CURRICULUM VITAE

Sergei S. Pilyugin

E-mail: pilyugin@ufl.edu
Web: http://people.clas.ufl.edu/pilyugin/
Office: 352-294-2326, Fax 352-392-8357,
Department of Mathematics, University of Florida
1400 Stadium Road, Gainesville, FL 32611-8105.

Professional experience:

August 2009–present: Professor of Mathematics, University of Florida
August 2018- August 2019: Associate Chair/Undergraduate Coordinator, Department of Mathematics, University of Florida

August 2006 – December 2006: Long-Term Visitor (on research leave), Department of Biology, Emory University

August 2005–August 2009: Associate Professor of Mathematics, University of Florida

August 1999–August 2005: Assistant Professor of Mathematics, University of Florida
April 2004 – June 2004: Long-Term Visitor, Mathematical Biosciences Institute, The Ohio State University
August 1997– August 1999: Joint Postdoctoral Fellow, Center for Dynamical Systems and Nonlinear Studies, Georgia Institute of Technology and Department of Biology, Emory University; Postdoctoral advisors: *Professors K. Mischaikow and J. K. Hale*

Education:

Graduate: Emory University, Ph. D. in Mathematics, 1997; Ph. D. thesis advisor: *Professor P. Waltman*
Undergraduate: University of St. Petersburg, Russia, Diploma in Mathematics (with distinction), 1993; Undergraduate thesis advisors: *Profs. G. A. Leonov and V. A. Pliss*

External funding:

- NSF Grant DMS-1411853 "Modeling the interplay of ecology and effectiveness of MPAs"
  Total amount funded: **$ 285,793.00**
  Effective dates: 08/01/14–07/31/18
  Co-PI: **Sergei S. Pilyugin**, Mathematics, University of Florida

- NSF Grant DMS-0818050 "Modeling microbial heterogeneity under antibiotic treatment"
  Total amount funded: **$ 238,266.00**
  Effective dates: 08/01/08–07/31/11
  PI: **Sergei S. Pilyugin**, Mathematics, University of Florida

- NSF Grant DMS-1065966 "University of Florida Conference on Computational and Systems Biology"

Total amount funded: **$ 20,000.00**
Effective dates: 03/01/11–03/01/12
PI: **Sergei S. Pilyugin**, Mathematics, University of Florida

- NSF Grant DMS-0835518 "The Second SIAM Gators Student Conference"
  Total amount funded: **$ 9,860.00**
  Effective dates: 01/01/09–12/31/09
  PI: **Sergei S. Pilyugin**, Mathematics, University of Florida

- NSF Grant DMS-0517954 "Adaptive dynamics of microbial populations: Physiological models of growth"
  Total amount funded: **$ 200,000.00**
  Effective dates: 08/01/05–07/31/08
  PI: **Sergei S. Pilyugin**, Mathematics, University of Florida

Professional awards and distinctions:

• University of Florida Term Professor, University of Florida, 2017-2020
• Colonel Allan R. and Margaret G. Crow CLAS Term Professor, University of Florida, 2012
• College of Liberal Arts and Sciences Teacher of the Year Award, University of Florida, 2002
• College of Liberal Arts and Sciences Teacher of the Year Award (nomination), University of Florida, 2000
• Sigma Xi Graduate Research Award, Emory University, 1997
• Marshall Hall Graduate Teaching Award, Emory University, 1996

Graduate students:

1. Shakti Gupta – 2005 Ph. D. in Chemical Engineering (co-advised), University of Florida;
2. Willard S. Keeran – 2007 Ph. D. in Mathematics, University of Florida;
3. Cameron J. Browne – 2012 Ph. D. in Mathematics, University of Florida;
4. Karly A. Jacobsen –2013 Ph. D. in Mathematics, University of Florida;
5. Jillian C. Stupiansky –2013 Ph. D. in Mathematics, University of Florida;
6. Chanda Littles-Jones –2016 Ph. D. in Interdisciplinary Ecology (co-advised), University of Florida;
7. Jing Jiao –2017 Ph. D. in Biology (co-advised), University of Florida;
8. Evan Milliken –2017 Ph. D. in Mathematics, University of Florida;
9. Subhorn Khonthapagdee –2019 Ph. D. in Mathematics, University of Florida;
10. Miroslaw Binder –2019 Ph. D. in Mathematics, University of Florida;
11. Jason Flynn –2022 Ph. D. in Mathematics, University of Florida;

12. Xiaochen Duan - (2027 expected) Ph. D. in Mathematics, University of Florida.

Service on editorial boards:

Associate Editor for Mathematical Biosciences and Engineering.
Associate Editor for Journal of Biological Systems.
Co-editor (with C. Ngonghala) of a special issue of JBS on dynamics of poverty and infectious diseases.

