

## Curriculum Vitae

Joël Tabak

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### *Professional Preparation*

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- 1993-1996** Ph.D. degree in neuronal modeling, Université de Rennes I, France. Dissertation Supervisor: L. E. Moore.
- 1989-1990** Advanced degree in Optics and Digital Image Processing (Aix-Marseille III).
- 1987-1990** Physics Engineering degree, Ecole Nationale Supérieure de Physique de Marseille.
- 1987-1988** Associate degree in Physics, Université d'Aix-Marseille III.

### *Professional Experience*

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- 2011-present** Associate Research Professor, Department of Biological Science, Department of Mathematics, Florida State University.
- 2005-2011** Assistant Scientist, Department of Biological Science, Florida State University.
- 2001-2005** Research Fellow, Laboratory of Neural Control, National Institute of Neurological Disorders and Strokes, Bethesda, MD.
- 1997-2001** Visiting Fellow, Laboratory of Neural Control, National Institute of Neurological Disorders and Strokes, Bethesda, MD.
- 1992** Photographer and teacher in mathematics and physics during military service.
- 1991** Programmer at ID Partners, Paris, France.

### *Award/Fellowship*

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- 1993-1995** Doctorate fellowship from the French Minister for Science and Education.

## **Teaching**

### *Member of Honors Thesis Supervisory Committee*

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1. Rudy Arceo (Fall 2007)

### *Member of Doctoral Dissertation Supervisory Committees*

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1. Natalia Toporikova (Graduated Spring 2007)
2. Bernard Fendler (Graduated Fall 2009)
3. Margaret Watts (Graduated Fall 2010)
4. Wondimu Teka (Graduated Summer 2012)
5. Diana Flores (Anticipated graduation date Spring 2016)
6. Daniel Weingard (Anticipated graduation date Spring 2016)

### *Co-Director for Doctoral Students*

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1. Sevgi Sengul (Graduated Fall 2014)
2. Patrick Fletcher (Anticipated graduation date Summer 2015)

### *Courses Taught*

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| <b>2014</b>      | Differential Equations (undergraduate, 3 credits), Florida State University  |
| <b>2013</b>      | Computational Neuroscience (graduate), Florida State University  |
| <b>2012</b>      | Introduction to neuronal dynamics and Applications of dynamic clamp; lectures and computer lab. Course developed for the Workshop on Dynamic Clamp, University of Valparaiso, Chile. |
| <b>2009</b>      | Production of Rhythmic Activity in the Nervous System. Course developed for the Summer Program in Science Technology Engineering and Mathematics, Florida State University.          |
| <b>2005-2007</b> | Seminars for the Biomathematics graduate program, Florida State University (topics: Bursting in single cells, Bursting in neural networks).  |
| <b>2001-2004</b> | Guest Lectures for the Neuroscience graduate program at the University of Maryland (topics: Hodgkin-Huxley model; Vestibular system).  |
| <b>1995</b>      | Computer Science Lab for Biology students, Université de Rennes.   |
| <b>1992</b>      | Mathematics and Physics for non-commissioned officers preparing to join the Air Force Academy.   |

