring 1985 and Fall 1985:	General Relativity

Previous teaching experience:

From Sept. 1973 to June 1975 I designed an introduction to quantum physics and relativity which I taught at City-Wide High School, Cincinnati and Hampshire College. I taught also at UC Santa Barbara as a postdoc.

OTHER PROFESSIONAL ACTIVITIES

- Expert Reviewer for the European Union Commission 2004
- Co-editor of special issue of the *Journal of Mathematical Physics*, November 1995.
- Referee for *Physical Review*, *Nuclear Physics B*, *Journal of Mathematical Physics*, *Classical and Quantum Gravity* and *Physics Letters B*,
- Proposal reviewer for NSF
- Manuscript reviewer, Oxford University Press, New York and other publishers
- Nominating Committee, Gihon foundation.
- Contributor, Edge web site.
- Advisory committee, FQX Foundation
- Discussions of my work appear in, among other places, *The Mind of God* (1992) by Paul Davies, *In the beginning: After COBE and Before the Big Bang* (1993) by John Gribbins, *The Third Culture*, by John Brockman (1995), *Darwin's Dangerous Idea* (1995) by Daniel Dennett, *Before the Beginning* (1997) by Martin Rees and *Blue Mars* by Kim Stanley Robinson.
- Member of Partecol collaboration
Meetings: June 19 to 23, 2008 Seattle

ACTIVITIES RELATED TO INTERACTION BETWEEN SCIENCE AND THE ARTS

Essays in Artists' Catalogues:

2001: Elizabeth Turk, Santa Barbara Contemporary Arts Museum

2001: Roger Penrose, Oxford Drawing Center, Oxford, UK

1997: Donna Moylan, "Ut Scientia Pictura", Baldacci Gallery, NYC

- March 18, 2004 Symposium on Matter and Space, with architect Cecil Balmond, University of Pennsylvania School of Architecture and Design.
- June 20, 2003 Science. Art and Democracy, IDEA CITY, Toronto, ON
- May 24, 2003 Science, Art and Democracy, Subtle Technologies conference, Toronto, ON
- Feb 26, 2003 Space-time-democracy, TED conference, Monterrey, CA
- Jan 30, 2001 Institute for Contemporary Arts, London, debate with the sculptor Mark Quinn in the series *Flesh, not Meat*
- April 3, 1999 Time: the present moment, debate with Jaron Lanier, Universums Universitet Event, Red Hook, New York City
- 1999 Organizing committee for *Universums Universitet*, a series of events sponsored by a group of artists in New York, with Saint Clair Cemin, Ron Gorchoy, Ray Smith.
- March 27, 1998 The scientists' response to postmodernism, Humanities Center Celebration, SUNY Stonybrook, invited talk.
- Nov. 19, 1997 Debate on "The Sokal/Social Text Affair", Rutgers University
- June 1997 Advisor for exhibition "Art confronts Science" at Paolo Baldacci gallery, New York, NY.
- May 1997 Advisor for design of a "Black Hole Terrace", in Charles Jenks, "Garden of Cosmological Speculation", Scotland.
- Dec 3 1996 Conference on reimagining the enlightenment, Collegium Budapest. Joint presentation with painter Donna Moylan
- Jan 1995 Art and Human Knowledge series, Columbia University, Graduate School of Art New York, NY
- 1993 Advisor to an actor in a film, "Soma Sema", directed by Madeline Schwartzman.
- Jan. 1993 "The problems of cosmology", "The Reality Club", an art/science Salon, New York, NY,
- 1992 Dramaturg for "Background Interference" a play by Drucilla Cornell, produced in NYC
- 1987-8 Advisor for theatrical productions: "Galileo" and "A walk in the woods" at Yale Rep. Theatre and Yale Drama School
- Summer 1984 Technical assistant to sculptor Penn Stallard, on a representation of the "Living Earth" using projected live satellite images, commissioned by the UN and US Department of State for the UN Conference on the Peaceful Uses of Outer Space, Vienna, Austria

UNIVERSITY AND INSTITUTE GOVERNANCE (PARTIAL LIST)

Perimeter Institute

- Founding faculty member
- PASCOS search committees,
- Foundations search committee
- Postdoc committee (7 years), Chair, 2007-013
- Faculty evaluations committee, 2011-2013
- Colloquium organizer (4 years)
- Governing committee 2007
- Executive committee 2007-08
- Director search committee 2007-08
- Art and culture committee 2011-

University of Waterloo

- Steering Committee, Waterloo Institute for Complexity and Innovation, 2008-

Ontario College of Art and Design

- President's advisory council, 2009-

Penn State University:

- Member of the University Senate (1996)
- Member of faculty search committee (1995-7), Chair, Faculty Search Committee (1996-7).
- Led searches and hiring for three positions, in string theory, experimental cosmic ray physics and experimental gravitational physics (LIGO)
- Member of teaching committee (1992-1998), chair (1996-7).
- Chair of the working group on computational biology, Penn State University, 1996-7

Syracuse University:

- Chair of the *ad hoc* task force of the College of Arts and Sciences on the relationship between research and teaching, Member of the *ad hoc* task force of the College of Arts and Sciences on review of the core curriculum at Syracuse University.