List of publications in reverse chronological order:
(On 04/04/2024, SCOPUS h-index = 23 for Sergei S. Pilyugin)

1. K.E.O. Todd-Brown, J.R. Holmquist, M.L. Vahsen, J. Hicks, S. S. Pilyugin and J.T. Morris (2024), *Cohort Marsh Equilibrium Model (CMEM): History, mathematics, and implementation*, JGR Biosciences, DOI: 10.1029/2023JG0007823.

2. J. M. Flynn and S. S. Pilyugin (2022), *Using restart sequences to determine beneficial first passage under restart*, arXiv:2204.07422.

3. J. M. Flynn and S. S. Pilyugin (2021), *First passage with restart in discrete time: with applications to biased random walks on the half-line*, arXiv:2108.11508v2.

4. J. Jiao, L. Riotte-Lambert, S. S. Pilyugin, M. A. Gil and C. W. Osenberg (2020), *Mobility and its sensitivity to fitness differences determine consumer resource distributions*, R. Soc. Open Sci. 7: 200247. http://dx.doi.org/10.1098/rsos.200247.

5. C. N. Ngonghala, S. S. Pilyugin (2020), Preface to the Special Issue on Dynamics of Poverty and Infectious Diseases, Journal of Biological Systems, DOI: 10.1142/S0218339020020015.

6. M. Binder and S. S. Pilyugin (2019), *Stability analysis of a deterministic model of Zika/Dengue co-circulation*, International Journal of Biomathematics, 12 (04), 1950045. DOI: 10.1142/S1793524519500451.

7. J. Jiao, S. S. Pilyugin, L. Riotte-Lambert and C. W. Osenberg (2018), *Habitat-dependent movement rate can determine the efficacy of marine protected areas*, Ecology, 99(11):2485-2495. DOI: 10.1002/ecy.2477.

8. S. Khonthapagdee and S. S. Pilyugin (2017), *Crowding and light limitation affect phytoplankton competition for nitrogen*, Journal of Biological Systems 25 (4), pp. 743-765.

9. J. Jiao, S. S. Pilyugin, C. Osenberg (2016), *Random movement of predators can eliminate trophic cascades in marine protected areas*, Ecosphere, DOI: 10.1002/ecs2.1421.

10. E. Milliken and S. S. Pilyugin (2016), *A model of infectious salmon anemia virus with viral diffusion between wild and farmed patches*, Discrete and Continuous Dynamical Systems B 21(6) pp. 1869 - 1893.

11. C. J. Browne and S. S. Pilyugin (2016), *Minimizing R_0 for in-host model with periodic combination antiviral therapy*, Discrete and Continuous Dynamical Systems B 21(10), pp. 3301-3314.

12. S. S. Pilyugin, Jan Medlock, P. De Leenheer (2016), *The effectiveness of marine protected areas for predator and prey with varying mobility*, Theoretical Population Biology 110, pp. 63-77.

13. C. Littles, S. S. Pilyugin, and T. Frazer (2016), *A combined inverse method and multivariate approach for exploring population trends in Florida manatees*, Marine Mammal Science 32 (1), pp. 122-140.

14. G. V. Beznoussenko, S. S. Pilyugin, W. J. C Geertz, M. M. Kozlov, K. N J. Burger, A. Luini, J. Derganc, and A. A. Mironov (2015), *Trans-membrane area asymmetry controls the shape of cellular organelles*, International Journal of Molecular Science, 16(3), 5299-5333; doi:10.3390/ijms16035299

15. K. Jacobsen and S. S. Pilyugin (2015), *Analysis of a mathematical model for tumor therapy with a fusogenic oncolytic virus*, Mathematical Biosciences 270 Part B, pp. 169 -182.

