

# Curriculum Vitae

Eran Halperin

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## Affiliation:

Senior Lecturer, Blavatnik School of Computer Science, and the Department of Molecular Microbiology and Biotechnology, Tel-Aviv University

Senior Research Scientist at the International Computer Science Institute, Berkeley.

## Research areas:

Computational and statistical methods in genetics, particularly in studies of human diseases, computational population genetics, and applied machine learning.

## Education:

1997-01 **Ph.D. in Computer Science**, Tel-Aviv University.

Thesis: *Approximation algorithms for optimization problems.*

Advisor: Prof. Uri Zwick.

1993-96 **M.Sc. in Computer Science**, Tel-Aviv University (Summa Cum Laude).

Thesis: *Bipartite subgraphs of integer weighted graphs.*

Advisor: Prof. Noga Alon.

1990-93 **B.Sc. in Mathematics and Computer Science**, Tel-Aviv University (Summa Cum Laude),

## Experience

### Academic Research Positions:

2008-present **Senior Lecturer**, Blavatnik School of Computer Science, and the Department of Molecular Microbiology and Biotechnology, **Tel-Aviv University**.

2004-present **Senior Research Scientist** at the International Computer Science Institute (**ICSI**), Berkeley.

2003-2004 **Research Associate** at the Computer Science department of **Princeton** University.

2001-03 **Post doc** at the Computer Science department of the University of California in **Berkeley**, and at the International Computer Science Institute (**ICSI**).

Hosts: Richard Karp, Christos Papadimitriou, Satish Rao, Alistair Sinclair.

July-August 2000 **Summer intern** in **AT&T research labs**, Florham Park, New Jersey.

Mentor: Edith Cohen.

## Industrial Positions:

07/07-12/08 **Director of Bioinformatics** in **Navigenics, Inc.**

06/97-02/00 **Bioinformatics Scientist at the Algorithms group** in **Compugen LTD.**

1993-96 Programmer in the Israeli Defense Forces.

## Awards and Honors:

2010 The **Krill** prize for excellence in scientific research.

2001 The **Rothschild** fellowship (for post-doc).

2000 The **Intel** prize (for Ph.D.), Tel-Aviv University.

2000 The **Checkpoint** prize (for Ph.D.), Tel-Aviv University.

1999 The **Maus** prize (for Ph.D.), Tel-Aviv University.

1993 24th in the **Putnum** mathematics competition.

1991-92 Prize of excellence in the 32nd and in the 33rd Grossman mathematics Olympics of the Israel Institute of Technology, the Technion.

## Academic Activities:

### 1. Scientific committees:

- Program committee: The 15th Annual International Conference on Research in Computational Molecular Biology (RECOMB), 2011.
- Program area Chair (Population Genomics): The Eighteenth International Conference on Intelligent Systems for Molecular Biology (ISMB) 2010.
- Program committee: The 14th Annual International Conference on Research in Computational Molecular Biology (RECOMB), 2010.
- Program committee: The 13th Annual International Conference on Research in Computational Molecular Biology (RECOMB), 2009.
- Program committee: The 8th Workshop on Algorithms in Bioinformatics (WABI), 2008.
- Program committee: The 7th European Conference on Computational Biology (ECCB), 2008.
- Program committee: The 3rd RECOMB Satellite Workshop on Computational Methods for SNPs and Haplotypes, 2007.
- Program committee: Computational Systems Biology (CSB), 2006.
- Program committee: Intelligent System for Molecular Biology (ISMB), 2005.
- Program committee: Intelligent System for Molecular Biology (ISMB), 2004.
- Program committee and organizing committee: The 2nd RECOMB Satellite Workshop on Computational Methods for SNPs and Haplotypes, 2004.

- ### 2. Grant reviewing:
- National Institute of Health, National Science Foundations, Bi-nSF, NSF, BSF, NIH

3. **Reviewer for journals:** Science Magazing, Nature Biotechnology, American Journal on Human Genetics, BMC Genetics, Genome Research, European Journal on Human Genetics, Genome Biology, Journal of Computational Biology, Journal of Bioinformatics and Computational Biology (JBCB), Journal of Algorithms, Journal of Computer and System Sciences (JCSS), SIAM Journal on Computing, Theoretical Computer Science, International Journal of Foundation of Computer Science (IJFCS), Transactions on Computational Biology and Bioinformatics (TCBB).

