VITA

David Edmund Beeman, Jr.
Department of Electrical, Computer and Energy Engineering
University of Colorado, 425 UCB
Boulder, CO 80309
email: dbeeman@colorado.edu

Degrees:

Stanford University, Stanford, CA.	B.S.	1961	Physics
University of California, Los Angeles	M.A.	1963	Physics
University of California, Los Angeles	Ph.D.	1967	Physics

Professional experience:

1961 - 1963	Science Teacher (part time), Harvard School, North Hollywood, CA
1963 - 1964	Teaching Assistant, Dept. of Chemistry, University of California, Los Angeles, CA
1967 - 1969	Temporary Research Associate, Theoretical Physics Division, A.E.R.E., Harwell, England
1969 - 1975	Assistant Professor of Physics, Harvey Mudd College, Claremont, CA
1975 - 1976	Visiting Fellow, Yale University (sabbatical - theory of amorphous semiconductors)
Spring 1976	Visiting Associate Professor of Physics, University of California, Los Angeles, CA
1975 - 1981	Associate Professor Physics, Harvey Mudd College, Claremont, CA
1981 - 1992	Professor of Physics, Harvey Mudd College (On leave July 1990 - July 1992)
1989 - 1990	Visiting Associate in Biology, California Institute of Technology, Pasadena, CA
1990 - 1992	Visiting Professor, Electrical and Computer Engineering, University of Colorado, Boulder
1992 - present	Professor Adjoint, Electrical and Computer Engineering, University of Colorado, Boulder

Research and Teaching Experience:

Much of my research prior to 1990 was in the area of computational solid state physics and in the use of simulations in undergraduate physics education. Many of these publications were in collaboration with undergraduate students and with experimentalists who measured spectra for materials which I have modeled. My recent work has been in computational neuroscience.

At the University of Colorado, I have lectured in the course "Brains, Minds and Computers", giving lectures on computer modeling of biological and artificial neural networks, served on thesis committees, and participated in departmental activities relating to engineering education and curriculum revision. I am also a member of the graduate faculty of the Center for Neuroscience and a member of the Society for Neuroscience and the Organization for Computational Neuroscience.

Since moving to Colorado in 1990, my principal activity has been the development of educational tutorials and instructional materials in computational neuroscience using the GENESIS simulator, working as a subcontractor on grants funding GENESIS development. This has involved the conversion of research simulations into more accessible "user-friendly" simulation-based educational tutorials. I have also co-authored a textbook and laboratory manual that incorporates computer simulations into neuroscience courses (Bower and Beeman 1994, 1998), and have taught the use of neural simulation techniques at various short courses on Computational Neuroscience (Marine Biology Laboratory 1990-1992; Crete 1997; Bangalore 1999; Trieste 2001; Obidos 2002–2003; Frankfurt 2006; Luebeck 2012; Brasil 2006, 2008, 2010, 2014). For these courses I provide an extensive collection of tutorials and documentation that was developed in conjunction with my teaching at CU and my simulator development duties.

Most recently, my research is carried out in collaboration with simulator developers, modelers, and experimentalists from the US, the UK, Belgium, Germany, and Brazil. I use biologically realistic computer models to study the generation and propagation of waves of activity in the auditory cortex (Beeman, 2013). Currently I am studying the effects of synaptic plasticity on the balance of excitation and inhibition in model networks that have structurally realistic neurons. Analysis of the numerical results of these simulations has required that I develop Python custom software for the visualization and analysis of network activity, as well as tutorials on using these tools in computational neuroscience (Rodriguez, et al. 2012).

Selected Publications by D. Beeman:

Beeman D (2015, 2013) Hodgkin-Huxley Model. In: Jaeger D., Jung R. (Ed.) *Encyclopedia of Computational Neuroscience*. Springer, New York. print ISBN (2015): 978-1-4614-6674-1, online ISBN (2013): 978-1-4614-7320-6, DOI: 10.1007/978-1-4614-7320-6_127-3.

Beeman D (2013) A modeling study of cortical waves in primary auditory cortex. BMC Neuroscience, 14(Suppl 1):P23 doi:10.1186/1471-2202-14-S1-P23.

Beeman, D. (2013) "A history of neural simulation software" In: J. Bower (Ed),*20 Years of Computational Neuroscience*. Chapter 3, pp. 33-77. Springer Series in Computational Neuroscience 9. Springer, New York.

Rodriguez, A.L., Cornelis, H., Beeman, D., and Bower, J.M. (2012) Multiscale modeling with GENESIS 3, using the G-shell and Python. BMC Neuroscience 2012, 13(Suppl 1):P176 doi:10.1186/1471-2202-13-S1-P176.

Cornelis H, Coop AC, Rodriguez AL, Beeman D and Bower JM (2011) Backwards-compatibility in GENESIS 3.0 and beyond: bridging between procedural and declarative modeling. BMC Neurosci. 12(Suppl 1): 17.

Bower, J. M. and Beeman, D. (2007) Constructing Realistic Neural Simulations with GENESIS. Neuroinformatics **401**:103-125.

