Flavio H. Fenton

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Education

1993 - 1999 Ph.D., Physics, Northeastern University, Boston, MA
Thesis title: *Theoretical Investigation of Spiral and Scroll Wave Instabilities Underlying Cardiac Fibrillation*
Advisor: Dr. Alain Karma

1990 - 1993 M.S., Physics, Northeastern University, Boston, MA

1985 - 1990 B.S., Theoretical Physics, Universidad Nacional Autónoma de México, (UNAM) Mexico City.
Thesis title: *The Antikaon-Proton Interaction At Low Energies*
Advisor: Dr. Manuel Torres Labansat

Professional Experience

2012 – Associate Professor
Physics Department, Georgia Institute of Technology, Atlanta, GA.

2006 – 2012 Research Associate
Biomedical Sciences, Cornell University, Ithaca, NY.

2009 July Visiting Fellow, Sir Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.

2001 – 2006 Director of Electrophysiology Research.
The Heart Institute, Beth Israel Medical Center, New York, NY

2006 July-Aug Visiting Fellow, Kavli Institute of Theoretical Physics, Santa Barbara CA

2003 July-Aug Visiting Fellow, Kavli Institute of Theoretical Physics, Santa Barbara CA

2001 – 2005 Visiting Research Scientist
Department of Physics, Hofstra University, Hempstead, NY

1999 – 2001 Postdoctoral fellow
Department of Mathematics, Hofstra University, Hempstead, NY

1998 – 1999 Postdoctoral fellow
Long Island Jewish Medical Center, New Hyde Park, NY

1996 – 1998 Systems Administrator
Department of Physics, Northeastern University, Boston, MA

1996 – 1998 Research Assistant
Department of Physics, Northeastern University, Boston, MA

1996 – 1998 Teaching Assistant, Computational Physics, Mathematics for Engineers, and General Physics
Department of Physics, Northeastern University, Boston, MA

1988 – 1990 Teaching Assistant, Calculus, Algebra and Mathematical Methods
UNAM, Mexico City, Mexico.

1988 – 1989 High School Physics Teacher. La Salle del Pedregal High School, Mexico City.

Honors and Awards

1990-1995 Full scholarship (stipend and tuition) from Universidad Nacional Autónoma de México, DGAPA (General Directorship of Academic Personnel Affairs) to Northeastern University

1990 Scholarship from Fermilab to attend the course "Accelerators in Physics" at Harvard University.

1993 Scholarship from Fermilab to attend the course "Computers in Accelerator Physics" at Harvard University.

1995 Best Poster Award at the Society for Industrial and Applied Mathematics Conference on Dynamical Systems.

1996 Travel Award by the Division of Biological Physics to attend the 1996 American Physical Society March Meeting.

2004 SIAM (Society for Industrial and Applied Mathematics) Student paper prize (Advisor)

2005 The 9th Michaelem Serventus Educational Hall Award from the 2005 Madrid Arrhythmia and Myocardium Conference

2006 NSF Science and Engineering Visualization Challenge, Third Place, Interactive Media category. *Science, 313; 2006, 1730-1735.*

2008 First Prize, International Acrobat 3D Contest in Interactive Technical Publishing.

Current Grant Awards

#1028261 FH Fenton (PI) $690,107 09/01/10—08/31/14
NSF (Collaborative Research: CDI type II program): "Dynamics and control of Cardiac Tissue"
Role PI

#0800793. FH Fenton (PI). *$360,000* 09/01/08 – 08/31/11
NSF (Dynamical Systems Program): *"Nonlinear Dynamics and Bifurcations in Cardiac Tissue"*
Addition supplements (Travel $3,000 and REU student $6,000)
Role: PI

#0926190 E.M. Clarke (PI). *$10,000,000* 09/01/09 – 08/31/14
NSF (Expeditions in Computing): *"Model Checking and Abstract Interpretation"*

Role: PI *for the Cornell section and Coordinator of the Atrial arrhythmia part of the grant. $437,872.00*

#241526 L. Stephan(PI). *€10,000,000 (Euros)* 10/01/09 – 09/31/14
Seventh Framework Programme EUTrigTreat: *"Identification and therapeutic targeting of common arrhythmia trigger mechanisms". Grant contains 17 projects.*
Role: Co-PI of project 11 *" Macroscopic modeling of ventricular arrhythmias initiation and termination in the heart" €217,000.00 Euros.*

#R01HL089271-01A2 N. Otani (PI) $1,951,263 07/15/09 – 04/30/14
Dynamical Heterogeneity of Refractoriness and the Induction of Reentry
Role: Co-Investigator

MCB010053P. FH Fenton and EM Cherry (PIs) *55,000* CPU hours/year 01/01/02 –12/31/12
NRSA: *"The Role of Anatomical Structure in Ventricular and Atrial Arrhythmias"*. Yearly grant that has been successfully renewed every year since 2002.
Role: PI.

MRI time FH Fenton (PI) 01/04/07 –
Pittsburgh NMR Center for Biomedical Research. *"Cardiac anatomy reconstruction from MRI images"*
Role: PI

Completed Grant Awards

HL075515-*03S, -04S, -05S and 06S*. FH Fenton (PI) *$449,608* 03/01/06 –11/30/09
NIH-NHLBI: (Supplement for diversity in health related research to R01). *"Computer Model of the Canine Ventricle".*
Role PI.

Faculty Innovation in Teaching Awards. FH Fenton (PI) $20,000 06/01/06 – 05/30/07
Cornell University. "Interactive Models for Cardiovascular Medicine".
Role PI with MS Kraus and EM Cherry.

#MRI-0320865 HM Hastings (PI). *$252,368* 08/01/03 – 07/31/06
NSF, Acquisition of a Beowulf supercomputer for physical science research.
Role: Co- PI with T Brack, and S Sobel.

HL072816-01 HM Hastings (PI). *$152,835* 05/01/03 – 04/30/05
NIH-R15 "Atrial Fibrillation: Anatomy versus Cell Physiology".
Role: Co-PI with EM Cherry.

Peer-Reviewed Publications (h-index: 18, g-index: 37)

Statistics:

(T) Theoretical papers	27	(Edu) Educational papers	2
(E) Experimental papers	6	(R) Review papers	4
(TE) Theoretical and Experimental papers	4	(C) Commentary papers	2
45 Journal Publications (Over 1,670 citations as of July 2012).			

Publications on major journals by impact factor and area.

