

## Beatriz Herrera, MS

Doctoral Candidate and NIMH NRSA Predoctoral Fellow

Department of Biomedical Engineering

Florida International University

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### EDUCATION

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#### August 2018 – PH.D. IN BIOMEDICAL ENGINEERING

Expected June 2024 Department of Biomedical Engineering, Florida International University (FIU), Miami, FL, USA.  
**Dissertation:** *A Reverse Engineering Approach for Translating Neuronal Signaling into Meso- and Macroscopic Potentials: Applications to Performance Monitoring Circuit.*  
**Major Advisor:** Dr. Jorge J Riera Diaz. **Co-Advisor:** Dr. Jeffrey D. Schall.  
**GPA:** 3.93/4.00

#### MS. IN BIOMEDICAL ENGINEERING

Received: Summer 2023 – Master en route to the PhD.

#### September 2013 B.SC. IN PHYSICS

– July 2018 Faculty of Physics, University of Havana, Havana, Cuba.  
**Thesis:** *Braess's Paradox in Spiking Neuronal Networks.*  
**Advisors:** Dr. Roberto Mulet and Dr. Eduardo Martínez-Montes.  
**GPA:** 4.67/5.00

### FELLOWSHIPS & GRANTS

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August 2022 – P.I., F31 – National Institute of Mental Health NRSA Predoctoral Fellow, [F31MH129101](https://orcid.org/F31MH129101), *Cortical microcircuit of performance monitoring: bridging multiscale neuronal activity and electrophysiological signatures in nonhuman primates.*  
August 2024

### SELECTED AWARDS AND HONORS

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2023 SfN Trainee Professional Development Award

2023 2023 Allen Institute Modeling Software Workshop Travel Grant

2023 1<sup>st</sup> Place Poster Presentation Award, 12<sup>th</sup> Annual BME Graduate Research Day, FIU.

2023 Cosyne New Attendees Travel Grant

2021 SfN Trainee Professional Development Award

2021 UGS Provost Award for Outstanding Paper or Manuscript (STEM), FIU

2021 1<sup>st</sup> Place Poster Presentation Award. 10<sup>th</sup> Annual BME Graduate Research Day, FIU.

2020 1<sup>st</sup> Place Outstanding Poster Presentation. 4<sup>th</sup> Annual Engineering Research Symposium, Institute for Neural Engineering, University of Miami, Miami, Florida.

### PUBLICATIONS

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\*Denotes Equal Contribution

### PEER-REVIEWED JOURNAL ARTICLES

Herrera, B., Sajad, A., Woodman, G.F., Schall, J.D., Riera, J.J., 2020. A Minimal Biophysical Model of Neocortical Pyramidal Cells: Implications for Frontal Cortex Microcircuitry and Field Potential Generation. *J. Neurosci.* 40, 8513–8529. <https://doi.org/10.1523/JNEUROSCI.0221-20.2020>.

**Beatriz Herrera\***, Jacob A. Westerberg\*, Michelle S. Schall, Alexander Maier, Geoffrey F. Woodman, Jeffrey D. Schall, Jorge J. Riera (2022) Resolving the mesoscopic missing link: Biophysical modeling of EEG from cortical columns in primates. *Neuroimage*. 263, 119593. <https://doi.org/10.1016/j.neuroimage.2022.119593>.

**Beatriz Herrera**, Amirsaman Sajad, Steven P Errington, Jeffrey D Schall, Jorge J Riera, Cortical origin of theta error signals, *Cerebral Cortex*, 2023; bhad367, <https://doi.org/10.1093/cercor/bhad367>

## **CONFERENCE PROCEEDINGS**

Venkatakrishnan, S.B., **Herrera, B.**, Riera, J.J., Narasimhan, G., & Volakis, J.L. (2022). RF-Analog Hybrid Circuitry Emulating Pyramidal Cell Neuronal Behavior. *2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI)*, 1078-1079.

## **RESEARCH EXPERIENCE**

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August 2018 – **Graduate Researcher**

Present

Neuronal Mass Dynamics (NMD) Laboratory, Department of Biomedical Engineering, FIU, Miami, FL & Schall Laboratory, Department of Biology, York University, Canada.