## Invited Presentations

### Invited Conference Presentations and Symposia

1. **Tabak, J.** (2014). Themes in computational neuroendocrinology. Tutorial at the *Computational Neuroscience Meeting*, Quebec City, Quebec.
2. **Tabak, J.** (2014). Why are pituitary cells excitable? *Workshop on Multiscale Problems Arising in the Biosciences*, Blackheath, Australia.
3. **Tabak, J.** (2014). A universal pattern of activity in developing neural networks? *Computational and Systems Neuroscience (Cosyne)*, workshop on “Homeostasis and Self-Regulation of Developing Circuits: From Single Neurons to Networks”, Snowbird, UT.
4. **Tabak, J.**, Bertram, R., & Sengul, S. (2012). Contributions of the two negative feedback variables in the Hodgkin-Huxley model. *SIAM Conference on the Life Sciences*, minisymposium on “Model analysis for neural dynamics”, San Diego, CA.
5. **Tabak, J.** (2011). Large conductance potassium (BK) channels promote mixed mode oscillations in excitable cells. *SIAM conference on Applications of Dynamical Systems*, minisymposium on “Mixed mode oscillations”, Snowbird, UT.
6. **Tabak, J.** (2010). A Universal Pattern of Activity in Developing Neural Networks. *The 7<sup>th</sup> International Conference on Differential Equations and Dynamical Systems*, University of South Florida, Tampa, FL.
7. **Tabak, J.** (2010). The unusual bursting pattern of pituitary cells. *Dynamics of Bursting Activity of Neurons*, Workshop sponsored by Georgia State University, Atlanta, GA.
8. **Tabak, J.** (2009). Effect of A-type potassium channels on bursting in a lactotroph model. *SIAM conference on Applications of Dynamical Systems*, minisymposium on “Bursting Oscillations in Pituitary Cells”, Snowbird, UT.
9. **Tabak J.** (2008). Paradoxical effects of fast potassium currents on the activity of pituitary endocrine cells. *European Conference on Mathematical and Theoretical Biology*, minisymposium on “Mechanisms of Hormone Secretion.” Edinburgh, Scotland.
10. **Tabak, J.**, Toporikova, N., Freeman, M.E. and Bertram, R. (2006). Low dose of dopamine may stimulate prolactin secretion by upregulating fast potassium currents. *Origin and Regulation of Bursting Activity in Neurons*, Workshop sponsored by Georgia State University, Atlanta, GA.
11. **Tabak, J.** (2004). Relaxation oscillator models for cell/network bursting with two types of negative feedback. *Computational Neuroscience Meeting*, workshop on “Cellular and Sub-cellular Mechanisms”. Baltimore, MD.
12. **Tabak, J.**, Rinzel, J. and O’Donovan, M.J. (2002). Regulation of rhythmic activity by synaptic depression and cellular adaptation in the disinhibited embryonic and neonatal mouse spinal cord. *Viktor Hamburger Symposium I, Ontogeny of the Motor System: from Neurogenesis to Behaviour*, Washington, DC.

### *Invited Lectures and Seminars*

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1. **Tabak, J.** (2012). Using dynamic clamp to understand the electrical activity of pituitary cells. *Summer School in Mathematical and Computational Neuroendocrinology*, Tours, France.
2. **Tabak, J.** (2012). Dynamic clamp: one small step for a lab, one giant leap for data. *Howard Baker Research Seminar*, Florida State University, Tallahassee, FL.
3. **Tabak, J.** (2011). Large conductance potassium (BK) channels promote bursting oscillations in pituitary cells. *Valparaiso Complex Systems Institute*, University of Valparaiso, Chile.
4. **Tabak, J.** (2009) How ion channels set the rhythm in pituitary cells. *Science Seminar Series*, Valdosta State University, Valdosta, GA.
5. **Tabak, J.** (2008). Fast potassium currents can stimulate calcium influx and hormone secretion in pituitary cells. *Mathematical Biology Seminar*, University of Utah, Salt Lake City, Utah.
6. **Tabak, J.** (2005). Respective contributions of two slow negative feedback processes in episodic activity. *Seminar of the Courant Institute of Mathematical Sciences*, New York University, New York, NY.
7. **Tabak, J.** (2004). Spontaneous episodic activity in the developing spinal cord. *School of Computational Science Colloquium*, George Mason University, Fairfax, VA.
8. **Tabak, J.** (2003). Spontaneous episodic activity in the developing spinal cord. *Seminar of the Institut de Physique*, Université de Strasbourg, Strasbourg, France.
9. **Tabak, J.** (2003). Spontaneous episodic activity in the developing spinal cord. *Seminar of the Hospital Ramón y Cajal*, Madrid, Spain
10. **Tabak, J.** (1999). Spontaneous activity in the developing spinal cord. *Seminar of the Institut Alfred Fessart*, Gif sur Yvette, France.
11. **Tabak, J.** (1999). Spontaneous activity in the developing spinal cord. *Seminar of the Institut de Neurobiologie de la Méditerranée*, Université d'Aix-Marseille, Marseille, France.
12. **Tabak, J.** (1999). Spontaneous activity in the developing spinal cord. *Seminar of the Centre de Neurosciences Intégratives et Cognitives*, Université de Bordeaux 1, Bordeaux, France.
13. **Tabak, J.** (1999). Modeling of a vertebrate central pattern generator (1) and Spontaneous activity in the chick developing spinal cord (2). *Benefri Blockcourse on Motor Control: Physiology, Molecular Biology and Clinics*. Physiological Institute, Bern, Switzerland.

## **Service**

### ***Guest Editor for Refereed Journal***

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Guest editor of a special issue of *Journal of Neuroendocrinology* on “Models in Neuroendocrinology” published in December 2010.

### ***Editorial Board Memberships***

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1. Physiological Reports (2013-present).