4. **Invited speaker**

09/2010 **Invited keynote speaker** at the 10th Workshop in Algorithms and Bioinformatics, Liverpool, United Kingdom.

05/2010 **Invited keynote speaker** at the Conference on Algorithms and COmplexity (CIAC), Italy.

11/2009 **Invited keynote speaker** at the Jornadas de Bioinformtica (JB).

05/2009 **Invited keynote speaker** at the 13th Annual International Conference on Research in Computational Molecular Biology (RECOMB)

02/2009 Invited speaker for The Future of Genomics Medicine II, Scripps Institute, San Diego, CA.

08/2008 Invited speaker in DIMACS Workshop on Computational Issues in Genetic Epidemiology, Rutgers University.

06/2008 The Future of Personalized Medicine. **Invited keynote speaker** at the Japan Bioexpo, 2008.

07/2006 **Invited keynote speaker** for the 17th Annual Symposium on Combinatorial Pattern Matching (CPM 2006), Barcelona.

06/2005 Invited speaker in the “Recombination: Hotspots and Haplotype Structure” workshop at the Mathematical Biosciences Institute, Ohio.

06/2004 Invited speaker in a mini-symposium of SIAM Discrete Mathematics, 2004.

## Publication List

### Journal papers:

1. Lucia Conde, Eran Halperin, et al., *Genome-wide association study identifies novel HLA-DQB1 risk alleles specific to follicular lymphoma*, **Nature Genetics**,8(42), 661-664, 2010.
2. Bogdan Pasaniuc, Ram Avinery, Tom Gur, and Eran Halperin, *A Generic Coalescent-based Method for the Selection of a Reference Dataset for Imputation*,**Genetic Epidemiology**, in press.
3. Bonnie Kirkpatrick, Javier Rosa, Eran Halperin, and Richard Karp, *Haplotype inference in complex pedigrees*, **Journal of Computational Biology**, 2010 Mar;17(3):269-80.
4. Noah Zaitlen, Bogdan Pasaniuc, Tom Gur, Elad Ziv, Eran Halperin, *Leveraging genetic variability across populations for the identification of causal variants*, **The American Journal of Human Genetics**, 2010 Jan; 86(1):23-33.
5. Bracci PM, Skibola CF, Conde L, Halperin E, Lightfoot T, Smith A, Paynter RA, Skibola DR, Agana L, Roman E, Kane E, Wiencke JK, *Chemokine polymorphisms and lymphoma: a pooled analysis*, **Leuk Lymphoma**, 2010 Mar;51(3):497-506.
6. Lindfors E, Gopalacharyulu PV, Halperin E, Oresic M., *Detection of molecular paths associated with insulinitis and type 1 diabetes in non-obese diabetic mouse*, **Plos One**, 2009 Oct 2;4(10).
7. Sriram Sankararaman, Guillaume Obozinski, Michael I. Jordan, and Eran Halperin, *Genomic Privacy and Limits of Individual Detection in a Pool*, **Nature Genetics**, 41, 965 - 967 (2009).
8. Christine F Skibola, Paige M Bracci, Eran Halperin, Lucia Conde, David W Craig, Luz Agana, Kelly Iyadurai, Nikolaus Becker, Angela Brooks-Wilson, John D Curry, John J Spinelli, Elizabeth A Holly, Jacques Riby, Luoping Zhang, Alexandra Nieters, Martyn T Smith and Kevin M Brown, *Genetic variants at 6p21.33 are associated with susceptibility to follicular lymphoma*, **Nature Genetics**, 41, 873 - 875 (2009)
9. Bogdan Pasaniuc, Sriram Sankararaman, Gad Kimmel and Eran Halperin, *Inference of Locus-Specific Ancestry in Closely Related Populations*, **Bioinformatics**, 2009 Jun 15;25(12):i213-21.
10. Eran Halperin and Dietrich A. Stephan, *Maximizing power in association studies*, **Nature Biotechnology**, 27(3), 255-6, 2009.
11. Eran Halperin and Dietrich A. Stephan *SNP imputation in association studies*, **Nature Biotechnology**, 27(4), 349-51, 2009.
12. Peddinti V. Gopalacharyulu, Vidya R. Velagapudi, Erno Lindfors, Eran Halperin and Matej Oresic, *Dynamic network topology changes in functional modules predict responses to oxidative stress in yeast*, **Molecular BioSystems**, 2009, DOI: 10.1039/b815347g.

