

Gurinder Singh “Mickey” Atwal

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EDUCATION

Princeton University, Dept. of Physics and Institute for Integrative Genomics, U.S. 2002-2005
Postdoctoral (Theoretical Biophysics and Computational Biology)
Advisor: Prof. William Bialek

Cornell University, Dept. of Physics, U.S. 1998-2002
PhD, MS (Theoretical Physics), GPA 4.0
Advisor: Prof. Neil Ashcroft

University of Cambridge, Gonville and Caius College, Cambridge, U.K.
MSci with honors (Experimental and Theoretical Physics) 1997-1998
BA with honors (Experimental and Theoretical Physics) 1996-1997
Part 1 Tripos (Medicine) 1994-1996

Tiffin School, London, U.K.
STEP (Physics - grade S, Chemistry - grade 1).
S level (Further Maths - grade 1)
A level (Maths, Further Maths, Biology, Chemistry, Physics). All at grade A. 1992-1994
GCSE (10 subjects). All at grade A. 1987-1992

EMPLOYMENT AND AFFILIATION

CURRENT

Assistant Professor Cold Spring Harbor Laboratory, U.S. 2008-Present
Faculty in the Center for Quantitative Biology.
Faculty in the Cancer Center.

Adjunct Professor Stony Brook University, U.S. 2012-Present
Department of Applied Mathematics and Statistics.

PAST

Member Cancer Institute of New Jersey, U.S. 2008-2010
Research member of the division of Population Genetics.

Member Institute for Advanced Study, Princeton, U.S. 2005-2008
Research in systems biology and population genetics at the School of Natural Sciences
headed by Prof. Arnold Levine.

Engineering Analyst W. S. Atkins, U.K. 1997 (summer)
Analysis of mechanical engineering projects on behalf of clients including the U.K. gov-
ernment and the Channel Tunnel. Computational research of structural reliability.

AWARDS AND DISTINCTION

- Winship Herr Award for Excellence in Teaching, Cold Spring Harbor Laboratory (2013).
- Named by Genome Technology magazine as one of the top 25 young investigators in systems biology (2010).

- Keighley's Bequest Award from Gonville and Caius College, University of Cambridge.
- Top physics student in Gonville and Caius College at University of Cambridge in all years.
- Top student for undergraduate computational physics research at University of Cambridge.

DUTIES

- Invited reviewer for Proceedings of National Academy of Sciences, Bioinformatics, Physical Review, Experimental Biology and Medicine, Brain Research, American Journal of Human Genetics, IET Systems Biology, Clinical Cancer Research, Molecular Cancer Therapeutics, Molecular Systems Biology, The FASEB Journal, GENSIPS and Human Molecular Genetics.
- Lead instructor and founder of Quantitative Biology graduate course at CSHL (2010-present).
- Member of Executive Committee of the Watson School of Biological Sciences, CSHL (2009-present).
- Member of Admissions Committee of the Watson School of Biological Sciences, CSHL (2009-present).
- Co-chair of 11th IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS), December 2-4, 2012.
- Program Committee of 10th IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS), December 4-6, 2011.
- Co-organizer and Program Chair of 9th IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS), November 10-12, 2010.
- Member of Executive Committee of the Laufer Center for Computational Biology and Genome Sciences, Stony Brook University (2010).
- Lecturer in Genetics graduate course at CSHL (2009).

RESEARCH SUPERVISION

- Robert Aboukhalil. PhD advisor (2012-present).
- Bernard Fendler. Postdoctoral advisor (2009-present).
- Ying Cai. PhD advisor (2009-present).
- Julian Homburger. Undergraduate research program (2012).
- Willey Yiao. PhD co-advisor with Prof. Michael Zhang (2010-2013).
- Yifan Mo. PhD co-advisor with Prof. Michael Zhang (2010-2012).
- Chengyu Liu. Undergraduate research program (2011).
- Joshua Weiss. Partners for the future program (2009).