### ***Guest Reviewer for Refereed Journals***

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1. PLoS One (2011–2015).
2. Bulletin of Mathematical Biology (2007–2014).
3. Journal of Neurophysiology (2002–2014).
4. F1000Research (2013).
5. Frontiers in Neuroscience (2013).
6. Biophysical Journal (2010–2013).
7. PLoS Computational Biology (2008–2013).
8. The Journal of Neuroscience (2012).
9. Journal of Neuroendocrinology (2010–2012).
10. Journal of Computational Neuroscience (2000–2012).
11. Journal of Physical Biology (2010–2011).
12. Progress in Biophysics and Molecular Biology (2010).
13. Clinical Neurophysiology (2009).
14. Mathematical Biosciences (2009).
15. Physiology and Behavior (2008–2009).
16. Journal of Theoretical Biology (2007–2009).
17. Biosystems (2008).
18. Biological Cybernetics (2007–2008).
19. Acta Biotheoretica (2007).
20. Mathematical Medicine and Biology (2007).
21. Neurocomputing (2007).

### ***Guest Reviewer for a Scientific Meeting***

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1. Computational Neuroscience Meeting (2012-2014)

### *Chair of a Symposium*

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1. Vo, T. & **Tabak, J.** (2013). *Computational Cellular Neuroendocrinology*. Symposium conducted at the meeting of Society for Industrial and Applied Mathematics, Conference on the Applications of Dynamical Systems, Snowbird, UT.
2. Clewley, R. & **Tabak, J.** (2012). *Model Analysis for Neural Dynamics*. Symposium conducted at the meeting of Society for Industrial and Applied Mathematics, Conference on the Life Sciences, San Diego, CA.
3. Bertram, R., Tsaneva-Atanasova, K. & **Tabak, J.** (2011). *Mathematical Neuroendocrinology*. Symposium conducted at the meeting of Society for Industrial and Applied Mathematics, Conference on the Applications of Dynamical Systems, Snowbird, UT.
4. **Tabak, J.** & Tsaneva-Atanasova, K. (2009). *Oscillations and Synchronization in Neuroendocrine Systems*. Symposium conducted at the meeting of Society for Industrial and Applied Mathematics, Conference on the Applications of Dynamical Systems, Snowbird, UT.

### *Reviewer for Grant Agencies*

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- 2013 Czech Science Foundation (one proposal).  
 2011 Agence National pour la Recherche (one proposal).  
 2000 National Science Foundation (one proposal).

## **Conference Presentations**

### *Refereed Presentations and Symposia*

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1. Vladimirski, B., **Tabak, J.**, O'Donovan, M.J., Rinzel, J. (2003). An Excitatory Neural Network Model of Spontaneous Activity in Developing Spinal Cord Using Synaptic Depression. Poster presentation at *Computational Neuroscience Meeting*, Alicante, Spain.
2. **Tabak, J.**, Vladimirski, B. and Rinzel, J. (2002). Reciprocal role of network connectivity and cellular excitability in excitatory networks. *Computational Neuroscience Meeting*, Chicago, IL.
3. **Tabak, J.**, Senn, W., O'Donovan, M.J. and Rinzel, J. (1998). Comparison of two models for pattern generation. Poster presentation at *Computational Neuroscience Meeting*, Santa Barbara, CA.