Journal	**Area**	**Impact factor**	**Number**
Nature	*General Science*	36.10	1
Science	*General Science*	31.36	1
Circulation	*Medicine*	14.595	1
Computer Aided Verification	*Computer Science*	10.92	1
Physical Review Letters	*Physics*	7.32	3
Comp. methods in systems Biology	*Computer Science*	5.56	2
Progress Biophys Mol Biol,	*Biophysics*	5.0	2
Heart rhythm	*Medicine*	4.24	2
New Journal of Physics	*Physics*	3.84	1
Am. J. Physiology	*Physiology*	3.8	4
Journal of Theoretical Biology	*Biology*	2.49	2
Phil. Trans. of the Royal Society A	*Mathematics*	2.62	1
Physical Review E	*Physics*	2.35	4
Chaos	*Physics*	2.1	3
Advances in Physiology Education	*Education*	1.38	1
SIAM Journal on Scientific Computing	*Mathematics*	1.22	1

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Articles:

1. **(T) Fenton F**, Karma A. Vortex dynamics in three-dimensional continuous myocardium with fiber rotation: Filament instability and fibrillation. *Chaos* 1998; 8: 20-47.
2. **(T) Fenton F**, Karma A. Fiber-rotation-induced vortex turbulence in thick myocardium. *Physical Review Letters* 1998; 81: 481-484.
3. **(T)** Rappel WJ, **Fenton F**, Karma A. Spatiotemporal control of wave instabilities in cardiac tissue. *Physical Review Letters* 1999; 83: 456-459.
4. **(T) Fenton F**, Evans S, Hastings H. Memory in an excitable medium: A mechanism for spiral wave breakup in the low-excitability limit. *Physical Review Letters* 1999; 83: 3964-3967.

5. **(T)** Hastings H, **Fenton F**, Evans S, Hotomaroglu O, Geetha J, Gittelson K, Nilson J, Garfinkel A. Alternans and the onset of ventricular fibrillation. *Physical Review E* 2000; 62: 4043-4048.

6. **(T) Fenton F**, Karma A, Hastings H, Evans S. Transition from ventricular tachycardia to ventricular fibrillation as a function of tissue characteristics. IEEE Chicago 2000, World Congress on Medical Physics and Biomedical Engineering, paper no. 5617-90379 (2000).

7. **(T) Fenton F**. Numerical simulations of cardiac dynamics: What can we learn from simple and complex models? *Computers in Cardiology* (IEEE) 2000; 27: 251-254.

8. **(T) Fenton F,** Evans S, Hastings H, Karma A. Transition from ventricular tachycardia to ventricular fibrillation as a function of tissue characteristics in a computer model. *Europace* 2000; 1 (Supplement D): paper no. 109P/10.

9. **(T)** Watanabe M, **Fenton F**, Evans S, Hastings H, Karma A. Mechanisms for discordant alternans. *Journal of Cardiovascular Electrophysiology* 2001; 12: 196-206.

10. **(Edu) Fenton FH**, Cherry EM, Hastings HM, Evans SJ. Real-time computer simulations of excitable media: JAVA as a scientific language and as a wrapper for C and FORTRAN programs. *BioSystems* 2002; 64: 73-96.

11. **(T) Fenton FH**, Cherry EM, Hastings HM, Evans SJ. Multiple mechanisms of spiral wave breakup in a model of cardiac electrical activity. *Chaos* 2002; 12: 852-892.

12. **(T) Fenton FH**, Cherry EM, Hastings HM, Evans SJ. Computers and arrhythmias: Computational approaches to understanding cardiac electrical dynamics. Proceedings of the Second MIT Conference on Computational Fluid and Solid Mechanics, 2003.

13. **(E)** Hastings, MH, Sobel GS, **Fenton FH**, Chaterpaul S, Frank C, Pekor J, Russell E. The Onset of Fluctuations in the Ferroin-Catalyzed Belousov-Zhabotinski Reaction. Experimental Chaos, AIP, 2003;676, 275-280.

14. **(T)** Cherry EM, **Fenton FH**. Suppression of alternans and conduction blocks despite steep APD restitution: Electrotonic, memory and conduction velocity restitution effects. *American Journal of Physiology* 2004; 286: H2332-2341.

15. **(T) Fenton FH**., Cherry EM., Karma A., Rappel WJ. Modeling wave propagation in realistic heart geometries using the phase-field method. *Chaos* 2005; 15: 013502

16. **(T)** Chen X, **Fenton FH**, Gray RA. Head-tail interactions in numerical simulations of reentry in a ring of cardiac tissue. *Heart Rhythm* 2005; 2: 1038-46.

17. **(T)** Bueno-Orovio A., Perez-Garcia VM., and **Fenton FH**. Spectral methods for partial differential equations in irregular domains: The spectral smoothed boundary method. *SIAM Journal on Scientific Computing* 2006; 28: 886-900.

18. **(R)** Chatterjee R, Cheng R, Brown WP, Fahrig R, Reinhart C, Yager D, Palais R, Benard L, Babaian C, DuBois C, Sparwasser N, Andresen T, Reiniger S, Meisner R, Borgeat L, Blais F, Taylor J, Lahanier C, Heving M, Suh C, Rajan K, Seig S, Koblin A, Berry D, Pickett-Heaps J, Tetaz F, Brennan J, Abdalati W, Mitchell H, Meier W, Vermilye T, Humphries S, Christensen A, Salver K, Bradbury J, Iacino G, Olsen E, Grotke R, **Fenton F**, Cherry E. 2006 Visualization Challenge Winners. *Science* 2006; 313, 1730-1735.

19. **(E)** Singh R, Bien H, Entcheva E, **Fenton, FH**. Inherent Dispersion in Restitution Properties Over Space. Engineering in Medicine and Biology Society, 2006. EMBS '06. 28th Annual International Conference of the IEEE;1, 3935-3938

20. **(T)** Cherry EM, **Fenton FH**. A tale of two dogs: Analyzing two models of canine ventricular electrophysiology. *American Journal of Physiology* 2007; 292: H43-H55.

21. **(T)** Cherry EM., Ehrlich JR, Nattel S, **Fenton FH**. Pulmonary vein reentry-Properties and size matter: Insights from a computational analysis. *Heart Rhythm* 2007; 12: 1553-1562. *(Article featured on the journal cover)*

22. **(T)** Bueno-Orovio A.,Cherry EM., **Fenton FH**. Minimal model for human ventricular action potential in tissue. *Journal of Theoretical Biology* 2008; 253: 544-560.

23. **(T) Fenton FH**, Cherry EM, Glass L. Cardiac arrhythmias. *Scholarpedia* 2008; 3, 1665.