**Major Advisor:** Dr. Jorge Riera Diaz, Department of Biomedical Engineering, FIU, Miami, FL, USA.

**Co-Advisor:** Dr. Jeffrey D. Schall, Professor, Department of Biology, York University, Canada.

### **Development of a minimal biophysical model of neocortical pyramidal cells**

- Proposed and validated a simplified biophysical model of L5 neocortical pyramidal neurons.
- Developed an extended point-source method to calculate local field potentials from 2-compartment neuron models.
- Reproduced current source density patterns evoked by Ca<sup>2+</sup> spikes and described the resulting EEG on macaque monkeys.
- Built a volume conductor model of the monkey's head from the subject's structural MRI.
- Reproduced changes in current source density when I<sub>h</sub> is blocked.
- Published in the Journal of Neuroscience (<https://doi.org/10.1523/JNEUROSCI.0221-20.2020>).

### **Cortical microcircuitry of agranular frontal cortex involved in performance monitoring.**

- Curated and analyzed local field potentials and neuronal spiking activity measured in SEF from macaque monkeys performing a saccade countermanding stop-signal task.
- Conducted spectral and time-frequency analyses to study laminar phase-amplitude coupling patterns.
- Performed laminar current source density analysis of local field potentials to understand the circuit origin of the error-related negativity (ERN).
- Devise a machine learning model for identifying interneuron types (P.V. – parvalbumin, C.B. – calbindin, and C.R. – calretinin interneurons) based on spike statistics of extracellular action potentials of putative interneurons recorded across layers of SEF.
- Build and simulate the cortical microcircuit for performance monitoring.

### **Cell-specific mechanisms of theta oscillations during error monitoring.**

- Created a MATLAB processing pipeline employing the FieldTrip toolbox to quantify the degree of spike-field phase synchronization.
- Reproduced the error-related spiking activity of putative L3 and L5 pyramidal neurons in SEF during error monitoring employing biologically realistic models of these neurons.
- Demonstrated error pyramidal neurons in SEF have a negligible contribution to the SEF laminar current sources but drive SEF theta oscillations.
- Demonstrated L5, but not L3 pyramidal neurons act as pacemakers of neocortical theta oscillations.
- Published in *Cerebral Cortex* (<https://doi.org/10.1093/cercor/bhad367>).

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### **Assessing the validity of the EEG dipolar approximation in rats, monkeys, and humans.**

- Created theoretical tools to compute the EEG evoked by the activity of cortical columns in the brain of each species utilizing a detailed approximation and the dipolar model.
- Implemented biophysical simulations in MATLAB employing these tools to simulate the EEG evoked by the activity of a collection of L5 pyramidal neurons and quantify the error made by the dipolar approximation.

### **Biophysical modeling of EEG from cortical columns in primates: Applications to the N2pc.**

- Established a biophysical forward modeling approach for calculating the mesoscopic cortical columnar current dipoles from laminar *in vivo* field potential recordings to determine the contribution of distinct areas to EEG ERPs.
- Built a volume conductor model of the monkey's head from the NIMH Macaque Template v2.0.
- Validated the model on synthetic data generated from detailed biophysical simulations.
- Applied model to *in vivo* laminar recordings from macaque monkeys to elucidate the source of a representative cognitive ERP component indexing visual attention, known as the N2pc.
- Built a volume conductor model of the monkey's head from the subject's structural MRI.

### **Neural basis of the error-related negativity (ERN)**

- Predicted ERN intracranial current sources in SEF from *in-vivo* laminar field recordings in two macaque monkeys performing a saccade countermanding stop-signal task.
- Calculated the contribution of SEF to the ERN generation through EEG forward modeling.
- Published in Cerebral Cortex (<https://doi.org/10.1093/cercor/bhad367>).
- Construct an ERN inverse source model that incorporates SEF predicted contribution to assess the contribution of the anterior cingulate cortex (ACC).

### **Electroencephalography (EEG) recordings**

- Completed behavioral data (eye tracking) and EEG recordings from humans performing different visual tasks (visual grading task, saccade countermanding stop-signal task).
- Designed a saccade countermanding stop-signal task using Psychtoolbox on MATLAB.
- Processed EEG and EEG/fMRI data in BrainVision Analyzer.
- Wrote an IRB protocol for studying sleep stages on normal subjects using EEG recordings (recorded four human subjects; more recordings are ongoing).