16. A. Handel, V. Akin, S. S. Pilyugin, V. Zarnitsyna, and R. Antia (2014), *How sticky should a virus be? The impact of virus binding and release on transmission fitness using influenza as an example*, J. R. Soc. Interface. 2014 11 20131083; doi:10.1098/rsif.2013.1083.

17. H. Pourbashash, S. S. Pilyugin, C. McCluskey, and P. De Leenheer (2013), *Global analysis of within host virus models with cell-to-cell viral transmission*, Discrete and Continuous Dynamical Systems B, in press.

18. C. J. Browne and S. S. Pilyugin (2013), *Global analysis of age-structured within-host virus model*, Discrete and Continuous Dynamical Systems B 18(8), pp. 1999-2017.

19. K. Jacobsen, J. Stupiansky, and S. S. Pilyugin (2013), *Mathematical modeling of citrus groves infected by Huanglongbing*, Mathematical Biosciences and Engineering **10** (3), pp. 705-728.

20. C. J. Browne and S. S. Pilyugin (2012), *Periodic multidrug therapy in a within-host virus model*, Bulletin of Mathematical Biology **74** (3), pp. 562-589.

21. S. F. Ellermeyer and S. S. Pilyugin (2011), *A size-structured model of bacterial growth and reproduction*, Journal of Biological Dynamics, DOI:10.1080/17513758.2010.535127.

22. P. De Leenheer, J. Dockery, T. Gedeon, and S. S. Pilyugin (2010), *The chemostat with lateral gene transfer*, Journal of Biological Dynamics **4** (6), pp. 607-620.

23. P. De Leenheer, J. Dockery, T. Gedeon, and S. S. Pilyugin (2010), *Senescence and antibiotic resistance in an age-structured population model*, Journal of Mathematical Biology **61** (4), pp. 475-499.

24. J. T. Noel, S. S. Pilyugin, and A. Narang (2009), *The diffusive influx and carrier efflux have a strong effect on the bistability of the lac operon in Escherichia coli*, Journal of Theoretical Biology **256** (1), pp. 14-28.

25. A. Handel, A. Yates, S. S. Pilyugin, and R. Antia (2009), *Sharing the burden: Antigen transport and firebreaks in immune responses*, Journal of Royal Society - Interface **6** (34), pp. 447-454.

26. P. De Leenheer and S. S. Pilyugin (2008), *Multi-strain virus dynamics with mutations: A global analysis*, Mathematical Medicine and Biology **25** (4), pp. 285-322.

27. P. De Leenheer and S. S. Pilyugin (2008), *Immune response to a malaria infection: Properties of a mathematical model*, Journal of Biological Dynamics **2** (2), pp. 102-120.

28. A. Narang and S. S. Pilyugin (2008), *Bistability of the lac operon during growth of Escherichia coli on lactose and lactose + glucose*, Bulletin of Mathematical Biology **70** (4), pp. 1032-1064.

29. P. De Leenheer, W. S. Keeran, and S. S. Pilyugin (2008), *Feedback-mediated coexistence and oscillations in the chemostat*, Discrete and Continuous Dynamical Systems - B **9** (2), pp. 321-351.

30. A. Handel, S. S. Pilyugin, A. Yates, and R. Antia (2007), *The importance of gap junctions during immune responses*, Trends in Immunology **28** (11), pp. 463-466.

31. M. Martcheva, S. S. Pilyugin, and R. D. Holt (2007), *Subthreshold and superthreshold coexistence of pathogen variants: The impact of age-structure*, Mathematical Biosciences, **207** (1), pp. 58-77.

32. P. De Leenheer, W. S. Keeran, and S. S. Pilyugin (2007), *Circular and elliptic orbits in a feedback-mediated chemostat*, Discrete and Continuous Dynamical Systems - B **7** (4), pp. 779-792.

33. A. Narang and S. S. Pilyugin (2007), *Bacterial gene regulation in diauxic and non-diauxic growth*, Journal of Theoretical Biology **244**, pp. 326-348.

34. A. Meyer-Bäse and S. Pilyugin (2006), *Stability analysis of an unsupervised neural network with feedforward and feedback dynamics*, Neurocomputing Letters **70**, pp. 603-606.

35. M. Martcheva and S. S. Pilyugin (2006), *The role of coinfection in multi-disease dynamics*, SIAM Journal on Applied Mathematics **66** (3), pp. 843-872.