13. Gad Kimmel, Richard M. Karp, Michael I. Jordan, and Eran Halperin, *Association Mapping and Significance Estimation via the Coalescent*, **The American Journal of Human Genetics**, 83(6) pp. 675-683, 2008.
14. Skibola CF, Bracci PM, Halperin E, Nieters A, Hubbard A, Paynter RA, Skibola DR, Agana L, Becker N, Tressler P, Forrest MS, Sankararaman S, Conde L, Holly EA, Smith MT, *Poly-morphisms in the estrogen receptor 1 and vitamin C and matrix metalloproteinase gene families are associated with susceptibility to lymphoma*, **PLoS ONE**, 3(7), 2008.
15. Sriram Sankararaman, Gad Kimmel, Eran Halperin, and Michael I. Jordan, *On the inference of ancestries in admixed populations*, **Genome Research**, 18:668-675, 2008. (special issue of RECOMB, 2008).
16. Sriram Sankararaman, Srinath Sridhar, Gad Kimmel, and Eran Halperin, *LAMP: Local Ancestry in admixed Populations*, **The American Journal of Human Genetics**, Volume 82, Issue 2, 290-303, 2008.
17. Bonnie Kirkpatrick, Carlos Santos Armendariz, Richard M Karp, and Eran Halperin, *HAP-LOPOOL: Improving Haplotype Frequency Estimation through DNA Pools and Phylogenetic Modeling*, **Bioinformatics**, 23(22): 3048-3055 (2007).
18. Gad Kimmel, Michael I. Jordan, Eran Halperin, Ron Shamir and Richard M. Karp, *randomization test for controlling population stratification in whole-genome association studies*, **The American Journal of Human Genetics**, 81:895-905, 2007.
19. Noah Zaitlen, Hyun Min Kang, Eleazar Eskin, and Eran Halperin, *Leveraging the HapMap Correlation Structure in Association Studies*, **The American Journal of Human Genetics**, 80:683-691, 2007.
20. Srinath Sridhar, Kedar Dhamdhere, Guy E. Blleloch, Eran Halperin, R. Ravi, and Russell Schwartz, *Algorithms for Efficient Near-Perfect Phylogenetic Tree Reconstruction in Theory and Practice*, **IEEE/ACM Trans. Comput. Biology Bioinform.** (TCBB) 4(4):561-571 (2007).
21. Kenneth B. Beckman, Kenneth A. Abel, Andreas Braun and Eran Halperin *Using DNA Pools for Genotyping Trios*, **Nucleic Acids Research**, 2006; doi: 10.1093/nar/gkl700.
22. Jonathan Marchini, David Cutler, Nick Patterson, Matthew Stephens, Eleazar Eskin, Eran Halperin, Shin Lin, Steve Qin, Goncalo Abecassis, Heather Munro and Peter Donnelly, *A comparison of phasing algorithms for trios and unrelated individuals*, **American Journal of Human Genetics**, 78 437-450, 2006.
23. Eleazar Eskin, Roded Sharan and Eran Halperin, *Optimally Phasing Long Genomic Regions using Local Haplotype Predictions*, *Journal of Bioinformatics and Computational Biology (JBCB)*, 4, pp. 639-647, 2006.
24. Rajiv Gandhi, Eran Halperin, Samir Khuller, Guy Kortsarz and Aravind Srinivasan, *Improved bounds for vertex cover with hard capacities*, *Journal of Computer Systems Sciences (JCSS)*, 72(1):16-33 (2006).