September 2015  
– July 2018

### **Undergraduate Researcher**

Department of Theoretical Physics, Faculty of Physics, University of Havana, Cuba

**Project:** "Statistical Physics' tools for inference of brain connectivity and activity from neuroimages data."

**Advisors:** Dr. Roberto Mulet and Dr. Eduardo Martinez

### **Braess's Paradox in a Network of Spiking Neurons**

- Implemented two one-compartment neuron models in Brian2 described by the Morris-Lecar and Hodgkin-Huxley models.
- Constructed and simulated spiking neural networks in Brian 2 to study the presence of an analogous of Braess's Paradox.
- Conducted statistical analysis in Python.

### **Studying the Hodgkin-Huxley model**

- Simulated a Hodgkin-Huxley neuron in C and examined its response to different current stimulations.

## TEACHING EXPERIENCE

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- Fall 2022      **Graduate Teaching Assistant**  
Department of Biomedical Engineering, FIU, Miami, FL, USA.  
**Course:** BME 4422: The Biophysics of Neural Computation – Theory  
**Instructor:** Dr. Jorge Riera Diaz
- Computational modeling lectures in MATLAB and NEURON, practical exercises lectures, office hours, grading, and projects instructor.
- Spring 2022 & Spring 2023      **Graduate Teaching Assistant**  
Department of Biomedical Engineering, FIU, Miami, FL, USA.  
**Course:** BME 4531/5505C: Medical Imaging (undergraduate and graduate course)  
**Instructor:** Dr. Jorge Riera Diaz
- Office hours, assignment design, and grading for electroencephalography & magnetoencephalography lectures.
- Fall 2021      **Graduate Teaching Assistant**  
Department of Biomedical Engineering, FIU, Miami, FL, USA.  
**Course:** BME 4050L: Biomedical Engineering Laboratory I.  
**Instructor:** Drs. Michael C. Christie and Shuliang Jiao.
- Laboratory lectures, office hours, and grading.
- Fall 2019      **Graduate Teaching Assistant**  
Department of Biomedical Engineering, FIU, Miami, FL, USA.  
**Course:** BME 4422/IDH 3034 (U38): The Biophysics of Neural Computation – Theory  
**Instructor:** Dr. Jorge Riera Diaz
- Computational modeling lectures in MATLAB and NEURON, practical exercises lectures, office hours, grading, and projects instructor.
- Spring – Summer 2016      **Undergraduate Teaching Assistant**  
Department of Theoretical Physics, Faculty of Physics, University of Havana, Cuba  
**Course:** Probabilities and Statistics.
- Designed and digitalized lectures.
- Lab Instructor, **Department of Applied Physics, University of Havana, Cuba.**
- Fall 2016      **Courses:** Electrodynamics Laboratory.
- Designed experiments, report structure, and questions for the Electrodynamics Laboratory of second-year Biology students.
- Lab Instructor**, Department of General Physics, University of Havana, Cuba.
- Spring – Summer 2015 & 2016      **Course:** Molecular Physics and Thermodynamics Laboratory.
- Laboratory lectures, assisting students during experiments, grading reports, and students' presentations.
- Fall 2014 & Fall 2015      **Course:** Classical Mechanics Laboratory.
- Laboratory lectures, assisting students during experiments, grading reports, and students' presentations.

## INVITED LECTURER

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- May 28, 2020      Introduction to NEURON and LFPy simulation environments.  
Florida International University, Miami, FL, USA
- Spring 2019 & 2020      Neuroimaging Software Tutorial Lectures – CSDplotter, Wave\_Clus, Brainstorm and SPM.  
Courses: BME 4422, BME 6126, IDH 3034, IDH 3035.

## MENTORING EXPERIENCE

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- Fall 2023 – present      Abdul Raafay Khan, Biomedical Engineering undergraduate at FIU.  
*Responsibilities:* train and assist student in recording and analyzing EEG data from normal subjects while asleep.
- Spring 2023 – Present      Sterline St Cyr, Biomedical Engineering undergraduate at FIU, and Ronald E. McNair Fellow.  
*Responsibilities:* Train and assist the student on a research project focused on identifying interneuron types based on the extracellular action potentials of single units recorded across layers of supplementary eye field of macaque monkeys performing a saccade countermanding stop-signal task.
- Fall 2021 – Spring 2023      Daniel Colome, a postbaccalaureate student at NMD lab.  
Currently a med student at ...  
*Responsibilities:* created an experimental protocol (IRB) for studying sleep stages on normal subjects using EEG recordings and supervised and assisted the student with the EEG recordings and data analysis.
- Fall 2021      Daniel Parrado Triana, Biomedical Engineering undergraduate at FIU.  
*Responsibilities:* trained the student to perform and analyze EEG recordings of humans during resting state and while performing cognitive-related tasks.
- Spring 2021 – Present      Julio Oliva, Biomedical Engineering Ph.D. student at FIU.  
*Responsibilities:* guide and assist Julio in his Ph.D. research exploring minimal artificial neural network architectures, learning rules, and classification tasks for modeling L5 tufted neocortical pyramidal neurons.
- October 2018 – October 2019      Romina Doubnia, Biomedical Engineering undergraduate student at FIU and Ronald E. McNair Fellow.  
Currently, Operational Excellence Process Improvement Lead at GSK.  
*Responsibilities:* Supervised and assisted the student's work on studying laminar phase-amplitude coupling patterns observed in the supplementary eye field of macaque monkeys performing a saccade countermanding stop-signal task. Romina presented her results at the 2019 Society for Neuroscience Annual Meeting in Chicago.

