

CURRICULUM VITAE

Christoph Adami

Education:

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| B.S. (Physics/Mathematics) | University of Bonn (Germany) | 1982 |
| Diplom (Theoretical Physics) | University of Bonn (Germany) | 1988 |
| M.A. (Physics) | SUNY at Stony Brook | 1988 |
| Ph.D. (Theoretical Physics) | SUNY at Stony Brook | 1988 |

Positions:

- Professor of Microbiology and Molecular Genetics. Michigan State University, Aug 2011-present
- Professor of Physics and Astronomy, Michigan State University, Aug 2011-present
- Visiting Professor in Microbiology and Molecular Genetics, Michigan State University, 2010-2011
- Professor of Applied Life Sciences, Keck Graduate Institute, 2004-2011
- Chair of the Faculty, Keck Graduate Institute, 2009-2010
- Visiting Associate in Biology, Caltech, 2009-2011
- Extended Faculty, School of Mathematical Sciences, Claremont Graduate University, 2005-2011
- Faculty Associate in Computation and Neural Systems, Caltech, 2001 – 2008
- Instructor, Computation and Neural Systems, Caltech, 1995-2004, 2006-2007
- Principal Scientist, Jet Propulsion Laboratory, 2001- 2004
- Research Scientist (Senior Level), Jet Propulsion Laboratory, 2000 -2001
- Burroughs-Wellcome Fellow in Computational Molecular Biology, 1997 -1999
- Senior Research Fellow, Computation and Neural Systems, Caltech, 1995- 2000
- Fairchild Prize Fellow, Division of Phys., Math. & Astron., Caltech, 1992 -1995 (Advisor: Prof. Steven E. Koonin)
- Postdoctoral Research Associate, Dept. of Physics, SUNY at Stony Brook, 1991-1992 (Advisor: Prof. Gerald E. Brown)

Honors:

- Fellow of the AAAS (2011)
- KGI Excellence in Research Award (2005-2006)
- NASA Space Act Award (2003)
- NASA Exceptional Achievement Medal (2002)
- President's Fund Award, Caltech (1996)
- Director's Fellowship, Los Alamos National Laboratory (1995, declined)
- Fairchild Prize Fellowship, Caltech (1992)
- Diplom in Theoretical Physics with Highest Honors (“Ausgezeichnet”), University of Bonn (1988)

Memberships:

- American Association for the Advancement of Science (AAAS)
- American Physical Society

- American Society for Microbiology
- International Society for Artificial Life

Professional Activities:

- Editorial Boards: Annual Review of Nonlinear Dynamics and Complexity, Artificial Life Journal, BMC Evolutionary Biology, Biology Direct.
- Referee for over 60 professional journals: Nature, Nature Genetics, Nature Chemical Biology, Nature Reviews Microbiology, Nature Communications, Science, PLoS Biology, PLoS Computational Biology, PLoS Genetics, PLoS Pathogens, PLoS One, Proc. Natl. Acad. Sci. USA, Proc. Royal Society London, J. Roy. Soc. Interface, Philos. Trans. Roy. Society B, J. Molecular Biology, Molecular Biology and Evolution, J. Molecular Evolution, Genome Biology, American Naturalist, Biology Direct, BMC Evolutionary Biology, BMC Bioinformatics, BMC Systems Biology, Briefings in Bioinformatics, Developmental Biology, J. of theoretical Biology, Evolution, Naturwissenschaften, Physical Review A,B,C,D,E, Physical Review Letters, Physics Letters A,B, Physica A,D, Nuclear Physics A, Annals of Physics, Europhysics Letters, European Journal of Physics, European Physical Journal B, J. of Physics A,B, Quantum Information Processing, Quantum Information and Computing, IEEE Transactions on Information Theory, Proceedings of the IEEE, Advances in Complex Systems, Artificial Life, BioEssays, Biosystems, Complex Systems, Complexity (Wiley), Genetic Programming and Evolvable Machines, Journal of the American Chemical Society, Collection of Czechoslovak Chemical Communications, Foundations of Science, Systems and Synthetic Biology, Origins of Life, Chaos, Journal of Economic Behavior and Organization (64)
- Program Chair of 13th International Conf. on Artificial Life, July 19-22nd, 2012, East Lansing, Michigan
- General Chair of Sixth International Conf. on Artificial Life, June 26-29th, 1998, Los Angeles, CA
- Advisory Boards:
 - External Advisory Board, Quantitative Biological Modeling Initiative, Michigan State University 2003-2008.
 - Scientific Advisory Boards:
 - 14th International Conference on Artificial Life, New York, 2014
 - 2014 Genetic and Evolutionary Computing Conference
 - 11th European Conf. on Artificial Life, Paris 2011
 - 2011 Genetic and Evolutionary Computing Conference
 - 12th International Conference on Artificial Life, Odense, Denmark, 2010
 - 10th International Conference on Artificial Life, Bloomington, Indiana, 2006
 - 9th International Conference on Artificial Life, Boston, September 2004
 - 7th International Conference on Artificial Life, August 2000.
 - Seventh European Conference on Artificial Life (ECAL 07), Lisbon 2007
 - Fifth European Conference on Artificial Life (ECAL 99).
 - 1999 Genetic and Evolutionary Computation Conference (GECCO 99)
 - 1st NASA Intern. Conf. on Quantum Computing and Quantum, Feb. 1998
 - Review Board for the Center for Integrated Space Microsystems Revolutionary Computing Technology Program, 1999, Jet Propulsion Laboratory.