COMMUNITY SERVICE

- Vice Commodore for external relations Outer Harbour Sailing Federation 2008-2011
- Vice Commodore for public relations Outer Harbour Sailing Federation 2007

RECREATION

- Jazz guitar
- Dingy sailing (Taser, 470, Contender)
- Reading: contemporary American and Canadian fiction, history, philosophy.

MEDIA INTERVIEWS, PROFILES ON MY WORK (PARTIAL LIST)

RADIO INTERVIEWS:

- CBC "How to think about science" series with David Cayley, June 11, 2008
- BBC Radio 4 "Science Friction" debate with Prof Neil Turok, Aug 23 2007
- BBC World Hard Talk, March 8, 2007
- KPCC, "AirTalk", Dec 18, 2006
- KUOW's 'Weekday' Sept 29, 2006
- KUSF "Static Limit" with David Reffkin, Sept 28, 2006
- KUSP "Talk of the Bay" Sept 28, 2006
- KQED's "Forum" with Michael Krasny Sept 28, 2006
- WNYC, "The Leonard Lopate Show" Sept 26, 2006
- WBAI, "Non Fiction" with Harry Allen, Sept 26, 2006
- PRI's "Fair Game" with Faith Salie, Sept 26, 2006
- NPR "Talk of the Nation" debate with Brian Greene, August 18, 2006
- BBC 4 Theories of everything, March 2005
- CBC Quirks and Quarks, on Einstein, March 2005
- New York and Company with Lenny Lopes, WNYC, August 8, 2001
- NPR interview, August 1, 2001
- BBC Radio 4, In our time, with Melvyn Bragg, Feb 22, 01, Three Roads
- BBC Radio 4, Time at the turn of the century, with Melvyn Bragg, Dec 30, 1999
- BBC, program on evolution, May 1998
- NPR radio, Dallas Texas , Nov. 17, 1997
- NPR, Wisconsin Public Radio with Steve Paulson, Sept. 3, 1997
- US Radio Daily with Gary Nowland, Sept. 2, 1997
- WFMU, New Jersey, Dorian Devins August 18, 1997
- New York and Company with Lenny Lopes, WNYC, New August 13, 1997
- BBC Radio 3, Afternoon Arts program, June 3, 1997
- BBC Radio Wales Scope, June 3, 1997
- BBC radio 4, The Afternoon Shift, June 2, 1997
- BBC Radio Scotland, The Usual Suspects, May 28, 1997
- BBC Radio Scotland, with Louise Dalziel, May 27, 1997
- BBC World Service, Discovery with Martin Redfern, May 15, 1997
- BBC radio 4, Start of the Week, May 19, 1997
- NPR, *All things considered*, April 29, 1997

TELEVISION INTERVIEWS (PARTIAL LIST):

- WGBH "Greater Boston" hosted by Emily Rooney November 15, 2006
- The National, CBC, April 2005
- Visionaries, for Canadian television and PBS, 1999
- La Vita Artificiale French TV, 1998
- Noorderlicht de levende kosmos, (a documentary about my work) Dutch TV, May 1998.
- A garden of cosmological speculation with Charles Jenks (Border TV, 1997),
- Steven Hawking's Universe (BBC, August 1997 and PBS, November, 1997),

1. PROFILES (PARTIAL LIST)

- *La Repubblica*, 9 Oct 1998 by Franco Praticco
- *Science News*, July 1998, by Ivor Peterson
- *U.S. News & World Report* July 20, 1998 by Gregg Easterbrook
- *Non Satis Scire*, May 1998
- *Brooklyn Magazine*, Nov. 1997
- *Muy Interesante Madrid*, Nov. 1997
- *The Chronicle of Higher Education*, August 15, 1997 by Vincent Kiernan

- *The Age*, Melbourne, Australia, August 30, 1997 by Peter Spinks
- *The Philadelphia Enquirer*, August 11, 1997 by Fay Flam
- *New York Times Magazine*, July 13, 1997 by Dennis Overbye
- *New Scientist*, May 24 1997 by David Concar
- *Scotland on Sunday*, May 18, 1997, by Geraldine Murray
- *The Center Daily Times*, May 11, 1997 by Caroline Terenzini
- *The Guardian*, "Five to Watch" January 1, 1997
- (Other profiles appeared in Italian and Polish in 1999)
- *Discover Magazine* (April 1993)
- *Omni Magazine* (February 1993)
- *Scientific American* (August 1992, Science and the Citizen)
- *New Scientist* (Feb. 1, 1992 by John Gribbins)
- *Physics World* (February 1992 by Werner Israel)
- *The Washington Post* (by Amitaba Sen)
- *The Independent of London* (June 11, 1990, by Paul Davies)
- *San Francisco Examiner* (March 3, 1991)
- *Nature* (1996), by John Maynard Smith and Eors Samarth

REVIEWS OF *THE TROUBLE WITH PHYSICS* (PARTIAL LIST):