24. **(TE)** Otani NF, Mo A, Mannava S, **Fenton FH**, Cherry EM, Luther S, Gilmour RF, Jr.. Predator-prey approach to analyzing complex dynamics in cardiac tissue. *Physical Review E* 2008; 78, 021913.

25. **(T) Fenton FH**, Cherry EM, Models of cardiac cell. *Scholarpedia* 2008; 3, 1868.

26. **(E) Fenton FH**, Cherry EM, Kornreich BG, Termination of equine atrial fibrillation by quinidine: An optical mapping study. *Journal of Veterinary Cardiology* 2008; 10 87-102. *(Article featured on the journal cover)*

27. **(TE)** Cherry EM. **Fenton FH.** "Visualization of spiral waves in simulated and experimental cardiac Tissue". *New Journal of Physics* 2008; 10, 125016 (43pp).

28. **(T)** Garzon A, Roman OG, **Fenton FH**. "Model-based control of cardiac alternans on a ring". *Physical Review E* 2009; 80**,** 021932.

29. **(TE) Fenton FH**, Luther S, Otani NF, Cherry EM, Pumir A, Bodenschatz E, Krinsky V, Gilmour RF Jr. "Termination of atrial fibrillation using pulsed low-energy far field stimulation". *Circulation* 2009; 120, 467-476.

30. **(TE)** Otani NF, Singh R, **Fenton FH**, Butcher J, DW Infanger DW, Neumann A, Luther S, Gilmour Jr RF "Use of Ultrasound Imaging to Map Propagating Action Potential Waves in the Heart" *Computers in cardiology*, 2009; 36: 617-620.

31. **(C) Fenton FH**, "The Value of Simulation" Physics World 2010;23:46-47.

32. **(C)** Cherry EM and **Fenton FH**, "Realistic cardiac electrophysiology modeling: are we just a heartbeat away? J. Physiol. 2010; 588, 2689.

33. **(R)** Fink M, Niederer SA, Cherry EM, **Fenton FH**, Koivumäki JT, Seemann G, Thul R, Zhang H, Sachse FB, Beard D, Crampin EJ, Smith NP. "Cardiac cell modeling: Observations from the heart of the cardiac physiome project", *Prog Biophys Mol Biol, 2011, 104; 2-21*

34. **(R)** Clayton RH, Bernus O; Cherry EM; Dierckx H; **Fenton FH**, Mirabella L, Panfilov S V, Sachse FB, Seeman G; Zhang H. "Models of cardiac tissue electrophysiology: Progress, challenges and open questions" *Prog Biophys Mol Biol 2011;104; 22-48*

35. **(T)** Niederer SA, Kerfoot E, Benson A, Bernabeu MO, Bernus O, Bradley C, Cherry EM, Clayton R, **Fenton FH**, Garny A, Heidenreich E, Land S, Maleckar M, Pathmanathan P,

Plank G, Rodriguez JF, Roy I, Sachse FB, Seemann G, Skavhaug O, Smith NP. "Verification of cardiac tissue electrophysiology simulations using an *N*-version benchmark". *Philosophical Transactions of the Royal Society A* 2011;369:4331-4351

36. **(T)** Garzon A, Roman OG**, Fenton FH**. Model-based control of cardiac alternans in Purkinje fibers. Physical Review E, 84, 041927 (2011).

37. **(E)** Luther S*****, **Fenton FH***, Kornreich BG, Squires A, Bittihn P, Hornung D, Zabel M, Flanders J, Gladuli A, Campoy L, Cherry EM, Luther GE, Hasenfuss G, Krinsky VI, Pumir A, Gilmour RF Jr., Bodenschatz E."Low-energy control of electrical turbulence in the heart" *Nature.* Jul 13;475(7355):235-9; 2011. * **Co-first authors.**

38. **(T)** Grosu R, Batt G, **Fenton FH**, Glimm J, Le Guernic C, Smolka SA, Bartocci E "From Cardiac Cells to Genetic Regulatory Networks" accepted to appear in 23rd International Conference on Computer Aided Verification, 6806, pp. 396-411, 2011

39. **(T)** Cherry EM, **Fenton FH** *"Effects of boundaries and geometry on the spatial distribution of action potential duration in cardiac tissue*" Journal of Theoretical Biology. 285; 164-76 2011.

40. **(T)** Murthy A, Bartocci E, Fenton FH, Glimm J, Gray RA, Smolka SA, and Grosu R, "Curvature Analysis of Cardiac Excitation Wavefronts*"*, CMSB 2011 9th International Conference on Computational Methods in Systems Biology, pages 151-160. ACM, 2011.

41. **(T)** Bartocci E, Cherry EM, Glimm J, Grosu R, Smolka SA, **Fenton FH** *"Toward Real-time Simulation of Cardiac Dynamics"*, CMSB 2011 9th International Conference on Computational Methods in Systems Biology, pages 103-110. ACM, 2011.

42. **(Edu)** Bartocci E, (29 more authors) and **Fenton FH**. "Teaching cardiac electrophysiology modeling to undergraduate students: Lab exercises and GPU programming for the study of arrhythmias and spiral wave dynamics" Advances in Physiology Education, *35: 427-437.* 2011.

43. **(R)** Cherry EM, **Fenton FH**, Gilmour F. Jr. "Mechanisms of Ventricular Arrhythmias: a dynamical systems-based perspective" Am. J. Physiol. 302(12): H2451-63, 2012.

44. **(E)** Kornreich BG, Cheetham J, Luther S, Singh R, Ducharme NG,[1] Soderholm LV, **Fenton FH** "Optimal mapping of equine intrinsic laryngeal muscle" *in review*

45. **(E) Fenton FH**, Cherry EM, Luther S, Kornreich BG "Ranolazine as an atrial antifibrillatory drug in large mamalian hearts" *in review*

Peer-Reviewed Abstracts

1. **Fenton F**, Cherry EM, Banville I, Gray RA, Hastings HM, Evans SJ. Validation of realistic 3D computer models of ventricular arrhythmias with optical mapping experiments. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 538.

2. Cherry EM, **Fenton FH**, Hastings HM, Xie F, Garfinkel A, Weiss JN, Evans SJ. The role of decreased conduction velocity in the initiation and maintenance of atrial fibrillation in a computer model of human atria. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 538.

3. Garfinkel A, **Fenton F**, Xie F, Weiss JN, Feliciano Z, Boyle N, Evans SJ, Hastings H, Cherry E. The effects of electrical restitution on the stability of scroll wave reentry in simulated human atrium. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 538.