Bower, J. M. and Beeman, D. (2007) GENESIS (simulation environment) Scholarpedia, 2:1383.

Brette R, Rudolph M, Carnevale T, Hines M, Beeman D, Bower JM, Diesmann M, Morrison A, Goodman PH, Harris Jr FC, Zirpe M, Natschlager T, Pecevski D, Ermentrout B, Djurfeldt M, Lansner A, Rochel O, Vieville T, Muller E, Davison AP, El Boustani S, and Destexhe A (2007). Simulation of networks of spiking neurons: a review of tools and strategies. J. Comput. Neurosci. **23** 349-398.

D. Beeman, "Introduction to Realistic Neural Modeling", Brains, Minds, and Media. **1**, bmm218 (2005a).

D. Beeman, "GENESIS Modeling Tutorial", Brains, Minds, and Media. **1**, bmm220 (2005b).

D. Beeman and J. M. Bower, "Simulator-independent representation of ionic conductance models with ChannelDB", Neurocomputing **58-60**, 1085–1090 (2004).

J. M. Bower, D. Beeman, and M. Hucka. (2003) "The GENESIS Simulation System" in *The Handbook of Brain Theory and Neural Networks*, Second edition (M.A. Arbib, Ed.), Cambridge, MA, MIT Press, pp. 475–478 (2003).

M. Hucka, K. Shankar, D. Beeman and J. M. Bower, "The Modeler's Workspace: Making model-based studies of the nervous system more accessible". Chapter 5 in *Computational Neuroanatomy: Principles and Methods*, G. Ascoli, (Ed.), Humana Press Inc. (2002).

N. H. Goddard, D. Beeman, R. Cannon, H. Cornelis, M.-O. Gewaltig, G. Hood, F. Howell, P. Rogister, E. De Schutter, K. Shankar, and M. Hucka, "NeuroML for plug and play neuronal modeling", Neurocomputing **44–45**, 1077–1081 (2002).

N. Goddard, M. Hucka, F. Howell, H. Cornelis, K. Shankar, and D. Beeman, "Towards NeuroML: Model Description Methods for Collaborative Modelling in Neuroscience", Philosophical Transactions of the Royal Society B. **356**, 1209-1228 (2001).

J. Forss, D. Beeman, J. M. Bower and R. Eichler-West, "The Modeler's Workspace: a distributed digital library for neuroscience", Future Generation Computer Systems **16**, 111-121 (1999).

J. M. Bower and D. Beeman, *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural SImulation System*, second edition, Springer-Verlag, NY (1998).

D. Beeman, J. M. Bower, E. De Schutter, E. N. Efthimiadis, N. Goddard, and J. Leigh, "The GENESIS Simulator-based Neuronal Database", Chapter 4 in *Neuroinformatics: An Overview of the Human Brain Project*, S. H. Koslow and M. F. Huerta (eds.), pp. 57-80, Lawrence Erlbaum Associates, Mahwah, NJ. (1997).

H. Wachtel, D. Beeman and P. Gailey, Human heart rate variation in response to intermittent exposures to 60 Hz magnetic fields may be due to an inherent hypersensitivity of pacemaker cells, Proceedings of the Annual Conference of the Bioelectromagnetics Society 1996, Victoria, BC. (1996).

J. M. Bower and D. Beeman, *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural SImulation System*, Springer-Verlag (1994). (ISBN 0-387-94019-7)

D. Beeman, "Simulation-based Tutorials for Education in Computational Neuroscience", in Computation in Neurons and Neural Systems, F. H. Eeckman (ed.), Kluwer Academic Press. (1994).

D. Beeman, "Computational Physics at Harvey Mudd College," *Proceedings of the Conference on Computing in Advanced Undergraduate Physics,* Lawrence University (1990)

N. Maley, D. Beeman and J. S. Lannin, "Dynamics of Tetrahedral Networks: Amorphous Si and Ge," *Phys. Rev.* **B38** , 10611 (1988).

D. Beeman, R. Tsu and M. F. Thorpe, "Structural Information from the Raman spectrum of amorphous silicon," *Phys. Rev.* **B32**, 874 (1985).

E. P. O'Reilly, J. Robertson and D. Beeman, "Electronic structure of amorphous carbon," *J. Non-Cryst. Solids* **77-78**, 83 (1985).

D. Beeman, J. Silverman, R. Lynds and M.R. Anderson, "Modeling studies of amorphous carbon," *Phys. Rev.* **B30**, 870 (1984).

D. Beeman, R. Lynds and M. R. Anderson, "Structural and Vibrational Properties of a Model of Vitreous As_2O_3," *J. Non-Cryst. Solids* **42**, 61 (1980).

D. Beeman and R. Alben, "Vibrational properties of elemental amorphous semiconductors," *Advances Phys.* **26**, 339 (1977).

D. Beeman and J. Boswell, "Computer graphics and electromagnetic fields," *Am. J. Phys.* **45**, 213 (1977).