25. Eran Halperin and Elad Hazan, *HAPLOFREQ - Estimating Haplotype Frequencies Efficiently*, special issue of Journal of Computational Biology (**JCB**), March 2006, Vol. 13, No. 2: 481-500. Also appeared in the proceedings of the 9th conference on Research in Computational Biology (**RECOMB**), 2005, 553–568.
26. Noah A. Zaitlen, Hyun Min Kang, Michael L. Feolo, Stephen T. Sherry, Eran Halperin, and Eleazar Eskin, *Inference and analysis of haplotypes from combined genotyping studies deposited in dbSNP*, **Genome Research**, 2005, 15:1594-1600.
27. David A. Hinds, Laura L. Stuve, Geoffrey B. Nilsen, Eran Halperin, Eleazar Eskin, Dennis G. Ballinger, Kelly A. Frazer, David R. Cox, *Whole-Genome Patterns of Common DNA Variation in Three Human Populations*, **SCIENCE**, 18 February 2005: 1072-1079.
28. Eran Halperin, Gad Kimmel, Ron Shamir, *Tag SNP Selection in Genotype Data for Maximizing SNP Prediction Accuracy*, proceedings of the international conference on Intelligent Systems for Molecular Biology (**ISMB**, 2005). Also as **Bioinformatics**, Vol. 21 Suppl. 1 pp. i195-i203 (2005).
29. Julia Chuzoy, Sudipto Guha, Eran Halperin, Sanjeev Khanna, Guy Kortsarz and Seffi Naor, *Tight lower bounds for the asymmetric k-center problem*, Journal of the ACM (**JACM**), 52(4):538-551, 2005.
30. Edith Cohen, Eran Halperin and Haim Kaplan, *Performance aspects of distributed caches using TTL-based consistency*, a special issue of Theoretical Computer Science (**TCS**), 331(1): 73-96 (2005).
31. Eran Halperin and Richard Karp, *The Minimum-Entropy Set Cover Problem*, a special issue of Theoretical Computer Science (**TCS**), 348: 240-250 (2005).
32. Eran Halperin and Eleazar Eskin, *Haplotype Reconstruction from Genotype Data using Imperfect Phylogeny*, **Bioinformatics** 20(12): 1842-1849 (2004).
33. Eran Halperin, Jeremy Buhler, Richard M. Karp, Robert Krauthgamer and Ben Westover, *Detecting protein sequence conservation via metric embedding*, proceedings of the eleventh international conference on Intelligent Systems for Molecular Biology (**ISMB**, 2003). Also, as a **Bioinformatics** supplement, 2003;19 Suppl 1:i122-9.
34. Eleazar Eskin, Eran Halperin and Richard M. Karp, *Efficient Reconstruction of Haplotype Structure via Perfect Phylogeny*, a special issue of Journal of Bioinformatics and Computational Biology (**JBCB**), 1 (1), 1-20, (2003).
35. Eran Halperin, Guy Kortsarz, Robert Krauthgamer, Aravind Srinivasan and Nan Wang. *Integrality ratio for Group Steiner Trees and Directed Steiner Trees*, proceedings of the 12th Symposium on Discrete Algorithms (**SODA**), 2003, 275–284. Accepted to Siam Journal on Computing (**SICOMP**).
36. Edith Cohen, Eran Halperin, Haim Kaplan and Uri Zwick, *Reachability and Distance Queries via 2-Hop Labels*, Siam Journal on Computing (**SICOMP**), 32 (5):1338-1355 (2003).

