

**Jacques Beaumont Ph.D.** (<http://www.clxbs.com>)

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**EDUCATION:**

1993 Post.Doc. Upstate medical University of SUNY, Syracuse NY. Cardiac arrhythmia  
1992 Ph.D., Montreal University, Quebec, Canada, Biomedical Engineering  
1985 M.S., Laval University, Quebec, Canada, Physics  
1982 B.S., Laval University, Quebec, Canada, Engineering Physics

**POSITIONS HELD:**

2013- Founder of Complex Biosystems Inc, Liverpool Ny.  
2013- Visiting scientist, Dept. of Pharmacology, SUNY Upstate Medical University,  
Syracuse NY  
2006-2012 Associate professor, Department of Bioengineering, Binghamton University,  
Binghamton, NY.  
2005-2006 Associate professor, Radiology, SUNY Upstate Medical University,  
Syracuse, NY  
2000-2006 Adjunct Associate Professor, Department of Bioengineering, Syracuse  
University, Syracuse NY.  
1999-2005 Assistant Professor, Pharmacology, SUNY Upstate Medical University,  
Syracuse, NY.  
1994-1999 Research Assistant Professor, Pharmacology, SUNY Upstate Medical Univ.,  
Syracuse, NY.  
1993-1994 Senior Research Scientist, Pharmacology, SUNY Upstate Medical University,  
Syracuse, NY.  
1992-1993 Postdoctoral Research Associate, Pharmacology, SUNY Upstate Medical  
University, Syr. NY.  
1988-1992 Graduate Student Institute of Biomedical Engn, University of Montreal,  
Montreal ,Canada.  
1987-1988 Clinical software engineer, Clinical Research Institute, Montreal, Canada.  
1985-1987 Consultant in Computer Science, DMR (now owned by Fujitsu),  
Montreal, Canada.

**MEMBER OF THE FOLLOWING PROFESSIONAL SOCIETIES**

Biophysical Society. Society for Industrial and Applied Mathematics (SIAM). Heart and Rhythm Society

**AWARDS:**

1. Funded by the National Partnership for Advance Computational Infrastructure 1996, 1998, 1999, 2000.
2. Mentor of Gregory Hoofnagle, Bioengineering Student, Syracuse University, which receives the Bioengineering Founder award for a research project hosted in my laboratory.
3. Mentor of the Syracuse University Scholar Andrew Goodwin. April 2000.
4. American Heart Association, New York Affiliate, Inc. and Upstate New York Cardiac Electrophysiology Society. Gordon K. Moe Young Investigator Award. October 1994.
5. Funded by the Whitaker Foundation 2001.
6. Funded by the NSF TeraGrid 2007-2011
7. Funded by NIH 1995-2005

**MEMBER OF THE FOLLOWING STUDY SECTIONS**

1. NSF Biomedical Engineering and Research to Aid Persons with Disabilities, 2001,2002, 2004, and 2005.
2. National academy of sciences, International collaboration program, 2003
3. NSF Departmental Reform, April 2004
4. The Health Research Council of New Zeland, 2005
5. NSF International Research Fellow Awards, 2006.
6. Institutional Review Board, Binghamton University 2007 to 2010
7. Advisory Committee for Scholar and Research, Binghamton University, 2008 to 2010
8. Strategic Partnership for Industrial Resurgence, Binghamton University, 2009 to 2010
9. National Institute of Health, panel ZRG1 SBIB-V 2009 to 2010
10. American Heart Association, Bioengineering and Cardiac Electrophysiology panels 2008 to present

### **REVIEWER FOR THE FOLLOWING JOURNALS**

Proceedings of the National Academy of Sciences, Biophysical Journal, Annals of Biomedical Engineering, IEEE Transactions on Biomedical Engineering, IEEE Transaction on Medical Imaging, Bioelectromagnetism, Circulation Research, American Journal of Physiology, Neurocomputing, Cardiovascular Engineering and Technology