4. Xie F, Garfinkel A, Qu Z, Weiss JN, **Fenton F**, Evans SJ, Hastings H, Karma A, Cherry E. The effect of electrical restitution on the stability of scroll reentry in anatomically realistic simulated rabbit ventricles. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 628.

5. **Fenton FH**, Cherry EM, Hastings HM, Evans SJ. The APD restitution hypothesis revised: Slope >1 does not always determine alternans and spiral wave breakup. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 1026.

6. Chen X, **Fenton FH**, Gray RA. Restitution curves can not predict the dynamics in a numerical model of reentry in a ring. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 1024.

7. Cherry EM, **Fenton FH**, Hastings HM, Evans SJ. Differences in reentry dynamics between two human atrial cell models. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 985.

8. Cherry EM, Rappel WJ, Evans SJ, **Fenton FH**. Effects of wall heterogeneity in an anatomically realistic model of cardiac ventricles: A simulation study. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 1109.

9. **Fenton FH**, Bueno Orovio A, Cherry EM, Evans SJ. Basis for the induction of phase two reentry in the Brugada syndrome: Insights from computer simulations. *Heart Rhythm* 2004; 1: S224-S225.

10. **Fenton FH**, Cherry EM, Ehrlich JR, Nattel S, Evans SJ. A simulation study of atrial fibrillation initiation: Differences in resting membrane potential can produce spontaneous activation at the pulmonary vein-left atrial junction. *Heart Rhythm* 2004; 1: S187-S188.

11. Cherry EM, Ehrlich JR, Nattel S, Evans SJ, **Fenton FH**. Heterogeneous conduction in pulmonary veins: A model of atrial fibrillation due to slow reentrant circuits appearing as focal activity. *Heart Rhythm* 2004; 1: S85.

12. **Fenton FH**, Cherry EM, Gray RA, Hastings H, Evans SJ. Fibrillation without alternans in Porcine Ventricles. *Heart Rhythm* 2005; 2: S301.

13. **Fenton FH**, Bueno Orovio A, Evans SJ, Hastings HM, Cherry EM. Reentrant arrhythmias in human ventricular models. *Heart Rhythm* 2006; 3: S186.

14. Cherry EM, Gilmour RF, Jr., **Fenton FH**. Tissue dynamics of two models of canine ventricular cell electrophysiology: Restitution, memory, and reentry properties. *Heart Rhythm* 2006; 3: S227.

15. **Fenton FH**, Cherry EM, Hastings HM, Evans SJ. Web-based programs for learning cardiac electrophysiology: Interactive simulations of heart cells and tissue. *Heart Rhythm* 2006; 3: S136.

16. Dierckx H, Cherry EM, Bernus O, Gilbert S, Holden A, Gilmour RF Jr, **Fenton FH.** Detailed anatomical reconstruction of the whole canine heart including fiber and sheet architecture using MRI and DTMRI. *Heart Rhythm* 2008; 5: S106.

Invited Talks and Seminars

1. "Instabilities of vortex dynamics in 3D," Boston University, Boston, MA, 1997.
2. "Fibrillation due to vortex instabilities in 3D continuous myocardium with fiber rotation," Long Island Jewish Medical Center, New Hyde Park, NY, 1997.
3. "Instabilities of electrical vortex filaments and wave turbulence in thick cardiac muscle", Northeastern University, Boston, MA, 1998.
4. "Instabilities of spiral waves in the heart," Duke University, Durham, NC, 1999.
5. "Vortex dynamics in three-dimensional continuous myocardium with fiber rotation: Filament instability and fibrillation", State University of New York Upstate Medical Center, Syracuse, NY, 1999.
6. "Vortex dynamics in three-dimensional continuous myocardium with fiber rotation: Filament instability and fibrillation", University of California at Los Angeles, CA, 2000.
7. "Vortex dynamics in three-dimensional continuous myocardium with fiber rotation: Filament instability and fibrillation", University of California at San Diego, CA, 2000.
8. "Vortex dynamics in three-dimensional continuous myocardium with fiber rotation: Filament instability and fibrillation", Salk Institute (2000)
9. "Instabilities of spiral waves and the transition from ventricular tachycardia to ventricular fibrillation," New York Academy of Sciences, New York City, NY, 2001.
10. "Modeling cardiac electrophysiology and arrhythmias using Compaq Alphas," Beth Israel Medical Center, New York, NY, 2001.
11. "All-heart simulations of cardiac arrhythmias," University of Missouri at Saint Louis, 2001.
12. "Multiple mechanisms of spiral wave breakup in a model of the cardiac action potential," University of Alabama at Birmingham, 2002.
13. "Spiral wave breakup mechanisms and their relevance to cardiac arrhythmias," Clark University, Worcester, MA, 2002.
14. "Multiple mechanisms of spiral wave breakup and their relation to fibrillation," Cornell University, Ithaca, NY, 2002.
15. "Multiple mechanisms of spiral wave breakup and their relation to fibrillation," State University of New York Upstate Medical University, Syracuse, NY, 2002.
16. "Ventricular fibrillation in mammalian hearts," McGill University, Montréal, Canada, 2003.
17. "Reproducing the ECG in simulated canine ventricles with transmural heterogeneity," Masonic Medical Research Laboratory, Utica, NY, 2003.
18. "Computers and arrhythmias: Computational approaches to understanding cardiac electrical dynamics," Pfizer, Inc., Groton, CT, 2003.
19. "Computers and arrhythmias: Computational approaches to understanding cardiac electrical dynamics," Universidad de Castilla-La Mancha, Ciudad Real, Spain, 2003.