37. Eran Halperin, Shay Halperin, Tzvika Hartman and Ron Shamir, *Handling long targets and errors in sequencing by hybridization*, a special issue of the Journal of Computational Biology (**JCB**), 10 (3-4), 483-497, (2003). Also appeared in the proceedings of the 6th conference on Research in Computational Biology (**RECOMB**), 2002.
38. Eran Halperin, *Improved approximation algorithms for the vertex cover problem in graphs and hypergraphs*, Siam Journal on Computing (**SICOMP**), 31, 1608-1623, (2002).
39. Eran Halperin and Uri Zwick, *A unified framework for obtaining improved approximation algorithms for maximum graph bisection problems*, a special issue of **Random Structures and Algorithms**, 20(3):382-402 (2002).
40. Eran Halperin, Ram Nathaniel and Uri Zwick, *Coloring  $k$ -colorable graphs using smaller palettes*, **Journal of Algorithms**, 45(1): 72-90 (2002).
41. Eran Halperin and Uri Zwick, *Approximation algorithms for MAX 4-SAT and rounding procedures for semidefinite programs*, **Journal of Algorithms**, 40, 184-211 (2001).
42. Eran Halperin, Simchon Faigler and Raveh Gill-More, *FramePlus: A sensitive algorithm for aligning DNA to protein sequences*, a special issue of **Bioinformatics** 15 (11):867-873 1999.
43. Noga Alon and Eran Halperin, *Bipartite subgraphs of integer weighted graphs*, **Discrete Mathematics** 181, 1998, 19-29.

**Peer reviewed conference papers:**

44. Bogdan Pasaniuc, Noah Zaitlen, and Eran Halperin, *Accurate Estimation of Expression Levels of Homologous Genes in RNA-seq Experiments*, **RECOMB** 2010.
45. Bonnie Kirkpatrick, Javier Rosa, Eran Halperin, and Richard Karp, *Haplotype inference in complex pedigrees*, **RECOMB**, 2009.
46. Srinath Sridhar, Satish Rao, and Eran Halperin, *A Discrete Algorithm Approach to Detect Population Substructure*, to appear in the proceedings of the 11th conference on Research in Computational **RECOMB**, 2007.
47. Kamalika Chaudhuri, Eran Halperin, Satish Rao and Shuheng Zhou, *A Rigorous Analysis of Population Stratification with Limited Data*, proceedings of the 16th Symposium on Discrete Algorithms (**SODA**), 2007.
48. Guy E. Blelloch, Kedar Dhamdhere, Eran Halperin, R. Ravi, Russell Schwartz, and Srinath Sridhar, *Fixed Parameter tractability of Binary Near-Perfect Phylogenetic Tree Reconstructions*, proceedings of the International Colloquium on Automata, Languages and Programming (**ICALP**), 2006.
49. Eran Halperin and Richard Karp, *Perfect Phylogeny and Haplotype Assignment*, proceedings of the 7th conference on Research in Computational Biology (**RECOMB**), 2004, 10-19.
50. Eleazar Eskin, Eran Halperin and Richard M. Karp. *Large Scale Reconstruction of Haplotypes from Genotype Data*, proceedings of the 7th conference on Research in Computational Biology (**RECOMB**), 2003, 104–113.

51. Eran Halperin, Robert Krauthgamer, *Polylogarithmic Inapproximability*, proceedings of the 35th Annual ACM Symposium on Theory of Computing (**STOC**), 2003, 585–594.
52. Micah Adler, Eran Halperin, Richard M. Karp and Vijay V. Vazirani, *A stochastic process on the hypercube with applications to peer-to-peer networks*, proceedings of the 35th Annual ACM Symposium on Theory of Computing (**STOC**), 2003, 575–584.
53. Eran Halperin and Aravind Srinivasan, *Improved approximation algorithms for the partial vertex cover problem*, proceedings of the 5th International Workshop on Approximation Algorithms for Combinatorial Optimization (**APPROX**), 2002, 161-175.
54. Eran Halperin, Dror Livnat and Uri Zwick. *Max Cut in cubic graphs*, proceeding of the 13th Symposium on Discrete Algorithms (**SODA**) 2002, 506-513.
55. Eran Halperin and Uri Zwick, *Combinatorial approximation algorithms for the maximum directed cut problem*, proceedings of the 12th Symposium on Discrete Algorithms (**SODA**) 2001, 1-7.

**Patents:**

56. United States Patent 6,625,545: Method and apparatus for mRNA assembly (1998).
57. United Kingdom Patent GB2444410: Genetic Analysis and systems and methods (2007).