### **THESES COMMITTEE(a total of 10)**

#### **INVITED LECTURES (from a total of 17)**

1. Realistic modeling of the mouse heart. A tool for genomic. The 74<sup>th</sup> congress of the ACFAS. May 15 to 19, 2006. University McGill, Montreal, Canada.
2. Inversion of Markov processes in bioelectricity. Implications for Cardiac Modeling. 6<sup>th</sup> International Congress on Industrial and Applied Mathematics. Zurich, July 16-20, 2007
3. Numerical Treatment of the Bidomain Equations in Large Scale Simulations. SIAM Life Science Conference. Montreal August 4-7, 2008
4. Multiscale analysis of cardiac rhythm disturbances in genetically altered substrate. SIAM Life science conference, Pittsburg PA, July 12-15, 2010.
5. Role played by cardiac tissue microanatomy in the spread of excitation. Multiscale modeling with experimental validation. World congress on mathematical modeling and computational simulation of cardiovascular and cardiopulmonary dynamics NIH sponsored symposium. Richmond Virginia, May 31 to June 3rd 2011.
6. Iterative methods for the solution of the cardiac Bidomain equations. Eastern sectional meeting of the American Mathematical Society. Held in Rochester New York, September 22-23, 2012.
7. Inverse problems in the interpretation of cardiac bioelectric data. Seminar series of the Mathematics Department at Rochester University. Held Nov 5, 2012

### **ORGANIZED SYMPOSIA**

Methods and investigations in cardiac modeling. 6<sup>th</sup> International Congress on Industrial and Applied Mathematics. Zurich, July 16-20, 2007

Multiscale modeling of normal and abnormal impulse propagation in the heart. SIAM Life Science Conference. Montreal, Quebec, Canada, August 4-7, 2008.

Multiscale analysis of cardiac rhythm disorders. SIAM Life science conference, Pittsburg PA, July 12-15, 2010.

### **TEACHING EXPERIENCE**

*BE-470 Autonomous agents. Bioengineering Undergraduate. Bioengineering Department Binghamton University. core course of 4 credits with laboratories. 2006-2012*

Physiological mechanisms of learning, how we can model them, and use them to control a robot.

*BE-211 Professional skills. Problem solving. Bioengineering Undergraduate. Bioengineering Department Binghamton University. core course of 1 credit. 2007-2012*

The learning process from a neuroscience perspective, and how we can better assimilate knowledge

*BE-472 Cardiac Bioelectricity, Bioengineering Undergraduate. Bioengineering Department Binghamton University. elective course of 3 credits. 2009-2012*

Heart hemodynamic and electrophysiology, detail coverage of cardiac bioelectricity, and arrhythmias

*BME-572 Cardiac Bioelectricity, Bioengineering Graduate. Bioengineering Department Binghamton University. Elective course of 3 credits. 2009-2012*

Students take the BE-472 lectures but make additional readings and exercises.

*BME-525 The Finite Element Method with Applications to Biomedical Problems. Graduate elective course, 3 credits, 2009-2012*

Intended to developers of simulation system, with emphasis on complex Biological systems.

*BME-501 Perspective on Complex system Engineering. 3 credits 2010-2012*

Quantitative methods to study complex Biological systems with application in Medicine

*BME-590 Biomedical Engineering seminars, 1 credit 2009-2012*

Expose students to complex biological systems, from experimental and theoretical perspectives.

## **PREVIOUS GRANT SUPPORT**

*National Institute of Health. Program Project: PO1-HL-39707., Intercellular communication and impulse propagation, Period: May 1995 to April 2000, PI: Jalife J.*

Roles: Director Computer modeling and electronic core, budget \$571,857

Project III, responsible for modeling, budget \$727,450

*National Institute of Health. Program Project: PO1-HL-39707. Intercellular communication and impulse propagation. Period: May 2000 to April 2005 (First 3 year of the program), PI: Jalife J.*

Title:

Goal: Elucidate the role played by key membrane proteins in the dynamics of vortices of electrical waves

Roles: Computer modeling core director budget \$914,423

Project II, director, budget \$817,238

*Whitaker Foundation. Biomedical Engineering Research Grants program. Computer modeling of spiral wave activity: Ionic mechanism leading to termination. April 1999 to October 2002*

Role: April 1999 to October 2002, budget \$203,433

*National Institute of Health. Share Instrumentation Grant Program, application 1 s10 RR12917-01A1.*

Computer modeling of propagation in the heart. 2004, on time purchase

Role: Principal investigator, Initial budget \$396,561, leveraged to \$796,561 with industry matching funds

*Hendrix funds. SUNY Research foundation. Computer model of genetically induced phase II reentry in the human heart. Period: 04/01/06 to 08/31/07*

Role: Principal investigator. Budget \$50,000

*National Science Foundation, Teragrid. Grants: TG-IBN070001T, TG-IBN080014N, TG-BCS090011, TG-BCS110013. Multiscale modeling of impulse propagation in the heart. Period: 01/11/06 to 10/31/2013*

Role: Principal investigator, Budget: resources to run large scale simulations on massively parallel computers.