36. M. Martcheva and S. S. Pilyugin (2006), *An epidemic model structured by host immunity*, Journal of Biological Systems **14** (2), pp. 185-203.

37. P. De Leenheer and S. S. Pilyugin (2006), *Feedback-mediated oscillatory coexistence in the chemostat*, Lecture Notes in Control and Information Sciences **341**, pp. 97-104.

38. V. V. Ganusov, S. .S. Pilyugin, R. Ahmed, and R. Antia (2006), *How does cross-reactive stimulation affect the longevity of CD8+ T cell memory?*, PLoS Computational Biology **2** (6), e55 DOI: 10.1371/journal.pcbi.0020055.

39. V. V. Ganusov, S. .S. Pilyugin, R. De Boer, R. Antia, K. Murali-Krishna, and R. Ahmed (2005), *Quantifying the cell turnover using CFSE data*, Journal of Immunological Methods **298**, pp. 183-200.

40. S. Gupta, S. S. Pilyugin, and A. Narang (2005), *The dynamics of single-substrate continuous cultures: The role of ribosomes*, Journal of Theoretical Biology **232**, pp. 467-490.

41. A. Narang and S. S. Pilyugin (2005), *Towards an integrated physiological theory of microbial growth: From subcellular variables to population dynamics*, Mathematical Biosciences and Engineering **2** (1), pp. 169-206.

42. S. S. Pilyugin, G. T. Reeves, and A. Narang (2004), *Predicting stability of mixed microbial cultures from single-species experiments: 1. Phenomenological model*, Mathematical Biosciences **192**, pp. 85-109.

43. S. S. Pilyugin, G. T. Reeves, and A. Narang (2004), *Predicting stability of mixed microbial cultures from single-species experiments: 2. Physiological model*, Mathematical Biosciences **192**, pp. 111-136.

44. G. T. Reeves, S. S. Pilyugin, and A. Narang (2004), *Growth of mixed cultures on mixtures of substitutable substrates: The operating diagram for a structured model*, Journal of Theoretical Biology **226** (2), pp. 143-157.

45. J. Shoemaker, G. T. Reeves, S. Gupta, S. S. Pilyugin, T. Egli, and A. Narang (2003), *The dynamics of single-substrate continuous cultures: The role of transport enzymes*, Journal of Theoretical Biology **222**, pp. 307-322.

46. A. Meyer-Bäse, S. S. Pilyugin, A. Wismuller, and S. Foo (2004), *Local exponential stability of competitive neural networks with different time scales*, Engineering Applications of Artificial Intelligence **17**, pp. 227-232.

47. J. Arino, S. S. Pilyugin, and G. S. K. Wolkowicz (2003), *Considerations on yield, nutrient uptake, cellular growth, and competition in chemostat models*, Canadian Applied Mathematics Quarterly **11** (2), pp. 107-142.

48. A. Meyer-Bäse, S. S. Pilyugin, and Y. Chen (2003), *Global exponential stability of competitive neural networks with different time scales*, IEEE Transactions on Neural Networks, **14** (3), pp. 716-719.

49. S. S. Pilyugin, V. V. Ganusov, K. Murali-Krishna, R. Ahmed and R. Antia (2003), *The rescaling method for quantifying the turnover of cell populations*, Journal of Theoretical Biology, **225**, pp. 275-283.

50. S. S. Pilyugin and P. Waltman (2003), *Divergence criterion for generic planar systems*, SIAM Journal of Applied Mathematics, **64** (1), pp. 81-93.

51. R. Antia, C. T. Bergstrom, S. S. Pilyugin, S. M. Kaech, and R. Ahmed (2003), *Models of CD8+ responses: 1. What is the antigen-independent proliferation program?*, Journal of Theoretical Biology **221**, pp. 585-598.

52. A. Meyer-Bäse and S. S. Pilyugin (2003), *Global asymptotic stability of a class of dynamical neural networks*, International Journal of Neural Systems **13** (1), pp. 47-53.

53. S. S. Pilyugin and P. Waltman (2003), *Multiple limit cycles in the chemostat with variable yield*, Mathematical Biosciences **182**, pp. 151–166.

54. S. F. Ellermeyer, S. S. Pilyugin, and R. Redheffer (2001), *Persistence criteria for a chemostat with variable nutrient input*, Journal of Differential Equations **171**, pp. 132–147.