### Non-Refereed Presentations and Symposia

1. Bertram, R., Tomaiuolo, M., Gonzalez-Iglesias, A., & **Tabak, J.** (2014). Using Mathematical Models to Determine the Source of Heterogeneity in Cellular Calcium Dynamics. *SIAM Conference on the Life Sciences*, minisymposium on “Heterogeneity in Electrically Excitable Cells and Networks”, Charlotte, NC.
2. Fletcher, P.A., **Tabak, J.** & Bertram, R. (2014). Real-Time Model Calibration and Prediction Testing with the GPU and Dynamic Clamp. *SIAM Conference on the Life Sciences*, minisymposium on “Heterogeneity in Electrically Excitable Cells and Networks”, Charlotte, NC.
3. Sengul S., **Tabak, J.**, Duncan, P., Shipston, M. & Bertram, R. (2014). Bursting in the pituitary corticotroph: the role of BK ion channels. Poster presentation at *SIAM Conference on the Life Sciences*, Charlotte, NC.
4. Sengul, S., Clewley, R., Bertram, R. & **Tabak, J.** (2013). The Contributions of Divisive and Subtractive Feedback in the Hodgkin-Huxley Model. Poster presentation at *Annual meeting of the Society for Neuroscience*, San Diego, CA.
5. Fletcher, P., **Tabak, J.**, & Bertram, R. (2013). How do cells detect the frequency of pulsatile chemical signals? *SIAM conference on Applications of Dynamical Systems*, minisymposium on “Computational Cellular Neuroendocrinology”, Snowbird, UT.
6. Fletcher, P., **Tabak, J.**, & Bertram, R. (2012). Modeling bursting and responses to thyrotropin-releasing hormone and prolactin in the tuberoinfundibular dopaminergic neurons of the arcuate nucleus. Poster presentation at *Annual meeting of the Society for Neuroscience*, New Orleans, LA.
7. Velez, P., Helena, C. V., Stathopoulos, A. M., Fletcher, P., **Tabak, J.**, Trombley, P. & Bertram, R. (2012). Electrophysiological recordings from dopaminergic neurons in the arcuate nucleus of female rats. Poster presentation at *Annual meeting of the Society for Neuroscience*, New Orleans, LA.
8. **Tabak, J.**, Gonzalez-Iglesias, A. E., Cristancho-Gordo, R., & Bertram, R. (2012). Multiple actions of hypothalamic oxytocin on pituitary cells. Poster presentation at *Annual meeting of the Society for Neuroscience*, New Orleans, LA.
9. Gonzalez-Iglesias, A. E., Cristancho-Gordo, R., Bertram, R., & **Tabak, J.** (2011). Oxytocin stimulates calcium signaling and hormone release in rat lactotrophs, somatotrophs and gonadotrophs. Poster presentation at *World Congress on Neurohypophysial Hormones*, Northeastern University, Boston, MA.
10. Tomaiuolo, M., **Tabak, J.**, Leng, G., & Bertram, R. (2011). Model calibration and testing on the same cell. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
11. **Tabak, J.**, Tomaiuolo, M., Gonzalez-Iglesias, A.E., Freeman, M.E., Bertram, R. (2010). BK channels promote bursting in pituitary cells. Poster presentation at *International Congress of Neuroendocrinology*, Rouen, France.
12. Gonzalez-Iglesias, A.E., **Tabak, J.**, Freeman, M.E., Bertram, R. (2010). Stimulatory effects of oxytocin on growth hormone release and calcium signaling in rat anterior

- pituitary cells. Poster presentation at *International Congress of Neuroendocrinology*, Rouen, France.
13. **Tabak, J.**, Tomaiuolo, M., Milesco, L.S., Gonzalez-Iglesias, A.E., Freeman, M.E., Bertram, R. (2009). BK channels promote bursting in pituitary cells. Poster presentation at *Annual meeting of the Society for Neuroscience*, Chicago, IL.
  14. Tomaiuolo, M., **Tabak, J.**, Bertram, R. (2008). Distinguishing the types of neuronal bursting using voltage traces alone. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
  15. **Tabak, J.**, Mascagni, M., Bertram, R. (2007). Spontaneous Episodic Activity in Developing Networks: Why episode duration is correlated with length of the preceding, not following, inter-episode interval. Poster presentation at *Annual meeting of the Society for Neuroscience*, San Diego, CA.
  16. Toporikova, N., Gonzalez-Iglesias, A.E., **Tabak, J.** Bertram, R. Freeman, M.E. (2007). Calcium and prolactin response to oxytocin in pituitary lactotrophs during the estrous cycle. Poster presentation at *Annual meeting of the Society for Neuroscience*, San Diego, CA.
  17. **Tabak, J.** Toporikova, N., Gonzalez-Iglesias, A. E. Freeman, M.E., Bertram, R. (2007). The Role of Fast Potassium Currents in Shaping the Activity of Pituitary Cells. Poster presentation at *Southeast Neural Net Meeting*, Wakulla Springs, FL.
  18. Toporikova, N., **Tabak, J.**, Freeman, M.E., Bertram, R. (2006). Low Dose of Dopamine May Stimulate Prolactin Secretion by Increasing Fast Potassium Currents. Poster presentation at *Annual meeting of the Society for Neuroscience*, Atlanta, GA.
  19. **Tabak, J.** (2006). Analysis of the paradoxical (excitatory) effect of potassium currents on hormone secretion. *Joint SIAM-SMB Conference on the Life Sciences* sponsored by the Society for Industrial and Applied Mathematics (SIAM) and the Society for Mathematical Biology (SMB), University of North Carolina, Raleigh, NC.
  20. Toporikova, N., **Tabak, J.**, Freeman, M.E., Bertram, R. (2006). Bursting Without a Slow Variable in a Lactotroph Model. Poster presentation at *Joint SIAM-SMB Conference on the Life Sciences* sponsored by the Society for Industrial and Applied Mathematics (SIAM) and the Society for Mathematical Biology (SMB), Raleigh, NC, 2006.
  21. Toporikova, N., **Tabak, J.**, Freeman, M.E., Bertram, R. (2006). Bursting Without a Slow Variable in a Model of the Pituitary Lactotroph. Poster presentation at *Origin and Regulation of Bursting Activity in Neurons*, Workshop sponsored by Georgia State University, Atlanta, GA.
  22. **Tabak, J.**, Rinzel, J. (2005). Respective contributions of two negative feedback mechanisms in neuronal rhythms. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
  23. **Tabak, J.**, O'Donovan, M.J., Rinzel, J. (2004). Relaxation oscillator models for cell / network bursting with two types of negative feedback. Poster presentation at *Annual meeting of the Society for Neuroscience*, San Diego, CA.