20. “Computers and arrhythmias: Computational approaches to understanding cardiac electrical dynamics,” Federal Drug Administration, Washington, DC, 2004.
21. “Computational physics of the heart: Normal and abnormal rhythms in heart disease,” Discovery Nights at Hofstra University, Hempstead, NY, 2004.
22. “Basis for the induction of phase two reentry in the Brugada syndrome: Insights from computer simulations,” University of Leeds, United Kingdom, 2004.
23. “Computers and arrhythmias: Computational approaches to understanding cardiac electrical dynamics,” Hofstra Summer Research Program, Hempstead, NY, 2004.
24. “Computers and arrhythmias: Computational approaches to understanding cardiac electrical dynamics,” Grand Rounds, Beth Israel Medical Center, New York, NY, 2004.
25. “Computational Physics of the Heart: from normal rhythm to spiral waves” Nonlinear Science Seminar, Physics Department at Georgia Tech, Atlanta GA, 2005
26. “Alternans in cardiac ventricular myocardium”, Department of Physiology, McGill University, Montreal, Canada, March 2007.
27. “Nonlinear dynamics in the heart: Modeling, simulating, and visualizing arrhythmias” Max Planck Institute for Dynamics and Self-Organization, Gottingen Germany, April 2007.
28. “Models of Ventricular Human Action Potentials”, Computing Laboratory, Oxford University , United Kingdom, April 2007,
29. “Alternans and Border Collision bifurcations; Theory and Experiments”, Department of Applied Physics, Universitat Politecnica de Catalunya, Barcelona, Spain. April 2007.
30. “Spiral wave dynamics and instabilities; Simulations and Experiments”, Department of Mechanical & Biomedical Engineering, Kangwon National University, Chunchon, South Korea. Nov. 2007.
31. “Visualization and Simulations in Whole Hearts; Emphasis in Spatiotemporal alternans, and Brugada Syndrome” KRISS (Korean Research Institute of Standards and Science), Daejeon, South Korea. November 2007.
32. “Understanding Wave Instabilities in Cardiac Tissue”, Physics Department, Georgia Tech. March 2008.
33. “Termination of fibrillation using pulsed low-energy far field stimulation”, Dept. of cell Biology and Physiology. University of Pittsburgh, October 2008.
34. "Electrotonic effects due to tissue boundaries in cardiac tissue", Institute of Membrane and Systems Biology, Leeds, UK. July 2009.
35. "Towards realistic 3D modeling of the human heart I", University Hospital Goettingen, Goettingen, Germany. September 8, 2009.
36. "Towards realistic 3D modeling of the human heart II", University Hospital Goettingen, Goettingen, Germany. September 10, 2009.
37. “Spiral waves and the heart: Modeling, simulating and visualizing the spatiotemporal organization of cardiac arrhythmias”, Physics Department. University of Calgary. February 5, 2010.

38. "Spiral waves in the heart: Understanding cardiac arrhythmias using tissue-level experiments and simulations" Molecular & Integrative Physiology Work-in-Progress Series" Department of Biomedical Science, Cornell University, September 30, 2010.

39. "Ondas espirales en el corazón: Usando sistemas complejos en medicina para entender el inicio, la evolución, y la terminación de arritmias" Diplomado en Medicina y Complejidad, Torre de Ciencias y Humanidades, UNAM, Mexico, Octubre 20,2010.

40. "Defibrillation Using Pulsed low energy far field stimulation: Applications for termination of atrial and ventricular fibrillation", Facolta di Ingegneria, Universita Campus Bio-Medico Di Roma. July 5, 2011.

41. "Spiral waves and the heart: A physics approach to the study and control of the complex spatiotemporal organization of cardiac arrhythmias." Physics Department, Georgia Institute of Technology, Atlanta GA, January 23th 2012.

42. "From Chaos to Cures; controlling the complex spatiotemporal dynamics of cardiac arrhythmias with a computational and experimental integrative approach." Center of Theoretical Biological Physics, University of California San Diego (UCSD), April 6, 2012.

Conference Presentations

1. "The kaon-proton interaction at low energies using Feynman diagrams," XXXII National Congress of Physics (Mexico), León, Mexico, 1989.

2. "Analyzing the Noble model and spiral waves in 3D," Society for Industrial and Applied Mathematics Conference on Applications of Dynamical Systems, Snowbird, UT, 1995 (poster, Awarded Best Poster).

3. "A new three-variable mathematical model of action potential propagation in cardiac tissue," American Physical Society March Meeting, St. Louis, MO, 1996.

4. "Multiple mechanisms of spiral wave breakup in a model of the cardiac action Potential," American Physical Society March Meeting, Atlanta, GA, 1999.

5. "Memory in an excitable medium: A mechanism for spiral wave breakup in the low-excitability limit," Dynamics Days (Santa Fe, 2000)

6. "Memory in an excitable medium: A mechanism for spiral wave breakup in the low-excitability limit," American Physical Society March Meeting, Minneapolis, MN, 2000.

7. "Transition from ventricular tachycardia to ventricular fibrillation as a function of tissue characteristics in a computer model," Cardiostim (Nice France, 2000) (poster)

8. "Breakup of spiral waves in 3D and the onset of ventricular fibrillation," Society for Industrial and Applied Mathematics Annual Meeting, Puerto Rico, 2000.

9. "Transition from ventricular tachycardia to ventricular fibrillation as a function of tissue characteristics," World Congress on Medical Physics and Biomedical Engineering, Chicago, IL, 2000.

10. "Numerical simulations of cardiac dynamics: What can we learn from simple and complex models?", Computers in Cardiology Conference, Boston, MA, 2000.

11. "Real-time computer simulations of complex systems using JAVA as a wrapper for C and FORTRAN programs," American Physical Society March Meeting, Seattle, WA, 2001.
12. "Validation of full 3D numerical simulations of electrical dynamics in rabbit ventricles with experiments," Dynamics Days, Baltimore, MD, 2002.
13. "Validation of 3D simulations of electrical dynamics in rabbit ventricles with experiments," Society for Industrial and Applied Mathematics Conference on the Life Sciences, Boston, MA, 2002.
14. "Ventricular fibrillation in mammalian hearts: Simulation results," American Physical Society March Meeting, Indianapolis, IN, 2002.
15. "Validation of realistic 3D computer models of ventricular arrhythmias with optical mapping experiments," North American Society for Pacing and Electrophysiology Scientific Sessions, San Diego, CA, 2002.
16. "The APD restitution hypothesis revised: Slope >1 does not always determine alternans and spiral wave breakup," North American Society for Pacing and Electrophysiology Scientific Sessions, Washington, DC, 2003 (poster).
17. "Ventricular fibrillation in mammalian hearts," Society for Industrial and Applied Mathematics Annual Meeting, Montréal, Canada, 2003.
18. "The APD restitution hypothesis revised: Slope >1 does not always determine alternans and spiral wave breakup," Gordon Conference on Cardiac Arrhythmia Mechanisms, New London, NH, 2003 (poster).
19. "Multiple mechanisms of ectopy: Phase two reentry and membrane potential triggers," Upstate New York Cardiac Electrophysiology Society Annual Meeting, Ithaca, NY, 2003.
20. "Alternans suppression in cardiac tissue by electrotonic effects," American Physical Society March Meeting, Montréal, Canada, 2004.
21. "Basis for the induction of phase two reentry in the Brugada syndrome: Insights from computer simulations," North American Society for Pacing and Electrophysiology Scientific Sessions, San Francisco, CA, 2004 (poster).
22. "A simulation study of atrial fibrillation initiation: Differences in resting membrane potential can produce spontaneous activation at the pulmonary vein-left atrial junction," North American Society for Pacing and Electrophysiology Scientific Sessions, San Francisco, CA, 2004 (poster).
43. "Dynamics of spiral waves and their relation to cardiac arrhythmias," Nolineal 2004, Toledo, Spain 2004.
23. "Mechanisms of phase two reentry," Society for Industrial and Applied Mathematics Conference on the Life Sciences, Portland, OR, 2004.
24. "Fibrillation without alternans in porcine ventricles: Reassessing the importance of APD restitution during fibrillation," Upstate New York Cardiac Electrophysiology Society Annual Meeting, Utica, NY, 2004.
25. "Fibrillation without alternans in porcine ventricles," Heart Rhythm Society Scientific Sessions, New Orleans, LA, 2005.