Grants:

- Co-Principal Investigator: "Evaluating Connectomes Using Measures of Complexity and Synergy" (Paul Allen Foundation, 10/2010-9/2012).
- Principal Investigator: "Statistics of Information Acquisition in Evolution" (2006-2007, Templeton Foundation)
- Co-Principal Investigator: "Structure and Origin of Functional Modules" (2005-2010, NSF Frontiers in Integrative Biological Research)
- Principal Investigator: "Digital Immune Systems" (2005-2006, Seaver Foundation)
- Principal Investigator: "Relativistic Quantum Information Theory" (2003-2007, Army Research Office)
- Principal Investigator: "Digital Life Experiments For In Situ Detection of Extraterrestrial Life", Director's Research and Development Fund Award, NASA (2001)
- Co-Principal Investigator: "Bacterial and Computational Experiments to Identify General Principles that Govern the Evolution of Complexity" (1999-2004, NSF BioComplexity Phase I)
- Principal Investigator: "Spatial and Temporal Dynamics of Simple Living Systems" (1997-1999, NSF, Physics Division)
- Principal Investigator: "Robustness and Evolvability of Computer Languages" (1997-1998, Microsoft Research)
- Founding Faculty Member: "Interfaces Between the Biological/Physical/Chemical and Computational Sciences" (1995-2000, Burroughs Wellcome Fund).
- Co-Principal Investigator: "President's Fund Award to Study Quantum Algorithms and Quantum Information Theory" (1997-1998, President's Fund)

Ph.D. Students (Graduated)

1. Charles Ofria (1999, Computation and Neural Systems, Caltech)
Now: Full Prof. in Computer Science, Michigan State U.
2. Johan Chu (1999, Physics, Caltech)
Now: U. Michigan Business School
3. Stephanie Chow (2005, Computation and Neural Systems, Caltech)
Now: Postdoc, Princeton U.
4. Evan Dorn (2005, Computation & Neural Systems, Caltech). Winner of "Innovative Electronic Thesis & Dissertation (ETD) Award"
Now: Logical Realty Inc. (Founder & CEO).
5. Robert Forster (2006, Physics, Caltech)
Now: Analyst, Tower Research Capital
6. D.A. Drummond (2006, Computation & Neural Systems). Winner: Best Caltech thesis.
Now: Ass. Prof, U. of Chicago
7. J. D. Bloom (2007, Chemistry, Caltech) [co-advised with Prof. Arnold]. Winner: Best Thesis Award in Bioengineering. Now: Ass. Prof., Fred Hutchinson Cancer Research Center
8. D. Iliopoulos (2010, Keck Graduate Institute)
Now: Pacific Biosystems, San Francisco
9. B. Østman (2010, Keck Graduate Institute)
Now: postdoc, Michigan State U.
10. J. Qian (2012, Keck Graduate Institute)

Now: staff scientist, Illumina Corp. (San Diego)
11. N. Chaumont (2013, Keck Graduate Institute)
Now: Staff Scientist, Stanford University