## PUBLICATIONS

### *Peer reviewed articles*

- Beaumont, J.**, Roberge, F.A. and Leon, L.J. On the interpretation of patch-clamp data using the Hodgkin-Huxley model. *Math. Biosci.* 115:65-101, 1993a.
- Beaumont, J.**, Roberge, F.A. and Lemieux, D.R. Estimation of the steady-state characteristics of the Hodgkin-Huxley model from patch clamp data. *Math. Biosci.* 115: 145-186, 1993b.
- Beaumont, J.**, Michaels, D., Delmar, M., Davidenko, J.M. and Jalife, J. A model study of changes in excitability of ventricular muscle cells with repetitive stimulation. Inhibition, facilitation and hysteresis. *Am. J. Physiol.* 268 (Heart Circ. Physiol.) 37:H1-H14, 1995.
- Beaumont, J.**, Davidenko, N., Davidenko, J.M. and Jalife, J. Self-Sustaining spiral wave activity in a two-dimensional ionic model of cardiac ventricular muscle. *Computer Simulations in Biomedecine.* Power H., Hart R.T., Computational Mechanics Publications Southampton and Boston. 75-87, 1995.
- Davidenko, J.M., Delmar, M., **Beaumont, J.**, Michaels, D. and Jalife, J. Electrotonic inhibition and active facilitation of excitability in ventricular muscle. *J. Cardiovasc. Electr.* 5,11, 945-960, 1994.
- Meijler, F.L., Jalife, J., **Beaumont, J.** and Vaidya, D. AV nodal function during atrial fibrillation: the role of electrotonic modulation of propagation. *J. Cardiovasc. Electr.* 7(9):843-861; 1996
- Beaumont, J.**, Davidenko N., Davidenko, J.M. and Jalife, J. Spiral waves in a two-dimensional model of ventricular muscle: Formation of a stationary core. *Biophys. J.* 75:1-14; 1998
- Beaumont J.** and Jalife J. Rotors and spiral waves in two-dimensions. In: *Cardiac Electrophysiology; from cell to bedside*, third edition. Zipes D. and Jalife J. Chap 38. 2000:327-335.
- Samie, F.H., Mandapati, R., Gray, R.A., Watanabe, Y., Zuur, C., **Beaumont, J.** and Jalife, J. A Mechanism of transition from ventricular fibrillation to tachycardia: Effect of calcium channel blockade on the dynamics of rotating waves. *Circ. Res.* 2000:86:684-691.
- Samie, H. F., Berenfeld, O., Anumonwo, J., Mironov, S., Udassi, S., **Beaumont, J.**, Taffet, S., Pertsov, A.M. and Jalife, J. Rectification of the background potassium current: a determinant of rotor dynamics in ventricular fibrillation. *Circulation Research* 2001;89:1216-1223 (This paper made the cover page I did the computer modelling part of this work).
- Wang G.J., **Beaumont J.** Parameter estimation of the Hodgkin-Huxley gating model: An inversion procedure. *SIAM J. Appl. Math.* 2004:64(4):1249-1267
- Bayer J.D., **Beaumont J.**, Krol A. Laplace-Dirichlet energy field specification for deformable models. An FEM approach to active contour fitting. *Annals of Biomedical Engineering.* Ann. of Biomed. Engr. 2005;33(9):1175-1186.
- Poddar A.H., Krol A., **Beaumont J.**, Price R.L., Slamani M.A., Fawcett J., Subramanian A., Coman I.L., Lipson E.D., Feiglin D.H. Ultrahigh resolution 3D model of Murine heart from micro-CT and serial confocal laser scanning microscopy images. *Proc. IEEE Nuclear science symposium and medical imaging conference*, 2005.

- Slamani A., Krol A., **Beaumont J.**, Price R.L., Coman I.L., Lipson E.D. Application of phase correlation to 3D reconstruction of large tissue volumes from scanning laser confocal microscopy. *Microscopy and Microanalysis*. 2006;12(2):106-112.
- Raba A.E, Cordeiro J.M., Antzelevitch C. **Beaumont J.**, Extending the conditions of application of an inversion of the Hodgkin-Huxley gating model. *Bulletin of Mathematical Biology* 2013;75(5):752-773.
- Bayer J.D., Epstein M., **Beaumont J.** Fitting continuous parametric surfaces to frontiers delimiting physiologic structures. *Computational and Mathematical Methods in Medicine* 2014 (2014). Special issue: Image-Based Computational Cardiology: From Data to Understanding. 2014:1-16
- Beaumont J.**, Wang G.. Inversion of time continuous Markov processes in bioelectricity. I Treatment of the chain. Under review in *SIAM J. Appl. Matrix Analysis*
- Costantino A.J., Hyatt C.J., Kollisch-Singule M.C., **Beaumont J.**, Roth B.J., and Pertsov A.M. Determining the light scattering and absorption parameters from forward directed flux measurements in cardiac tissue. *Journal of Biomedical Optics*. Accepted for publication July 2017