26. Fibrillation without alternans in porcine ventricles: Theory and Numerical Simulations," SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, 2005.
27. "Fibrillation without alternans in porcine ventricles: Theory, Experiments and Numerical Simulations," SIAM Annual Meeting, New Orleans, LA, 2005.
28. "Data Visualization in Physics II: VRML and Java for three-dimensional imaging and fully three-dimensional movies", APS annual Meeting, Baltimore MD, 2006.
29. "Web-based programs for learning cardiac electrophysiology: Interactive simulations of heart cells and tissue," Heart Rhythm Society Scientific Sessions, Boston, MA, 2006 (poster).
30. "Reentrant arrhythmias in human ventricular models," Heart Rhythm Society Scientific Sessions, Boston, MA, 2006 (poster).
31. "Spatiotemporal Control of Wave Instabilities in Cardiac Tissue" PhysCon 2007 (3rd International IEEE Scientific Conference on Physics and Control), Potsdam, Germany, 2007.
32. "Anatomically correct heart reconstructions by using MRI/DTMRI imaging and ionic models of human action potentials" APCTP (Asia Pacific Center for the Theoretical Physics) Focus Program on Dynamic Aspects of Biological Networks. APCTP Headquarters, Pohang, South Korea. 2007.
33. "Termination of Atrial Fibrillation Using Low-energy Far-field Stimulation; A Computational and Optical Mapping Study" American Heart Association Scientific Session, New Orleans, USA 2008.
34. "Bifurcaciones de periodo doble en tejido cardíaco y control de alternacion". XIX Semana Regional de Investigacion y docencia en Matematicas. Hermosillo, Sonora, Marzo 5, 2009
35. "Low-energy Far-field Defibrillation" SIAM Conference on Applications of Dynamical Systems. Snowbird, Utah, May 18, 2009
36. "Cardiac Tissue Multistability" Isaac Newton Institute for Mathematical Sciences Cambridge, UK, July 10, 2009
37. "Termination of fibrillation using pulsed low-energy far-field stimulation: A computational and optical mapping study" Dynamics days, Goettingen, Germany August 3 2009
38. "Cardiac Alternans 3: Alternative Mechanisms" Dynamics in Systems Biology Abardeen, Scotland; September 16, 2009
39. "Spiral Waves in the Heart Space-time organization of electrical waves in the heart and relation to cardiac arrhythmias", Coherence in Health II; Heart-Brain-Heart Connection, Utrecht, Netherlands; October 9, 2009.
40. "Action Potential Restitution Curve Splitting: An Alternative Mechanism for Cardiac Alternans", Seventh Annual Cardiovascular diversity research supplement awardees session, AHA, Orlando, Florida, November 14, 2009.
41. "Multistability in cardiac tissue" SIAM: Emerging Topics in Dynamical Systems and Partial Differential Equations, Barcelona, Spain May 31, 2010.

42. "From bifurcations and spiral waves to chaos: The many dynamics of cardiac tissue", Invited speaker to the 11th Experimental Chaos and Complexity Conference, Lille, France, June 1-4, 2010.

43. "Far field low energy defibrillation" NSF Expeditions in Computing CMACS PI review meeting. U of Maryland, April 28-29 2011

44. "Report from the Workshop on Computational Modeling of Complex Systems" NSF Expeditions in Computing CMACS PI review meeting. U of Maryland, April 28-29 2011

45. "Low Voltage Atrial Defibrillation in Vitro" Heart Rhythm Society. San Francisco, May 6, 2011.

46. "Overview of Multi-Scale Modeling of Cardiac Contraction", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah. May 25, 2011.

47. "Arrhythmia modeling in the mouse, rabbit and human heart" EUtrigTreat General Assembly; Utrecht. June 23-24; 2011

48. "Synchronization and termination of cardiac arrhythmias using low energy far field stimulation" Physcon 2011; Leon, Spain. September 5; 2011.

49. "In real time simulations of 2d and 3D cardiac dynamics using GPUs" Dynamics Days Europe 2011; Oldenburg, Germany. September 14; 2011.

50. "Atrial arrhythmia workshop: education and outreach report" NSF expeditions in Computing CMACS PI review meeting. Carnegie Mellon U. Nov 3, Pittsburgh 2011.

51. "Synchronization and termination of cardiac arrhythmias using low energy far field stimulation" Dynamics Days 2012. Baltimore January 4; 2012.

52. "Synchronization as a mechanism of chaos control; Applications to cardiac arrhythmias." German Physics Society meeting, Berlin March 28, 2012.

53. "Simulations of Complex Systems using WebGL and HTML5: Exploiting Your Computer's GPUs for Real Time and Platform-Independent Interactive Calculations", Spring 2012 CMACS Virtual PI Meeting April 20 and 27, 2012.

54. "Arrhythmia modeling in the mouse and human heart", 4th Annual meeting and general assembly of the EUTrigTreat large-scale consortium. Beatenberg/Bern, Switzerland, June 22, 2012.

Workshop Invited Presentations

1. "Multiple mechanisms of spiral wave breakup," invited talk given at the Dynamics of Interfaces, Patterns and Domains Workshop, Los Alamos, NM, 1999.

2. "Multiple mechanisms of spiral wave breakup in a model in 2D and 3D", invited talk given at the Mapping and Control of Complex Arrhythmias Workshop, Montréal, Canada, 2000.