List of Publications

125. L. Albantakis, A. Hintze, C. Koch, C. Adami, & G. Tononi, *Evolution of Integrated Causal Structures in Animals Exposed to Environments of Increasing Complexity*. In review.
124. R.S. Olson, P.B. Haley, F.C. Dyer, & C. Adami, *Exploring the Conditions that Select For the Evolution of Cooperative Vigilance Behavior*. In review.
123. D.B. Knoester, H.J. Goldsby, and C. Adami. *Leveraging Evolutionary Search to Discover Self-Adaptive and Self-Organizing Cellular Automata*. Arxiv 1405.4322
122. K. Bradler and C. Adami, *Black Holes as Bosonic Gaussian Channels*. Arxiv 1405.1097. New Journal of Physics, in review.
121. C. Adami, J. Schossau, and A. Hintze, *Evolutionary Game Theory Using Agent-based Methods*, BioEssays (in review).
120. A. Gupta and C. Adami, *Changes in Epistatic Interactions in the Long-Term Evolution of HIV-1 Protease* (MBE, in review)
119. R.S. Olson, D.B. Knoester, and C. Adami. *Evolution of Swarming Behavior is Shaped by How Predators Attack*. J. Computational Evolution (in review).
118. A. Hintze, R.S. Olson, C. Adami, and R. Hertwig, *Risk Sensitivity as an Evolutionary Adaptation*. Sci. Rep., in review.
117. B. Patra, Y. Kon, G. Yadav, A. Sevold, J. Frumkin, R.R. Vallabhajosyula, A. Hintze, B. Østman, J. Schossau, A. Bhan, B. Marzolf, J. Tamashiro, A. Kaur, N. Baliga, E. Grayhack, C. Adami, D. Galas, A. Raval, E. Phizicky, A. Ray. *A Genome-wide Dosage-Rescue Network Reveals Genetic Robustness and a Mechanism for Huntington's Disease*. Nature Communications, in review.
116. C. Adami and G. ver Steeg, *Black Holes Are Almost Optimal Quantum Cloners*. Quant-ph/0601065. In review.
115. A.E. Johnson, E. Strauss, R. Pickett, C. Adami, I. Dworkin, & H. J. Goldsby, *More Bang For Your Buck: Quorum-Sensing Capabilities Improve the Efficacy of Suicidal Altruism*. In: Proceedings of Artificial Life 14. (H. Sayama, J. Rieffel, S. Risi, R. Doursat & Hod Lipson, eds.) MIT Press (2014) pp.120-128.
114. B. Østman, R. Lin, and C. Adami, *Trade-offs Drive Resource Specialization and the Gradual Establishment of Ecotypes*. BMC Evol. Biology **14** (2014) 113.
113. K. Bradler and C. Adami, *The Capacity of Black Holes to Transmit Quantum Information*. J. High Energy Phys. **1405** (2014) 95.