### PRESENTATIONS AT CONFERENCES WITH PUBLICATION IN PROCEEDINGS

(from a total of 61)

1. Baldwin J. and **Beaumont J.** Implantable electrical stimulator for the dissociation of the atrioventricular pathway during atrial fibrillation. FDA and NHLBI third annual workshop on cardiovascular device modeling. The integration of nonclinical and computer models. NIH June 10-11, 2010
2. Raba A., **Beaumont J.** A computational approach to the investigation of congenital arrhythmias. SIAM Life Science Conference. July 12-15, 2010, Pittsburgh P.A.
3. **Beaumont J.** Multiscale analysis of cardiac rhythm disorders disturbances in genetically altered substrates. SIAM Life Science Conference. July 12-15, 2010, Pittsburgh P.A.
4. **Beaumont J.** Multiscale modeling of inherited arrhythmias. Multiscale modeling consortium meeting. Held at National Institute of Health, October 27-28, 2010
5. **Raba A., Beaumont J.** Cardiac vortex dynamics: From cell to tissue. 55<sup>th</sup> Annual meeting of the Biophysical Society. Held in Baltimore Maryland, March 5-9, 2011.
6. **Beaumont J.**, Raba A. Initiation of cardiac arrhythmias in the congenital LQT2 and LQT3 syndromes. 55<sup>th</sup> Annual meeting of the Biophysical Society. Held in Baltimore Maryland, March 5-9, 2011.
7. Raba E.A., **Beaumont J.** Role of protein defects on the creation of premature cardiac beats. 37<sup>th</sup> annual northeast Bioengineering conference. Troy NY, April 1-3, 2011.
8. Baldwin J. and **Beaumont J.** Control of atrioventricular excitation during atrial fibrillation. National conference on undergraduate research. Held in Ithaca NY, April 1<sup>st</sup> 2011.
9. Raba A. **Beaumont J.** A Multi-scale Analysis of the Mechanisms of Arrhythmia. World congress on mathematical modeling and computational simulation of cardiovascular and cardiopulmonary dynamics. NIH sponsored symposium. Richmond Virginia May 31 to June 3<sup>rd</sup>, 2011.
10. **Beaumont J.** and Raba A. New perspectives on the initiation of premature beat in genetically altered cardiac tissue. World congress on mathematical modeling and computational simulation of cardiovascular and cardiopulmonary dynamics. NIH sponsored symposium. Richmond Virginia May 31 to June 3<sup>rd</sup>, 2011.
11. **Beaumont J.** Role played by cardiac tissue microanatomy in the spread of excitation. Multiscale modeling with experimental validation. World congress on mathematical modeling and computational simulation of cardiovascular and cardiopulmonary dynamics. Sponsored by NIH. Symposium talk. Held in Richmond Virginia, May 31 to June 3<sup>rd</sup>, 2011.
12. Epstein M., **Beaumont J.** Electrical wave dynamics in the sub-endocardium of cardiac ventricles. 23<sup>rd</sup> annual meeting of the Upstate New York Cardiac Electrophysiology Society held in Toronto, October 11, 2013.
13. **Beaumont E., Beaumont J.** Integrated visualization environment for the interpretation of Medical and Biomedical Imaging data, 24<sup>th</sup> annual meeting of the Upstate New York Cardiac Electrophysiology Society held in Buffalo NY, November 4, 2014.

14. Munoz A.C. **Beaumont J.** On the detachment of traveling impulses from the border of cardiac ventricular injuries. Upstate New York Cardiac Electrophysiology Society held in Utica NY, October 28, 2016.
15. **Beaumont J.** Toward an integrated model of nutrient transport and absorption in the small intestine. Methodological aspects. Advancing microbiome research symposium. Microbiome & Disease. Held in Chicago Illinois, November 17, 2016
16. Harmon E.S., Thompson M.O., Mandal K.C., Schmidlein C.R., Turner J.N., **Beaumont J.**, And Krol A. Development of ultrafast detector for advanced time-of-flight brain PET. SPIE conference on Medical Imaging. To be Held in Houston Texas, February 10-15, 2018