3. "Simulations in irregular domain for cardiac tissue using the phase field method," invited talk given at the Cardiac Nonlinear Dynamics Meeting, Vanderbilt University, Nashville, TN, 2001.

4. “Multiple mechanisms of spiral wave breakup,” invited talk given at the Wave Dynamics in Biological Excitable Media Workshop, Aspen Center for Physics, Aspen, CO, 2002.
5. “Multiple mechanisms of spiral wave breakup,” invited talk given at the Pattern Formation in Physics and Biology Workshop, Kavli Institute of Theoretical Physics, Santa Barbara, CA, 2003.
6. “Ten different physiological and structural mechanisms for spiral wave breakup in 2D and 3D,” invited talk given at the Integrative Biology Workshop, University of Oxford, United Kingdom, 2004.
7. “Beyond Slope One: Alternans Suppression and Other Understudied Properties of APD Restitution” invited talk given at the Cardiac Dynamics Workshop, Kavli Institute of Theoretical Physics, University of California, Santa Barbara, CA, July-August 2006.
8. “Alternans, Restitution and Models of Human Ventricular Cells”, invited talk given at the International Workshop on Non-linear Dynamics in Excitable Media, Gent University, Belgium, April 2007.
9. “Spatiotemporal Alternans and Control of Wave Instabilities in Cardiac Tissue”, invited talk given at the APCTP (Asia Pacific Center for the Theoretical Physics) Workshop on Self-Organization in Biological Complex Systems, Pusan National University, South Korea. November 2007.
10. “Estudio de la dinámica de Ondas en el tejido cardiaco y sus instabilidades” Plenary talk given at the Biomathematics Workshop 45 anniversary of the department of Mathematics, Sonora University, Mexico. March 6, 2009
11. "Termination of fibrillation using low-energy far-field stimulation: A computational and optical mapping study" The Cardiac Physiome Project, The Isaac Newton Institute of Mathematical Sciences, Cambridge UK. July 22, 2009.
12. "Termination of fibrillation using low-energy far-field stimulation: A computational and optical mapping study" ESF (European Science Foundation) Workshop in Cardiac Dynamics, Slovakia, August 25, 2009.
13. “Caos, espirales y la dinámica del corazón” XII escuela de Otono en biologia Matematica y VI Encuentro Nacional de Biologia Matematica Pachuca Mexico, Octubre 14, 2010
14. Five lectures on “Complex Systems and the Heart; Experiments, Theory and Simulation” NSF-CMACS Workshop on Atrial Fibrillation. Lehman College, Bronx, NY Jan 3-7, 2011.
15. “Synchronization and Termination of Atrial and Ventricular fibrillation using low-energy far field stimulation; A theoretical and experimental approach” NHLBI-VCU World Congress and Workshop. Williamsburg, VA June 1st, 2011.
16. “Low energy defibrillation, theory and experiments in vitro and in vivo” TRM Forum on Computer Simulations and Experimental Assessment of Cardiac Function. Lugano, Switzerland; December 6, 2011.
17. "Integrating partial differential equations in 2 and 3D using GPUs and a web browser: Applications to heart dynamics" 2nd Conference of Computational Interdisciplinary Science (CCIS 2012) Guanajuato Mexico, August 1, 2012.

Conference Sessions Organized

1. "Models of the Whole Heart," Biomedical Engineering Society Annual Meeting, Raleigh, NC, 2001.
2. "Cardiac Electrical Dynamics in Realistic Anatomical Models," Society for Industrial and Applied Mathematics Annual Meeting, Montréal, Canada, 2003.
3. "Electrical Dynamics of Cardiac Tissue, Parts I, II, III, and IV," Society for Industrial and Applied Mathematics Conference on the Life Sciences, Portland, OR, 2004.
4. "Instabilities and complexities in the heart: Models, experiments, and simulations, Parts I, II, III, and IV," Society for Industrial and Applied Mathematics Conference on Applications of Dynamical Systems, Snowbird, UT, 2005.
5. "Cardiac Dynamics: Period-doubling Bifurcations and Arrhythmias", SIAM on Applications of Dynamical Systems, Snowbird, UT, 2009.
6. "Cardiac Dynamics, Parts I,II,III, and IV" SIAM: Emerging Topics in Dynamical Systems and Partial Differential Equations, Barcelona, Spain 2010.
7. "Dynamics of Cardiac Contraction and Mechanical Deformation" SIAM on Applications of Dynamical Systems, Snowbird, UT, May 2011

Professional Services

Review Editorial Board for the following journals

1. Frontiers in Cardiac Electrophysiology.
2. Frontiers in Computational Physiology and Medicine.
3. (International Scholarly Research Network) ISRN Biomathematics.
4. Scholarpedia.

Referee for the following journals:

1. American Journal of Physiology
2. Annals of Biomedical Engineering
3. Applied Physics Letters
4. Biomedical Engineering OnLine
5. Biophysical Journal
6. Bulletin of Mathematical Biology
7. Circulation
8. Circulation Research
9. Chaos
10. Dynamics of Continuous, Discrete and Impulsive Systems
11. Encyclopedia of Biomaterials and Biomedical Engineering
12. Europace
13. Europhysics Letters
14. Experimental Physiology
15. Frontiers in Cardiac Electrophysiology.
16. Frontiers in Computational Physiology and Medicine.

17. Heart Rhythm
18. Human Frontiers Science Program (HFSP) Journal
19. IEEE Transactions on Biomedical Engineering
20. IEEE Transactions on Magnetics
21. Interface Focus
22. ISRN Biomathematics
23. Journal of Biological Physics
24. Journal of Biomechanical Engineering
25. Journal of Biomedical Optics
26. Journal of Computational Physics
27. Journal of Molecular and Cellular Cardiology
28. Journal of the Royal Society Interface
29. Journal of Statistical Physics
30. Journal of Theoretical Biology
31. Mathematical Biosciences
32. Mathematical Medicine and Biology
33. Medical and Biological Engineering and Computing
34. New Journal of Physics
35. Physica D: Nonlinear Phenomena
36. Physical Review E
37. Physical Review Letters
38. PLoS ONE
39. PLoS Computational Biology
40. Progress in Biophysics and Molecular Biology.
41. Scholarpedia
42. The Journal of Physiology.
43. Theoretical Biology and Medical Modelling.