112. C. Adami and G. ver Steeg, *Classical Information Transmission Capacity of Quantum Black Holes*. *Classical and Quantum Gravity* **31** (2014) 075015.
111. R. Olson, M. Mirmomeni, T. Brom, E. Bruger, A. Hintze, D.B. Knoester, and C. Adami, *Evolved Digital Ecosystems: Dynamic Steady State, not Optimal Fixed Point*. In "Advances in Artificial Life (ECAL 2013)" (P. Liò, O. Miglino, G. Nicosia, S. Nolfi and M. Pavone, eds.) MIT Press (2013) pp. 126-133.
110. S. Chapman, D. Knoester, A. Hintze, and C. Adami, *Evolution of an Artificial Visual Cortex for Image Recognition*. In "Advances in Artificial Life (ECAL 2013)". (P. Liò, O. Miglino, G. Nicosia, S. Nolfi and M. Pavone, eds.) MIT Press (2013) pp. 1067-1074.
109. R. S. Olson, D. K. Knoester, and C. Adami, *Critical Interplay Between Density-Dependent Predation and Evolution of the Selfish Herd*, Proceedings of the 2013 Genetic and Evolutionary Computing Conference. (C. Blum, ed.) ACM Press (2013), pp. 247-254.
108. B. Østman and C. Adami, *Predicting Evolution and Visualizing High-dimensional Fitness Landscapes*, in "Recent Advances in the Theory and Application of Fitness Landscapes" (A. Engelbrecht and H. Richter, eds.). Springer Series in Emergence, Complexity, and Computation (2013), pp. 493-510.
107. C. Adami and A. Hintze. *Evolutionary Instability of Zero-Determinant Strategies Demonstrates that Winning Is Not Everything*. *Nature Communications* **4** (2013) 2193.
106. R. S. Olson, A. Hintze, F. C. Dyer, D. B. Knoester, C. Adami, *Predator Confusion is Sufficient to Evolve Swarming*. *J. Royal Society Interface* **10** (2013) 20130305.
105. L. Marstaller, A. Hintze, and C. Adami, *Cognitive Systems Evolve Complex Representations for Adaptive Behavior*. *Neural Computation* **25** (2013) 2079-2107.
104. C. Adami, *Boldly Going Beyond Mathematics*, *Science* **338** (2012) 1421-1422.
103. C. Adami, *Adaptive Walks on the Fitness Landscape of Music*. *Proc. Natl. Acad. Sci. USA* **109** (2012) 11898-11899.
102. J. Qian, T. Ferguson, D.N. Shinde, A. J. Ramírez-Borrero, A. Hintze, C. Adami, A. Niemz, *Sequence Dependence of Isothermal DNA Amplification via EXPAR*, *Nucleic Acids Research* **40** (2012) e87.
101. C. Adami, *The Use of Information Theory in Evolutionary Biology*, *Annals NY Acad. Sciences* **1256** (2012) 49-56.
100. C. Adami, J. Schossau, and A. Hintze, *Evolution and Stability of Altruist Strategies in Microbial Games*, *Physical Review E* **85** (2012) 011914.
99. B. Østman, A. Hintze, and C. Adami, *Impact of Epistasis and Pleiotropy on Evolutionary Adaptation*, *Proc. Roy. Soc.* **279** (2012) 247-256.
98. E.D. Dorn and C. Adami, *Robust Monomer Distribution Biosignatures in Evolving Digital Biota*, *Astrobiology* **11** (2011) 959-968.
97. J. Edlund, N. Chaumont, A. Hintze, C. Koch, G. Tononi, and C. Adami, *Integrated Information*

- Increases with Fitness in the Evolution of Animals*, PLoS Comp. Biol. **7** (2011) e1002236.
96. C. Adami, J. Qian, M. Rupp, and A. Hintze, *Information Content of Colored Motifs in Complex Networks*. Artificial Life **17** (2011) 375-390.
95. C. Adami, *Toward a Fully Relativistic Theory of Quantum Information*, in: *From Nuclei to Stars: Festschrift in Honor of Gerald E. Brown*, edited by S. Lee (World Scientific, Singapore, 2011). Pp. 71-102.
94. J. Qian, A. Hintze, and C. Adami, *Colored Motifs Reveal Computational Building Blocks in the C. elegans Brain*. PLoS ONE **6** (2011) e17013.
93. E.D. Dorn, K.H. Neelson, and C. Adami, *Monomer Abundance Distribution Patterns as a Universal Biosignature: Examples from Terrestrial and Digital Life*, J. Mol. Evol **72** (2011) 283-295.
92. D. Iliopoulos, A. Hintze, and C. Adami, *Critical Dynamics in the Evolution of Stochastic Strategies for the Iterated Prisoner's Dilemma*, PLoS Comp. Biol. **6** (2010) e1000948.
91. B. Østman, A. Hintze, and C. Adami, *Critical Properties of Complex Fitness Landscapes*, Proc. 12th Intern. Conference on Artificial Life, H. Fellerman et al, eds. (MIT Press, 2010), pp. 126-132,
90. A. Hintze and C. Adami, *Darwinian Evolution of Cooperation via Punishment in the "Public Goods" Game*, Proc. 12th Intern. Conference on Artificial Life, H. Fellerman et al, eds. (MIT Press, 2010) pp. 445-450.
89. A. Hintze and C. Adami, *Modularity and Anti-Modularity in Networks with Arbitrary Degree Distribution*, Biology Direct **5** (2010) 32.
88. L. Marsteller, A. Hintze, and C. Adami, *Measuring Representation*. In W. Christensen, E. Schier, & J. Sutton (Eds.), ASCS09: Proceedings of the 9th Conference of the Australasian Society for Cognitive Science (pp. 232-237). Sydney, Australia: Macquarie Centre for Cognitive Science (2009).
87. C. Adami (2009), *Biological Complexity and Biochemical Information*, in *Encyclopedia of Complexity and Systems Science*, R. Meyers, ed., Springer Verlag, pp 489-511.
86. D. Iliopoulos, P. Szor, and C. Adami, *Darwin Inside the Machines: Malware Evolution and the Consequences for Computer Security*, Proceedings of VB2008 (Ottawa), H. Martin ed., pp. 187-194 (2009).
85. C. Adami, *The Logic of Science*, The New Atlantis **19** (Winter 2008) 3-5.
84. A. Hintze and C. Adami, *Evolution of Complex Modular Biological Networks*, PLoS Comp. Biol. **4** (2008) e23.
83. C. Adami, *Who Watches the Watcher?* Science **316** (2007) 1125-1126.
82. N. Chaumont, R. Egli, and C. Adami, *Evolving Virtual Creatures and Catapults*. Artificial Life **13** (2007) 139-157.
81. R. Conduit, C. Adami, H. Lipson, V. Zykov, and J. Bongard, *To Sleep, Perchance To Dream*. Science **315** (2007) 1219-1220.
80. C. Adami, *What Do Robots Dream Of?* Science **314** (2006) 1093-1094.
79. R. Forster, C. Adami, and C.O. Wilke, *Selection for Mutational Robustness in Finite Populations*. J. theor. Biology **243** (2006) 181-190.