RESEARCH PUBLICATIONS

- J. Kinney, G. S. Atwal, *Equitability, mutual information, and the maximal information coefficient*, arXiv:1301.7745.
- R. Aboukhalil, B. Fendler, G. S. Atwal, *Kerfuffle: a web tool for multi-species gene colocalization analysis*, BMC Bioinformatics 2013, 14:22.
- J. Kinney, G. S. Atwal, *Maximally informative models and diffeomorphic modes in large datasets*, arXiv:1212.3647.
- Y. Cai, B. Fendler, G. S. Atwal, *Utilizing RNA-Seq data for cancer network inference*, IEEE Workshop on Genomic Signal Processing and Statistics, GENSIPS (2012).

- W. Ouyang, W. Liao, M. Huse, C. Luo, M. Kim, M. Peng, P. Chan, Q. Ma, Y. Mo, D. Meijer, K. Zhao, A. Rudensky, G. Atwal, M. Zhang, N. Yin, *Novel Foxo1-dependent transcriptional programs control Treg cell function*, Nature, 491, 554-559 (2012).
- B. Fendler, G. S. Atwal, *Systematic deciphering of cancer genome networks*, Yale J Bio Med. 2012 September; 85(3): 339-345.
- L. F. Grochola, J. Zeron-Medina, E. Repapi, A. Finlayson, Y. Cai, G. S. Atwal, G. L. Bond, *The Inheritance of p53*, book chapter in book *p53 in the Clinics*, Springer (2012).
- A. Paul, Y. Cai, G. S. Atwal, J. Huang, *Developmental coordination of gene expression between synaptic partners during GABAergic circuit assembly in cerebellar cortex*, Front. Neural Circuits 6:37 (2012)
- M. Chen, C. P. Pratt, M. E. Zeeman, N. Schultz, B. S. Taylor, A. O'Neill, M. Castillo-Martin, D. G. Nowak, A. Naguib, N. Navin, D. M. Grace, J. Murn, G. S. Atwal, C. Sander, W. L. Gerald, C. Cordon-Cardo, A. C. Newton, B. S. Carver, L. Trotman, *Identification of PHLPP1 as a tumor suppressor reveals the role of feedback compensation in PTEN-mutant prostate cancer progression and therapy*, Cancer Cell, 20(2):173-86 (2011).
- M. S. Mehta, A. Vazquez, D. A. Kulkarni, J. E. Kerrigan, G. Atwal, S. Metsugi, D. L. Toppmeyer, A. J. Levine, K. M. Hirshfield, *Polymorphic variants in TSC1 and TSC2 and their association with breast cancer phenotypes*, Breast Cancer Res Treat. Jul 25 (2010).
- H. Mizuno, G. Atwal, H. Wang, A. Levine, A. Vazquez, *Fine-scale detection of population-specific linkage disequilibrium using haplotype entropy in the human genome*, BMC Genetics, 11:27 (2010).
- H. Kang, Z. Feng, Y. Sun, G. S. Atwal, M. E. Murphy, T. R. Rebbeck, Z. Rosenwaks, A. J. Levine, W. Hu, *Single-nucleotide polymorphisms in the p53 pathway regulate fertility in humans*, Proc Nat Acad Sci (USA) 106:9671-9766 (2009).
- G. S. Atwal, T. Kirchhoff, E. E. Bond, C. Menin, R. Bertorelle, F. Bartel, K. Offit, A. J. Levine, G. Bond, *Altered tumor formation and evolutionary selection of genetic variants in the human MDM4 oncogene*, Proc Nat Acad Sci (USA) 106:10236-10241 (2009).
- G. S. Atwal, R. Rabadan, G. Lozano, L. Strong, M. Ruijs, M. Schmidt, L. Veer, H. Nevanlinna, J. Tommiska, K. Aittomaki, G. Bougeard, T. Frebourg, A. Levine, G. Bond, *An information-theoretic analysis of genetics, gender and age in cancer patients*, PLoS ONE 3(4): e1951 (2008).
- W. Hu, Z. Feng, G. S. Atwal, A. J. Levine, *p53: A new player in reproduction*, Cell Cycle 7, 7 (2008).
- G. S. Atwal, G. Bond, S. Metsuyanin, M. Papa, E. Friedman, T. Distelman-Menachem, E. Ben-Asher, D. Lancet, D. Ross, J. Sninsky, T. White, A. Levine and R. Yarden, *Haplotype structure and selection of the MDM2 oncogene in humans*, Proc Nat Acad Sci (USA) 104, 4524-4529 (2007).
- N. Slonim, G. S. Atwal, G. Tkacik and W. Bialek, *Information based clustering*, Proc Nat Acad Sci (USA) 102, 18297-18302 (2005).
- N. Slonim, G. S. Atwal, G. Tkacik and W. Bialek, *Estimating mutual information and multi-information in large networks*, arXiv:cs.IT/0502017.
- G. S. Atwal, *Dynamic plasticity in coupled avian midbrain maps*, Phys. Rev. E 70, 06194 (2004).
- G. S. Atwal and N. W. Ashcroft, *Polarization waves and superconducting instabilities in electron systems*, Phys. Rev. B 70, 104513 (2004).
- G. S. Atwal and W. Bialek, *Ambiguous model learning made unambiguous with 1/f priors*, Neural Information Processing Systems 16, MIT Press, Cambridge (2004).
- G. S. Atwal and N. W. Ashcroft, *Correlation effects and the high-frequency spin susceptibility of an electron liquid: Exact limits*, Phys. Rev. B 67, 233104 (2003).