Referee for the following granting organizations:

1. Agencia Nacional de Evaluación y Prospectiva, Ministerio de Ciencia e Innovación (Spain)
2. Austrian Science Fund, FWF (Austira)
3. Human Frontier Science Program (International)
4. Marsden Fund from the Royal Society of New Zealand (New Zealand)
5. Mathematics of Information Technology and Complex Systems (Canada)
6. Natural Sciences and Engineering Research Council of Canada (Canada)
7. National Science Foundation, NSF, (USA)
8. Netherlands Research Council (Netherlands)

Grant Review Panels

NSF panelist for the Dynamical Systems program

Mentored Students.

Undergraduate Students; degree, school, project, year.

- Catalina Peralta; Chemistry, Hofstra, BZ reaction and ionic cell modeling. 2004 *(Won second place, Undergraduate research competition, NY sectional of APS meeting, 2004)*.
- Alex Zaharakis; Physics, Hofstra, fluctuations in the BZ reaction, 2004 *(Tied second place also at the Undergraduate research competition, NY sectional of APS meeting, 2004).*
- Claudia Frank ; Physics, Hofstra, fluctuations in the BZ reaction 2004.
- Jordan Pekor; Physics, Hofstra, fluctuations in the BZ reaction 2004.
- Stephen Chaterpaul; Chemistry, fluctuations in the BZ reaction 2004.
- Alisa Mo, Chornell Analysis of optical mapping data 2007.
- Andrew Filipski, Rochester Inst. Tech., Java programming, 2011.

Graduate students; degree, school, project, year.

- Alex Chen, Bioengineering, U of Alabama, splitting of CV restitution, 2002-2004.
- Alfonso Bueno, Engineering, U. de Castilla-La Mancha, ionic cell modeling, 2003-2006 (Won SIAM best student paper prize).
- Alejandro Garzon, Physics, Georgia Tech, Control of alternans, 2007-2010.
- Amgad Squire, Physics, Cornell, Defibrillation mechanisms, 2008-2011
- Rupinder Singh , Biomedical Engineering, Cornell, Cardiac contraction modeling, 2009-
- Fred Von Stein. Physiology, Cornell, Purkinje network reconstruction 2010-
- Siddhartha Sinha, Biomedical Engineering Cornell. MRI image segmentation. 2010.
- Alessio Gizzi, Engineering, Universita Campus BioMedico Di Roma, Characterization of alternans in space, 2010-2012
- Philip Bittin, Physics, Max Planck, Lyapunov Vectors, 2010-2012
- Daniel Hornung, Physics, Max Planck, fiber reconstruction from DTMRI 2011-
- Ariful Islam, Computer Science, Stony Brook, Model reduction 2011-
- Abishek Murthy, Computer Science, Stony Brook, Curvature of reentrant waves 2011-
- Chagit Sima Braiman, Cornell University, Conduction velocity in cardiac tissue, 2011-
- Danielle Toupo, Cornell University, Modeling complex systems, 2011-
- Nicholas Braiman, Cornell University, Conduction velocity in cardiac tissue, 2011-
- Marco Piangerelli, Cornell U/U of Bologna, hypocalcemia, 2012-

Post-Doctorate supervised; degree, school, project, year

- Wonho Oh, Applied Math, Brookhaven NL, Bidomain simulations 2004-2005.
- Young-Seon Lee, Mathematics, Cornell, Calcium dynamics 2007-2009
- Ezio Bartocci, Computer sciences, Stony Brook, Large scale simulations of cardiac dynamics, 2010- 2012

Ph.D. Dissertation Committees.

1. Kim, Youngeun, PhD, Stony Brook University. Thesis:" A simulation of the breakup of spiral waves using bidomain equations in electrical cardiology" 2005.
2. Alfonso Bueno-Orovio PhD. Universidad de Castilla-La Mancha, Spain. Thesis:Mathematical modeling and spectral simulation of genetic diseases in the human heart "2007.
3. Rebecca M. Smith, PhD. Syracuse University, NY 2009.
4. Hans Dierckx PhD. Ghent University. Belgium 2010.

Journal Covers

Heart Rhythm 2007; 12: for article "Pulmonary vein reentry-Properties and size matter: Insights from a computational analysis"

Journal of Veterinary Cardiology 2008, 10: for article "Termination of equine atrial fibrillation by quinidine: An optical mapping study".

Research reviewed in the news

- "Working a Beat" in *DOE Computational Science Graduate Fellowship Magazine*, 2002.
- "Hearts Gone Wild" in *Projects in Scientific Computing,*. Pittsburgh Super Computer Center 2003 public report. Nov, 2003.
- "Excitable Media: The Belousov-Zhabotinsky Chemical Reaction and the Heart", Hofstra Horizons, 2004 19-25.
- "The beat goes on" in *Scientific Computing World Magazine* Jan/Feb 2005.
- "Critical Exponents, Cardiac Dynamics, and History in the DSWeb tutorial section" in *Dynamical Systems Magazine* October, 2005.
- "2006 Visualization Challenge" in *Science Magazine* Vol. 313, 1735 Sept 2006.
- "Cornell scientists honored for making science interactive and visually exciting" in *Cornell Chronicle*. Oct 4, 2006.
- "The Human Heart Laid Bare" in *News-journal of the Society for industrial and Applied Mathematics*, SIAM news Vol 39 Nov 9, 2006.
- "Visualization award announcement" in *The Biological Physicist* Vol 6 p 19 Oct 2006,
- "The Cardiac Museum" in *Web 3D art* 2007
- "Exploring Time" in *Discovery channel documentary*, Feb, 2007.
- "Visualization sheds light on cardiac dynamics" in *medical physics web* Dec 16, 2008.
- **"**Visualizing Ventricular Fibrillation" Seeing Science section in *Biomedical Computation review magazine,* Winter 2008/2009
- "Computing Luminaries Receive NSF Grant to Develop Modeling Tools for Complex Systems" *Dr. Dobb's Digest*. August 19, 2009.
- "Cornell Vet Researchers Investigate Atrial Fibrillation" TheHorse.com, Article#15624, January 12, 2010.

- “Off Bet Hearts” Pittsburgh Supercomputer Center 2010. Highlight projects in scientific computing.pg 28-31. January 2011.
- New method defibrillates heart with less electricity, pain” Cornell University Chronicle, July, 2011
- “A Gentler Defibrillator Jolt”, in IEEE Spectrum inside technology, July 2011
- “Kinder, Gentler Defibrillator Uses Multiple, Small Jolts”, Scientific American, July 2011
- **“**A kinder, gentler defibrillator”, Nature News, July 2011
- “A Less Shocking Way to Reset a Broken Heart” Science, July 13, 2011
- “New technologies aim to take shock out of treating irregular hearts”, Nature Medicine 17, 906, August 2011