78. C. Adami, *Three Weeks with Hans Bethe*. In *Hans Bethe and His Physics*, G.E. Brown and C.-H. Lee, eds., World Scientific (Singapore, 2006), pp. 45-111.
77. N. Chaumont, R. Egli and C. Adami, *Evolving Virtual Catapults*. Proc. 10th Conference on Artificial Life, L.M. Rocha, L.S. Yeager, M.A. Bedau, D. Floreano, R.L. Goldstone, and A. Vespignani, eds., (MIT Press, 2006) pp. 262-268.
76. C. Adami, *Reducible Complexity*. Science **312** (2006) 61-63.
75. C. Adami, *Digital Genetics: Unraveling the Genetic Basis of Evolution*. Nature Reviews Genetics **7** (2006) 109-118.
74. D.A. Drummond, J.D. Bloom, C.O. Wilke, C. Adami and F.H. Arnold. *Why Highly Expressed Proteins Evolve Slowly*. Proc. Natl. Acad. Sci. USA **102** (2005) 14338-14343.
73. D.R. Mitchell, C. Adami, W. Lue, and C.P. Williams, *A Random Matrix Model of Adiabatic Quantum Computation*. Phys. Rev. A **71** (2005) 052324.
72. R.J. Terrile, C. Adami, H. Aghazarian, S.N. Chau, V.T. Dang, M.I. Ferguson, W. Fink, T.L. Huntsberger, G. Klimeck, M.A. Kordon, S. Lee, P. von Allmen, and J. Xu, *Evolutionary Computation Technologies for Space Systems*. Proc. IEEE Aerospace Conference (2005) pp. 4284-4295.
71. J.D. Bloom, J.J. Silberg, C.O. Wilke, D.A. Drummond, C. Adami, and F.H. Arnold, *Thermodynamic Prediction of Protein Neutrality*. Proc. Natl. Acad. Sci. **102** (2005) 606-611.
70. A.N. Hampton and C. Adami, *Evolution of Robust Developmental Neural Networks*. Proc. of Artificial Life IX, Boston, MA, Sep 12-15, 2004. J. Pollack, M.A. Bedau, P. Husbands, T. Ikegami, and R. Watson, eds., pp 438-443.
69. J.D. Bloom and C. Adami, *Evolutionary Rate Depends on Number of Protein-Protein Interactions Independently of Gene Expression Level: Response*. BMC Evol. Biol. **4** (2004)
68. S.S. Chow, C.O. Wilke, R.E. Lenski, C. Ofria, and C. Adami, *Adaptive Radiation from Resource Competition in Digital Organisms*. Science **305** (2004) 83-85.
67. H. Lee, U.H. Yurtsever, P. Kok, G.H. Hockney, C. Adami, S.L. Braunstein, and J.P. Dowling, *Towards Photostatistics from Photon-Number Discriminating Detectors*. J. Mod. Optics **51** (2004) 1517-1528.
66. C. Adami, *Information Theory in Molecular Biology*. Physics of Life Reviews **1** (2004) 3-22.
65. J.D. Bloom, C.O. Wilke, C. Adami, and F.H. Arnold, *Stability and Evolvability of Function in a Model Protein*. Biophys. Jour. **86** (2004) 2758-2764.
64. P.R.A. Campos, C.O. Wilke, and C. Adami, *Modeling Stochastic Clonal Interference*. In *Modelling in Molecular Biology* (Springer Series in Natural Computing, 2004), G. Ciobanu and G. Rozenberg, eds., pp. 21-39.
63. D. A. Wagenaar and C. Adami, *Influence of Chance, History, and Adaptation on Digital Evolution*. Artif. Life **10** (2004) 181-190.
62. J.A. Edlund and C. Adami, *Evolution of Robustness in Digital Organisms*. Artif. Life **10** (2004)

167-179.