55. S. S. Pilyugin and R. Antia (2000), *Modeling immune responses with handling time*, Bulletin of Mathematical Biology **62**, pp. 869–890.

56. S. S. Pilyugin and P. Waltman (1999), *The simple chemostat with wall growth*, SIAM Journal on Applied Mathematics **59** (5), pp. 1552–1572.

57. S. S. Pilyugin and P. Waltman (1999), *Competition in the unstirred chemostat with periodic input and washout*, SIAM Journal on Applied Mathematics **59** (4), pp. 1157–1177.

58. R. Antia, S. S. Pilyugin, and R. Ahmed (1998), *Models of immune memory: One the role of cross-reactive stimulation, competition and homeostasis in maintaining immune memory*, Proc. Natl. Acad. Sci. USA **95**, pp. 14926-14931.

59. S. S. Pilyugin, J. Mittler, and R. Antia (1997), *Modeling T-cell proliferation: An investigation of consequences of the Hayflick limit*, Journal of Theoretical Biology **186** (1), pp. 117-129.

Teaching experience:

Undergraduate level: Mathematical Methods for Life Sciences with MATLAB, Calculus 1–3, Honors Calculus 1–3, Survey of Calculus, Linear Algebra, Computational Linear Algebra with MATLAB, Ordinary Differential Equations 1–2, Partial Differential Equations, History of Mathematics, Advanced Calculus, Introduction to Number Theory, Introduction to Complex Variables, Introduction to Formal Mathematics (Sets and Logic).
Graduate level: Ordinary Differential Equations, Partial Differential Equations, Applied Differential Equations, Bifurcation Theory, Dynamics and Population Persistence, Seminar in Biomathematics.
Curriculum development: Applied Differential Equations, Partial Differential Equations, Bifurcation Theory, Dynamics and Population Persistence, Graduate Seminar in Biomathematics, Introduction to Mathematical Biology. A new undergraduate course Mathematical Methods for Life Sciences (with MATLAB) is an integral component of the UF interdisciplinary undergraduate program sponsored by the Howard Hughes Medical Institute.

Synergistic activities:

- Chair of the Mathematics Assistant Professor Search Committee, 2023-2024.

• Member of the Mathematics Chairman Search Committee, 2023-2024, 2018-2019.
• Member of the Mathematics Assistant Professor Search Committee, 2021-2022.
• Panelist on the NSF DMS Panel in Mathematical Biology, 2006, 2014, 2021.
• Member of the Mathematics Visiting Assistant Professor Search Committee, 2019-2020.
• Chair of the Mathematics Lecturer Search Committee, 2018-2019.
• Chair of the Undergraduate Committee (Upper Division), 2018-2019.
• Panelist on the NSF DMS Career Award Panel, 2015.
• Co-organizer of the University of Florida Conference on Computational and Systems Biology 2011. The conference was partially supported by the NSF grant DMS-1065966 to S. S. Pilyugin (PI).
• Faculty advisor for SIAM Gators (The University of Florida SIAM Student Chapter), 2006–09.
• Participant of the Howard Hughes Medical Institute biomathematics retreat, 2007.
• Co-Director, Center for Applied Mathematics at UF, 2005–present.
• Organizer of the MBI Seminar Series, April-June 2004.
• Co-Organizer of the Ohio State University - MBI Workshop 5 " Immunology Modeling: Signaling and Immune Dynamics", 2004.
• Co-Organizer of the Ohio State University - MBI Workshop 6 " Disease Models: Host-Pathogen Interactions", 2004.
• Organizer of the University of Florida Conference on Theoretical Immunology 2002. The conference was partially supported by the NSF grant DMS-0124610 to S. S. Pilyugin (PI). (http://www.math.ufl.edu/∼pilyugin/Conf2002/conference.html)
• Organizer of the Applied Mathematics Seminar at the University of Florida, 1999–03.
• Participant of the University of Florida Bioinformatics Initiative, 2002.

Outreach activities:

• Representative of UF Mathematics Department at the STEAM Night at Norton Elementary School, Gainesville, March 2023 and March 2024.
• Co-organiser of the UF Math Circle, 2022-2024.
• Participant of the UF Math Festival, 2023-2024.
• Proctor for the National Math Kangaroo Competition, 2024.