Print Media:

- *The Wall Street Journal*, June 24, 2006
- *Seed Magazine*, August 2006
- *Time* magazine August 21, 2006
- *Discover Magazine*, September 2006
- *Scientific American*, September 2006
- *Wired*, September 2006:15
- *The Economist*, Sept 14, 2006
- *The New York Times Book Review*, Sep 17, 2006 by Tom Siegfried
- *The Boston Globe*, Sept 17, 2006
- *USA Today*, Sept 19, 2006
- *The New York Sun*, by Michael Shermer, Sept 27, 2006
- *The New Yorker*, by Jim Holt, Sept 25, 2006
- *The LA Times*, by K C Cole, Oct 8, 2006
- *Nature*, by George Ellis (Nature 44, 482, 5 Oct. 2006)
- *San Francisco Chronicle*, by Keay Davidson, Oct 13, 2006
- *Dallas Morning News*, by Fred Bortz, Oct 15, 2006
- *Toronto Star*, by Peter Calamai, Oct 15, 2006
- *Philadelphia City Paper*, by Matt Hotz, Nov 8, 2006
- *The Oregonian*, by James N. Gardner, Nov 5, 2006
- *The Philadelphia Inquirer*, by Fred Bortz, Dec 18, 2006
- *American Scientist*, by Joseph Polchinski, Jan-Feb 2007
- *Physics World* by Michael Riordan, Feb 2007
- *Reason Magazine*, by Kenneth Silber
- *Financial Times* by Alan Cane
- *Sunday Times of London*, by Bryan Appleyard
- *New Humanist*, AC Grayling, March/April 2007, p 32-33
- *Scotsman* by Andrew Crumey
- *The Telegraph*, by Roger Highfield
- *The New Criterion*, by Martin Gardner, April 2007

ON THE INTERNET:

- Slate review by Gregg Easterbrook
- Sean Carroll's pre-review: The String Theory Backlash
- Sabine Hossenfelder's review

- Dave Bacon's review
- John Walker's review
- Sean Carroll's review
- Chad Orzel's review
- Christine Dantas's review
- Jonathan Shock's review
- John Clark review
- Expanded version of Polchinski's review
- Response to Polchinski's review
- Alejandro Satz's review
- Brian's Study
- Stephen Strauss
- Susan Crawford's review
- Steinn Sigurdsson's review
- John Baez's review

REVIEWS OF *THREE ROADS TO QUANTUM GRAVITY* (PARTIAL LIST):

- *The Guardian*, Feb 17, 2001, by Mark Buchanan
- *Physics World*, December 2000, by Michael Duff
- *The Independent*, January 25, 2001, by John Gribbin
- *New Scientist*, Feb 3, 2001, by Robert Matthew
- *Nature*, March 6, 2001 by David Lindly
- *Physics Today*, March 2002, by Jorge Pullin
- *Scientific American*, August 2001, by Chet Reymo
- *American Scientist*, Jan-Feb, 2002, by Paul Renteln
- Others listed on <http://www.qgravity.org/roads/>

REVIEWS OF *THE LIFE OF THE COSMOS* (PARTIAL LIST):

- *New York Times Book Review*, July 27, 1997, p. 26 by George Johnson
- *The Washington Post*, Sunday bookworld June 15, 1997, by Curt Suplee
- *The Sunday Times* books section, May 18, 1997, p. 5 by John Gribbin
- *The Sunday Times Bookshop*, Richard Dawkins "What they're reading"
- *Discover Magaine* July 1997 by Tim Folger
- *Nature*, June 12, 1997, p. 671 by George Ellis
- *Lingua Franca*, June/July 1997 by Jim Holt
- *New Statesman*, June 6, 1997 p. 48 by John Maddox
- *Independent on Sunday*, May 4, 1997, p. 23 by John Gribbin
- *The Independent* weekend section, June 21, 1997, p.7 by Peter Tallack
- *The Guardian*, June 19, 1997, p. 11 by Tim Radford
- *The Times Higher Education Supplement* 15 Aug. 1997, p. 20 by Martin Ince
- *The Philadelphia Inquirer Books*, May 25, 1997 by Eric Chaisson
- *The Scotsman*, May 27, 1997 by Martin Hannan
- *The Scotsman*, June 2, 1997, p. 13. by Christopher Lambton
- *Prospect*, May 1997, p. 35 by John Gribbin
- *Publishing News* 14 March 1997
- *Science*, 1 August 1997, vol. 227 p. 644 by Joseph Silk
- *New Scientist*, 19 July 1997 p. 46 by Tony Hay
- *Literary Review*, August 1997, p. 49
- *Kirkus Reviews*, April 1, 1997
- *Physics World*, Dec. 1997 by Bernard Carr
- *London Review of Books*, 1 Jan, 1998, by John Leslie, p. 18.
- *Times Literary Supplement*, 2 Jan. 1998, by Michael Redhead, p.5.
- *First Things*, August/September 1998 Peter J. Leithart
- *Postmodern Culture*, *Physics Today*, *J. of Philosophy of Science*, all 1998