61. J.S. White and C. Adami, *Bifurcation into Functional Niches in Adaptation*. *Artif. Life* **10** (2004) 135-144.

60. C. Adami and C.O. Wilke, *Experiments in Digital Evolution*. *Artif. Life* **10** (2004) 117-122.

59. J.D. Bloom and C. Adami, *Apparent Dependence of Protein Evolutionary Rate on Number of Interactions is Linked to Biases in Protein-Protein Interactions Data Sets*. *BMC Evol. Biol.* **3** (2003) 21.

58. R.M. Gingrich, A.J. Bergou, and C. Adami, *Entangled Light in Moving Frames*. *Phys. Rev. A* **68** (2003) 042102.

57. C. Ofria C. Adami, and T. C. Collier, *Selective Pressures on Genomes in Molecular Evolution*. *J. theor. Biology* **222** (2003) 477-483.

56. R.E. Lenski, C. Ofria, R.T. Pennock, and C. Adami, *The Evolutionary Origin of Complex Features*. *Nature* **423** (2003) 139-144.

55. C. Adami, *Sequence Complexity in Darwinian Evolution*. *Complexity (Wiley)* **8** (2002) 49-56.

54. C. Kamp, C.O. Wilke, C. Adami, and S. Bornholdt. *Viral Evolution Under the Pressure of an Adaptive Immune System: Optimal Mutation Rates for Viral Escape*. *Complexity (Wiley)* **8** (2002) 28-33.

53. C.O. Wilke, R.E. Lenski, and C. Adami, *Compensatory Mutations Cause Excess of Antagonistic Epistasis in RNA Secondary Folding*. *BMC Evol. Biol.* **3** (2003) 3.

52. C.O. Wilke and C. Adami, *Evolution of Mutational Robustness*. *Mut. Research* **522** (2003) 3-11.

51. R.M. Gingrich and C. Adami, *Quantum Entanglement of Moving Bodies*. *Phys. Rev. Lett.* **89** (2002) 270402.

50. C. Adami, *What is Complexity?* *BioEssays* **24** (2002) 1085-1094.

49. C. O. Wilke and C. Adami, *The Biology of Digital Organisms*. *Trends in Ecology and Evolution* **17** (2002) 528-532.

48. C. Ofria, T.C. Collier, and C. Adami, *Design of Evolvable Computer Languages*. *IEEE Transactions on Evolutionary Computation* **6** (2002) 420-424.

47. C. Adami and J. Chu, *Critical and Near-Critical Branching Processes*. *Phys. Rev. E* **66** (2002) 011907.

46. C. Adami, *Ab-Initio Modeling of Ecosystems with Artificial Life*. *Natural Resource Modeling* **15** (2002) 133-146.

45. C. Adami, *Simulations of Evolution*. In M. Pagel, S. Frank, C. Godfray, B. K. Hall, K. Hawkes, D. M. Hillis, A. Kodric-Brown, R. E. Lenski, and A. Pomiankowski, eds., *Encyclopedia of Evolution* (Oxford University Press, New York), p. 1064-1066. (2002)

