

BENJAMIN J. RAPHAEL

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EDUCATION

- 1996-2002 **Ph.D.** in Mathematics, University of California, San Diego.
Thesis Title: *A Computational Investigation of Spectral Sets and Rational Dilations over Multiply-Connected Domains*. Advisor: Professor Jim Agler.
- 1992-1996 **S.B.** in Mathematics, **S.B. Minor** in Biology, Massachusetts Institute of Technology.

EXPERIENCE

- 2006- **Assistant Professor**, Department of Computer Science & Center for Computational Molecular Biology, Brown University
- 2005-2006 **Burroughs Wellcome Postdoctoral Fellowship** in Computer Science (Bioinformatics), University of California, San Diego. Sponsor: Professor Pavel Pevzner.
- 2002-2004 **Alfred P. Sloan Postdoctoral Fellowship** in Computer Science (Bioinformatics), University of California, San Diego. Sponsor: Professor Pavel Pevzner.
- 1998-2002 **Research Assistant**, Department of Mathematics, University of California, San Diego. Supervisor: Professor Jim Agler.

INVITED TALKS

- 2007 Mathematical Sciences Research Institute, “Mathematical Systems Biology of Cancer II”
Harvard Medical School
GEM4 Conference on Cancer, Singapore
Fifth Annual Bertinoro Computational Biology Meeting
University of Virginia, Department of Mathematics
Sixth Annual McGill Workshop on Bioinformatics in Barbados
- 2006 Tufts University, Department of Computer Science
Brown University, Center for Statistical Sciences

Mathematical Sciences Research Institute, “Mathematical Systems Biology of Cancer”
University of California, San Diego, Department of Mathematics
University of Southern California, Department of Computational and Molecular Biology
University of Minnesota, Department of Computer Science
Washington University St. Louis, Department of Genetics
Boston University, Bioinformatics Program
Brown University, Department of Computer Science
University of California, Irvine, Department of Computer Science
University of California, Santa Cruz, Department of Biomolecular Engineering
Fred Hutchinson Cancer Research Center
Purdue University, Department of Computer Science
University of Wisconsin, Department of Biomedical Informatics
Memorial Sloan-Kettering Cancer Center
University of Maryland, Department of Computer Science
Georgia Tech, Department of Computer Science
University of California, San Diego, Cancer Center

- 2004 RECOMB Satellite Meeting on Comparative Genomics, Bertinoro, Italy
Duke University, Department of Computer Science
North Carolina State University, Bioinformatics Seminar
Intelligent Systems in Molecular Biology (ISMB), Glasgow, Scotland.
- 2003 European Conference on Computational Biology (ECCB), Paris, France.

RESEARCH GRANTS

- 2007-2009 Department of Defense Breast Cancer Research Program
“Hormonal Involvement in Breast Cancer Amplification”
Amount: \$500,000
Role: Co-PI (PI: Susan Gerbi)
- 2005-2010 Burroughs Wellcome Career Award at the Scientific Interface
“High-resolution analysis of Tumor Genome Architectures”
Amount: \$500,000
Role: PI
- 2002-2004 Alfred P. Sloan Foundation / DOE Fellowship in Computational Biology
Amount: \$120,000
Role: PI

UNIVERSITY SERVICE

Member, Faculty Search Committee, Center for Computational Molecular Biology, 2006-present.
Member, Graduate Student Admissions Committee, Dept. of Computer Science, 2006-present.

PROFESSIONAL ACTIVITIES

Steering Committees:

RECOMB Satellite Workshop on Computational Cancer Biology, 2007-present.

Program Committees:

Workshop on Algorithms in Bioinformatics (WABI), 2008.

RECOMB Satellite Workshop on Computational Cancer Biology (Chair), 2007.

Sixth IEEE International Workshop on High Performance Computational Biology (HiCOMB 2007)

RECOMB Satellite Workshop on Systems Biology, 2006-2007.

9th Annual Conference on Computational Genomics, 2006.

RECOMB Satellite Workshops on Systems Biology and Regulatory Genomics, 2005.

RECOMB Satellite Workshop on Comparative Genomics, 2005-2006.

Organizing Committees:

RECOMB Satellite Workshop on Computational Cancer Biology, 2007.

RECOMB Satellite Workshops on Systems Biology and Regulatory Genomics, 2005.

RECOMB Satellite Workshop on Regulatory Genomics, 2004.

Referee:

Proceedings of the National Academy of Sciences, Bioinformatics, Journal of Computational Biology, Journal of the Association for Computing Machinery (ACM), ACM Transactions on Algorithms, Research in Computational Biology (RECOMB) Conference, Genome Biology, Trends in Genetics, BMC Bioinformatics, Parallel Computing, European Conference on Computational Biology (ECCB).

Founder/Member, Bioinformatics Consulting Group, UCSD Computer Science Department, 2004-2006 (www-cse.ucsd.edu/groups/biocg).

Founder/Member, Graduate Mathematics Consulting Group, UCSD Mathematics Department, 1999-2002 (math.ucsd.edu/~mathstorm).

Professional Memberships:

International Society for Computational Biology, 2002-present.

American Mathematical Society, 1996-2002.

HONORS/AWARDS

NSF Career Development Award, 2008.

Brown Center for Computational Molecular Biology, CCMB Scholarship Innovator Award, 2007.

Named one "Tomorrow's PI's" by *Genome Technology* magazine, 2006.

Burroughs Wellcome Career Award at the Scientific Interface, 2005-2010.

Intelligent Systems in Molecular Biology (ISMB), Best Poster Award, 2005.