Reviewing and refereeing activities:

• Referee for Proceedings of National Academy of Sciences USA, SIAM Journal on Applied Mathematics, Journal of Differential Equations, Electronic Journal of Differential Equations, Mathematical Biosciences, Mathematical Biosciences and Engineering, Journal of Mathematical Biology, Journal of Theoretical Biology, Bulletin of Mathematical Biology, Discrete and Continuous Dynamical Systems – Series B, Industrial and Engineering Chemistry Research, Proceedings of the Royal Society, London – Series B, IEEE Transactions on Medical Imaging, Journal of Mathematical Analysis and Applications.
• External reviewer for the National Science Foundation (NSF) and the National Institutes of Health (NIH)

• Reviewer for Mathematical Reviews

Lectures, addresses, and colloquia:

• **Invited:**

1. *Crowding and light limitation affect phytoplankton competition for nitrogen*, Arizona State University, 2019.
2. *Understanding the role of mobility in the effectiveness of MPAs*, AMS sectional meeting, Orlando, Florida, 2017.
3. *Deterministic within-host viral dynamics*, NCTS International Conference on Nonlinear Dynamics with Applications to Biology in memory of Paul E Waltman, Taiwan, 2014.
4. *Feedback-mediated coexistence and oscillations in the chemostat*, The CDSNS Colloquium, Georgia Institute of Technology, 2006.
5. *Feedback-mediated oscillatory coexistence in the chemostat*, The IFT Colloquium, University of Florida, 2006.
6. *Modeling physiological aspects of microbial growth*, The Dixieland Analysis Seminar, Emory University, 2005.
7. *Modeling microbial growth from physiological viewpoint*, Arizona State University, 2004.
8. *Dynamics of mixed microbial cultures: Stability of a structured model*, DIMACS, Rutgers University, 2004.
9. The MBI lecture series (3 lectures on various subjects), MBI, The Ohio State University, 2004.
10. *"Program models of CD8 immune responses"*, DIMACS Workshop on Infectious Diseases, Rutgers University, 2002
11. *"Estimating birth and death of immune cell populations"*, Georgia Institute of Technology and Emory University Workshop "Differential Equations in Biology", Georgia Tech, Atlanta, 2000
12. *"Modeling microbial competition in the chemostat"*, University of Alberta, Edmonton Canada, 1998
13. *"Cancer: modeling finite proliferative capacity of cells"*, National Institutes of Health, Research Triangle Park NC, 1998

• **Contributed:**

1. *Global dynamics of age-structured within-host virus models*, Georgia Tech conference in memory of Jack Hale, 2013.

2. *A size-structured model of bacterial growth and reproduction*, SMB-DMS workshop on Antibiotic Resistance, Miami, 2011.

3. *Some notes on mutation models*, AMS regional meeting, Boca Raton, 2009.

4. *Quantifying the cell turnover using CFSE data*, Joint SMB-SIAM meeting, Raleigh, 2006.

5. *Quantifying the immune cell turnover: Existing approaches to the same problem*, MBI Workshop 5 on Immunological Models, The Ohio State University, 2004.

6. *Some remarks on backward bifurcations and the role of coinfection in multi-disease dynamics*, MBI Workshop 6 on Host-Pathogen Interactions, The Ohio State University, 2004.

7. *"Examples of complicated dynamic behavior in the chemostat with variable yield"*, Fourth G. Butler Memorial Conference, University of Alberta, 2003

8. *"The rescaling method for quantifying cell turnover"*, DIMACS Workshop on Infectious Diseases, Rutgers University, 2002

9. *"Subcritical Hopf bifurcation and applications"*, University of Florida Workshop "Topology in Biology", University of Florida, Gainesville, 2002

10. *"Dynamics of single-substrate continuous cultures"*, Joint AMS-MAA meeting 975, Atlanta, 2002

11. *"Program models for specific immunity"*, University of Florida Conference "Biocomputing 2001", University of Florida, Gainesville, 2001

12. *"Estimating birth/death rates of immune cells using cell cycle based models"*, Duke University First Conference on Mathematical Immunology, Duke University, Raleigh-Durham, 2000

13. *"Modeling the Hayflick limit"*, International Conference on Mathematics in Medicine, Vanderbilt University, Nashville, 1997

14. *"Chemostats with wall attachment"*, MathFest, Georgia Institute of Technology, Atlanta GA, 1997