44. P.R.A. Campos, C.O. Wilke, and C. Adami, *Optimal Adaptive Performance and Delocalization in NK Fitness Landscapes*. *Physica A* **304** (2002) 495-506.
43. C. Adami and J.P. Dowling. *Quantum Computation—The Ultimate Frontier*. Proc. AMOS 2001 Tech. Conf., Sept. 10-14, Wailea, Maui, Hawaii. P. Kervin, L. Bragg, and S. Ryan, eds. Maui (2001) p. 462-467.
42. C. O. Wilke, J.L. Wang, C. Ofria, R. E. Lenski, and C. Adami, *Evolution of Digital Organisms at High Mutation Rate Leads To Survival of the Flattest*. *Nature* **412** (2001) 331-333.
41. C. O. Wilke and C. Adami, *Interaction Between Directional Epistasis and Average Mutational Effects*. Proc. Royal Society London B **268** (2001) 1469.
40. C. Adami and S.E. Koonin, *Complex Langevin Equation and the Many-Fermion Problem*. *Phys. Rev. C* **63** (2001) 034319.
39. M.A. Bedau, C. Adami, J.S. McCaskill, N.H. Packard, S. Rasmussen, D.G. Green, T. Ikegami, K. Kaneko, and T.S. Ray, *Open Problems in Artificial Life*. *Artificial Life* **6** (2000) 363-376.
38. D. A. Wagenaar and C. Adami, *Influence of Chance, History and Adaptation on Evolution in Digitalia*. Proc. of Artificial Life VII, Portland, OR, Aug. 1-6, 2000. M.A. Bedau, J.S. McCaskill, N.H. Packard, and S. Rasmussen. eds., MIT Press (2000), p. 216-220.
37. J. C. Astor and C. Adami, *A Developmental Model for the Evolution of Artificial Neural Networks*. *Artificial Life* **6** (2000) 189-218.
36. C. Adami, C. Ofria and T. C. Collier, *Evolution of Biological Complexity*. Proc. Natl. Acad. Sci. **97** (2000) 4463-4468.
35. C. Adami and N.J. Cerf, *Physical Complexity of Symbolic Sequences*. *Physica D* **137** (2000) 62-69.
34. J. Chu and C. Adami, *A Simple Explanation for Taxon Abundance Patterns*. Proc. Nat. Acad. Sci. **96** (1999) 15017-15019.
33. R. E. Lenski, C. Ofria, T. C. Collier, and C. Adami, *Genome Complexity, Robustness, and Genetic Interactions in Digital Organisms*. *Nature* **400** (1999) 661-664.
32. C. Ofria, C. Adami, T.C. Collier, and G. Hsu, *Evolution of Differentiated Expression Patterns in Digital Organisms*. Lect. Notes Artif. Intell. **1674** (1999) 129-138.
31. N.J. Cerf, C. Adami, and R.M. Gingrich, *Reduction Criterion for Separability*. *Phys. Rev. A* **60** (1999) 898.
30. N.J. Cerf and C. Adami, *Quantum Extension of Conditional Probability*, *Phys. Rev. A* **60** (1999) 893.
29. C. Ofria and C. Adami, *Evolution of Genetic Organization in Digital Organisms*. In *Evolution as Computation*, DIMACS Workshop, Princeton, 1999, L.F. Landweber and E. Winfree, eds., Springer-Verlag, N.Y. (2002) pp. 296-313.
28. C. Adami and N.J. Cerf, *Prolegomena to a Non-Equilibrium Quantum Statistical Mechanics*. *Chaos, Solitons & Fractals* **10** (1999) 1637-1650. Special issue on Quantum Computation.

27. C. Adami and N.J. Cerf, *Quantum Computation with Linear Optics*. Lect. Notes in Comp. Sci. **1509** (1999) 391-401. Proc. of QCQC '98.
26. C. Adami and N.J. Cerf, *What Information Theory Can Tell Us About Quantum Reality*. Lect. Notes in Comp. Sci. **1509** (1999) 258-268. Proc. of QCQC '98.
25. J. C. Astor and C. Adami, *Development and Evolution of Neural Networks in an Artificial Chemistry*. Proc. of 3rd German Workshop on Artificial Life, C. Wilke, S. Altmeyer, and T. Martinetz, eds., Verlag Harri Deutsch (1998) p. 15-29.
24. C. Adami, R. Seki and R. Yirdaw, *Critical Exponent of Species-Size Distribution in Evolution*. Proc. of "Artificial Life VI" Los Angeles, June 27-29, 1998; C. Adami, R. Belew, H. Kitano, and C. Taylor, eds., MIT Press (1998), p. 221-227.
23. N. J. Cerf and C. Adami, *Information Theory of Quantum Entanglement and Measurement*. Physica D **120** (1998) 62-81.
22. N. J. Cerf, C. Adami, and P.G. Kwiat, *Optical Simulation of Quantum Logic*. Phys. Rev. A **57** (1998) R1477-1480.
21. C. Adami and N.J. Cerf, *von Neumann Capacity of Noisy Quantum Channels*. Phys. Rev. A **56** (1997) 3470-3483.
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