Alfred P. Sloan Foundation / DOE Fellowship in Computational Biology, 2002-04.

U.S. Department of Education, GAANN Fellowship in Mathematics (declined), 1999.

TEACHING EXPERIENCE

- 2007 **Professor**, Department of Computer Science, Brown University. Graduate Course “Topics in Computational Biology: Genomes, Networks, and Cancer.” (Spring and Fall Semesters)
- 1996-2002 **Teaching Assistant**, Department of Mathematics, University of California, San Diego. Four years of experience leading weekly discussion sections in undergraduate courses including: Calculus, Differential Equations, Linear Algebra, and Introduction to Algorithms.
- 1996 **Lecturer**, Massachusetts Institute of Technology. Designed and taught intersession course *Introduction to Mathematical Proofs* with Henry Cohn.

PUBLICATIONS

B. Raphael, S. Volik, Guiqing Huang, F. Waldman, J. Costello, S. Aerni, R.P. Brown, A. Bashir, K. Pienta, G. Mills, K. Bajsarowicz, P. Paris, Q. Tao, W. Kuo, J.W. Gray, J. Cheng, M. Nefedov, P. de Jong, and C. Collins. (2008). A sequence based survey of the complex structural organization of tumor genomes. *Genome Biology*. (In Press).

A. Bashir, S. Volik, C.C. Collins, V. Bafna, **B. Raphael**. (2008) Evaluation of Paired-end Sequencing Strategies for Detection of Genome Rearrangements in Cancer. *PLOS Computational Biology*. (In Press)

J. Agler, J. Harland, **B. Raphael**. (2008) Classical Function Theory, Operator Dilation Theory, and Machine Computation on Multiply-Connected Domains. *Memoirs of the American Mathematical Society*. Vol. 191, No. 892.

A. Bashir, Y.T. Liu, **B. Raphael**, D. Carson, V. Bafna, (2007) Optimization of primer design for the detection of variable genomic lesions in cancer. *Bioinformatics*. 23(21):2807-15.

L. Cao, K. Yu, V. Nguyen, A. Ritz, **B. Raphael**, Y. Kawakami, T. Kawakami, A.R. Salomon, (2007) Quantitative Time-Resolved Phosphoproteomic Analysis of Mast Cell Signaling. *Journal of Immunology*. 179(9):5864-76.

B. Raphael, S. Volik, C. Collins (2007). Analysis of Genomic Alterations in Cancer. In *Genome Sequencing Technology and Algorithms*. H. Tang, S. Kim, E. Mardis (eds). Artech House Publishers. (Invited Book Chapter)

E. Corona, **B. Raphael**, E. Eskin. (2007) Identifying Deletion Polymorphisms from Haplotypes. *Proceedings of the 11th Annual International Conference on Research in Computational Biology (RECOMB 2007)*. pg. 354-365.

S. Yooseph, G. Sutton, D.B. Rusch, A.L. Halpern, S.J. Williamson, K. Remington, J.A. Eisen, K..B. Heidelberg, G. Manning, W. Li, L. Jaroszewski, P. Cieplak, C.S. Miller, H. Li, S. T. Mashiyama, M. P. Joachimiak, C. van Belle, J. Chandonia, D. A. Soergel, Y. Zhai, K. Natarajan, S. Lee, **B. J. Raphael**, V. Bafna, R. Friedman, S. E. Brenner, A. Godzik, D. Eisenberg, J.E. Dixon, S. S. Taylor,

R.L. Strausberg, M. Frazier, J.C. Venter. (2007) The Sorcerer II Global Ocean Sampling Expedition: Expanding the Universe of Protein Families. *PLOS Biology*. 5(3):e16.

M. Chaisson, **B. Raphael**, and P. Pevzner. (2006) Micro-inversions in Mammalian Evolution. *Proceedings of the National Academy of Sciences, USA*. 103(52):19824-9.

E. Eskin, T. Ideker, **B. Raphael**, C. Workman (eds.), (2006) *Systems Biology and Regulatory Genomics. Joint Annual RECOMB 2005 Satellite Workshops on Systems Biology and on Regulatory Genomics*. Lecture Notes in Computer Science , Vol. 4023. Springer-Verlag.

N.C. Jones, D. Zhi, **B. Raphael**. (2006) AliWABA: Alignment on the Web through an A-Bruijn Approach. *Nucleic Acids Research*. July 1;34:W613-6.

S. Volik, **B. Raphael**, et al. (2006) Decoding the Fine-scale Architecture of a Breast Cancer Genome and Transcriptome. *Genome Research*, 16(3):394-404

D. Zhi, **B. Raphael**, A. Price, H. Tang, P. Pevzner. (2006) Identifying Repeat Domains in Large Genomes. *Genome Biology*, 7(1):R7.

B. Raphael, D. Zhi, H. Tang, P. Pevzner. (2004) A Novel Method for Multiple Alignment of Sequences with Repeated and Shuffled Domains. *Genome Research*, 14(11):2336-46.

B. Raphael, P. Pevzner. (2004) Reconstructing Tumor Amplisomes. *Bioinformatics*, 20 Suppl 1:I265-I273. (Special ISMB/ECCB 2004 Issue).

B. Raphael, L. Liu, and G. Varghese. (2004) A Uniform Projection Method for Motif Discovery in DNA Sequences. *IEEE Transactions on Computational Biology and Bioinformatics*, 1(2): 91-94.

B. Raphael, S. Volik, C. Collins, P. Pevzner. (2003) Reconstructing Tumor Genome Architectures. *Bioinformatics*, Suppl 2:ii162-171. (Special ECCB 2003 Issue).