24. Marchetti, C., **Tabak, J.**, O'Donovan, M.J., Rinzel, J. (2003). Model of spontaneous activity in the developing spinal cord using activity-dependent variations in intracellular chloride. Poster presentation at *Annual meeting of the Society for Neuroscience*, New Orleans, LA.
25. **Tabak, J.**, Vladimirski, B., O'Donovan, M.J., Rinzel, J. (2002). Reciprocal role of network connectivity and cellular excitability in models of burst generation. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
26. **Tabak, J.**, O'Donovan, M.J. (2001). Activity-dependent modulation of glutamatergic/cholinergic pathways in the developing spinal cord. Poster presentation at *Annual meeting of the Society for Neuroscience*, San Diego, CA.
27. Cohen U.E., Wenner, P. **Tabak, J.**, O'Donovan, M.J. (2001). Effects of chronic activity blockade on the development of network properties in the chick embryo spinal cord. Poster presentation at *Annual meeting of the Society for Neuroscience*, San Diego, CA.
28. **Tabak, J.**, Rinzel, J., O'Donovan, M.J. (2000). Plasticity linked to recovery of activity after glutamatergic blockade in developing spinal cord. Poster presentation at *Annual meeting of the Society for Neuroscience*, New Orleans, LA.
29. **Tabak, J.** (2000). Network plasticity caused by glutamatergic blockade linked to synaptic depression. *Annual Intramural Research Program Scientific Retreat, NIMH/NINDS, National Institutes of Health*.
30. O'Donovan, M.J., Wenner, P., Chub, N., **Tabak, J.**, Whelan, P.J., Rinzel, J. (2000). The genesis of spontaneous activity in the developing spinal cord of the chick embryo. *Journal of Physiology (London)*, 525:2S, Suppl.
31. Rinzel, J., O'Donovan, M.J., **Tabak, J.**, Senn, W. (2000). Network bursting oscillations in developing spinal cord. *Pacific Rim Dynamical Systems Conference*.
32. Tucker, L.B., **Tabak, J.**, O'Donovan, M.J. (2000). Spontaneous motility in the embryonic chick: relationship between durations of quiescent intervals and episodes of activity. Poster presentation at *International Society for Developmental Psychobiology*, New Orleans, LA.
33. O'Donovan, M.J., Chub, N., Wenner, P., **Tabak, J.**, Whelan, P.J. (1999). Mechanisms of spontaneous activity in developing spinal networks. *International Brain Research Organization World Congress*, Jerusalem, Israel.
34. Senn, W., **Tabak, J.**, Rinzel, J., Streit, J. (1999). Bursting network activity induced by different types of synaptic adaptation. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
35. **Tabak, J.**, O'Donovan, M.J. (1999). Activation of metabotropic receptors depresses evoked potentials in the developing spinal cord. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
36. Bonnot, A., **Tabak, J.**, Cohen, U., Wenner, P., O'Donovan, M.J. (1998). Calcium imaging of rhythmic activity in the mouse spinal cord. Poster presentation at *Annual meeting of the Society for Neuroscience*, Los Angeles, CA.
37. **Tabak, J.**, Bonnot, A., Wilson, C.G., O'Donovan, M.J. (1998). Developmental changes of the effects of gabaergic and glycinergic transmission in the spinal cord of mouse fetus and

- neonate. Poster presentation at *Annual meeting of the Society for Neuroscience*, Los Angeles, CA.
38. **Tabak, J.**, Murphey, C.R., Moore, L.E. (1996). Estimation methods in locomotor network activity. Poster presentation at *Annual meeting of the Society for Neuroscience*, Washington, DC.
  39. **Tabak, J.**, Murphey, C.R. and Moore, L.E. (1995). Modeling of a central pattern generator in *Xenopus* embryo. *Annual Houston Conference on Biomedical Engineering Research*, Rice University, Houston, TX.