- G. S. Atwal, I. G. Khalil and N. W. Ashcroft, *Dynamical local-field factors and effective interactions in the two-dimensional electron liquid*, Phys. Rev. B 67, 115107 (2003).
- G. S. Atwal, *Dynamical correlation in electron liquids*, PhD thesis, Cornell University (2002).
- G. S. Atwal and N. W. Ashcroft, *Relaxation of an electron system: Conserving approximation*, Phys. Rev. B 65, 115109 (2002).
- G. S. Atwal and E. Terentjev, *Order-disorder transitions in nematic elastomers*, Cambridge University Technical Report, (1998).

MEETING RESEARCH ABSTRACTS

- M. Chen, T. Herzka, G. Atwal, N. Narula, S. Plafker, L. Trotman, *Importin-11 regulates PTEN levels in lung cancer*, Cancer Biology and Therapeutics, CSHL (2013).
- B. Fendler, R. Aboukhalil, W. Xue, D. Esposito, M. Spector, S. Powers, S. Lowe and G. S. Atwal, *Genomic organization of the tumor suppressor gene network*, Genomics of Common Diseases, Nature Genetics, Maryland (2012).
- B. Fendler, R. Aboukhalil, W. Xue, D. Esposito, M. Spector, S. Powers, S. Lowe and G. S. Atwal, *Genomewide colocalization of tumor suppressor genes*, Mechanisms and Models of Cancer, CSHL (2012).
- B. Fendler and G. S. Atwal, *Asymmetric mutation processes in stochastic models of microsatellite allele length distributions in humans*, ASHG Annual Meeting (2010).
- G. Rajagopal, Y. L. Chan, T. T. Lim, D. Pennica, A. J. Levine, G. S. Atwal, *Information theory based method for the detection of interacting SNPs*, AACR Annual Meeting (2009).
- G. S. Atwal, *Natural selection of genetic fidelity*, CSHL Meeting on Engineering Principles in Biological Systems (2008).
- G. S. Atwal, *Correlations in Complex Disease Association Studies*, SIAM Conference on Computational Science and Engineering, (2007).
- G. S. Atwal, *Topographic plasticity in barn owls*, Cosyne (2004).
- G. S. Atwal, *Dynamic plasticity of coupled cortical maps*, APS March Meeting (2003).
- G. S. Atwal and N. W. Ashcroft, *Polarization-waves and pairing in electron systems*, APS March Meeting (2003).
- G. S. Atwal and N. W. Ashcroft, *Dynamical local-field factors and effective interactions in the two-dimensional electron liquid*, APS March Meeting (2002).
- G. S. Atwal and N. W. Ashcroft, *Relaxation in an electron gas: conserving approximation*, APS March Meeting (2001).
- G. S. Atwal and N. W. Ashcroft, *Collective excitations in a quasi-two-dimensional electron-hole gas*, APS March Meeting (2000).

INVITED SPEAKER PRESENTATIONS

- *Quantitative Genomics*, Universidad Nacional Autónoma de México, Cuernavaca, Mexico (2013).
- *Stress, selection, sex and the human genome*, Renaissance Technologies, NY (2013).
- *Big data challenges in cancer systems biology*, Janssen Research & Development, PA (2013).
- *Utilizing RNA-Seq data for cancer network inference*, GENSIPS, Maryland (2012).
- *Cancer evolution: the long and short of it*, KITP, Santa Barbara, CA (2012).
- *Polymorphisms and fertility*, Celmatix, NY (2011).

- *Genetic diversity of the p53 tumor suppressor pathway*, Conference on Genomic and Genetic Aspects for Human Health and Disease, The Norwegian Academy of Science and Letters, Norway (2010).
- *Recent human evolution of the p53 pathway*, Cornell University Weill Medical College, NY (2010).
- *Network polymorphisms and cancer*, Governor's Conference on Effective Partnering in Cancer Research, Institute for Advanced Study, Princeton (2010).
- *Statistical physics of population genetics*, Rutgers University (2010).
- *Population genetics of cancer*, Princeton Center for Theoretical Science, Princeton University (2010).
- *Haplotype analyses of the p53 pathway*, AACR International Conference on Frontiers in Basic Cancer Research, Boston (2009).
- *Evolution of p53, p63 and p73*, The Systems Biology of Cancer and Infectious Diseases, Rome, Italy (2009).
- *Stress, selection, sex and the human genome*, President's Council Meeting, CSHL (2009).
- *Natural selection of genetic fidelity*, Laufer Center, Stony Brook University (2009).
- *Statistical physics of recent human evolution*, DIMACS Workshop on Identifying Signatures for the Evolution of Complex Phenotypes, Rutgers University (2009).
- *Population genetics of the human MDM4 oncogene: evolution and cancer risk*, Network Biology 2.0, Broad Institute (2009).
- *Statistical mechanics of population genetics*, Niels Bohr Institute, Copenhagen, Denmark (2008).
- *Population genetics and positive selection of SNPs and genes*, NTNU, Trondheim, Norway (2008).
- *Stress and natural selection in humans*, Harvard School of Public Health (2008).
- *The role of MDM2 and p53 polymorphisms in cancer and fecundity*, Cancer Institute of New Jersey (2008).
- *Aspects of population genetics: coalescent theory*, New York University (2008).
- *Stress and selection in humans*, Jackson Laboratory, Maine (2008).
- *Haplotypes of the MDM2 and MDM4 genes*, p53 Meeting, Banbury, CSHL (2007).
- *The role of MDM2 and p53 polymorphisms in cancer and fecundity*, International MDM2 Workshop IV, Woods Hole (2007).
- *Evolutionary positive selection of a subset of alleles in the MDM2 gene*, AACR Annual Meeting, Los Angeles (2007).
- *Correlations in complex disease association studies*, SIAM Conference on Computational Science and Engineering, Costa Mesa (2007).
- *SNP and haplotype analyses of oncogenes and tumor suppressor genes*, Gene Network Sciences, Massachusetts (2007).
- *Genomic stability, selection and longevity*, KITP Longevity Meeting, Santa Barbara (2007).
- *Introduction to information theory for biologists*, Cancer Institute of New Jersey (2006).
- *Information-based clustering*, DIMACS Workshop on Clustering Problems in Biological Networks, Rutgers University (2006).
- *Lectures on information theory and haplotype analysis*, Bioinformatics Institute, Singapore (2006).
- *Information-theoretic clustering of biological data*, IBM Research, NY (2006).
- *Haplotype structure of the MDM2 gene*, Memorial Sloan Kettering Cancer Center, NY (2006).

- *Statistical physics in biological modeling and analyses: from barn owls to yeast*, Institute for Advanced Study, Princeton (2005).