## SELECTED TALKS

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- Herrera, B.** (September 2023) "*Cortical Origin of Theta Error Signals*," Mini-Symposium between Dr. Jorge J. Riera's and Dr. Ying Zheng's laboratories, Virtual Meeting.
- Herrera, B.** (June 2022) "*Cell-specific mechanisms of theta oscillations during error monitoring in medial frontal cortex: Empirical findings and biophysical modeling*," Martinez-Trujillo Lab Retreat, University of Western Ontario, London, Ontario, Canada.

## PEER-REVIEWED CONFERENCE ABSTRACTS

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- B. Herrera, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera.** "Error neurons in supplementary eye field drive low-frequency cortical rhythmicity with a negligible contribution to current sources." *Biomedical Engineering Society Annual Meeting*, Seattle, Washington. October 11-14, 2023.
- B. Herrera, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera.** "Error neurons in SEF drive low-frequency cortical rhythmicity with a negligible contribution to current sources." *2023 LatinXinBME Symposium*, University of Washington Medicine, Seattle, Washington. Oct. 11, 2023.
- B. Herrera, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera.** "Error neurons in SEF drive low-frequency cortical rhythmicity with a negligible contribution to current sources." *Florida Consortium on Neurobiology of Cognition Annual Meeting*, UF Scripps, Jupiter, Florida. May 11-12, 2023.

- J. Oliva, **B. Herrera**, J. Riera Diaz. "Use NEURON-based BMTK model of L5 tufted pyramidal cell to explore minimal DNN architecture." *FIU TBBS Symposium Summer 2023*, Florida International University, Miami, Florida.
- B. Herrera**, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera. "Error neurons in SEF drive low-frequency cortical rhythmicity with a negligible contribution to current sources." *12<sup>th</sup> Annual BME Graduate Research Day*, Department of Biomedical Engineering, Florida International University, Miami, Florida. Mar. 3, 2023. (1<sup>st</sup> Place Poster Presentation Award)
- J. Oliva, **B. Herrera**, J. Riera Diaz. "Use Brain Modeling Toolkit and NEURON model of L5 tufted pyramidal cell to explore minimal ANN architecture, learning rules, and classification tasks for a Modeled Cortical Pyramidal Cell." *12<sup>th</sup> Annual BME Graduate Research Day*, Department of Biomedical Engineering, Florida International University, Miami, Florida. Mar. 3, 2023.
- B. Herrera**, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera. "Cell-specific mechanisms of medial frontal theta during error monitoring." *Computational and Systems Neuroscience (COSYNE) 2023 Conference*, Montreal, Quebec, Canada. March 9–12, 2023.
- J. Oliva, **B. Herrera**, J. Riera Diaz. "Exploring minimal ANN architecture, learning rules and classification tasks of L5 tufted pyramidal cell: A computational approach with NEURON 7.4". *MARC U\*STAR, TBBS and UtGP Student Research Symposium*, Florida International University, Miami, Florida. Dec. 2, 2022.
- B. Herrera**, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera. "Cell-specific mechanisms of theta oscillations during error monitoring in medial frontal cortex: Empirical findings and biophysical modeling." *Society for Neuroscience 51<sup>st</sup> Annual Meeting*, San Diego, California. November 12-16, 2022.
- J. A. Westerberg, **B. Herrera**, M. S. Schall, J. J. Riera, A. Maier, G. F. Woodman, and J. D. Schall. "The neural basis for an EEG index of attention." *Human Single Neuron Meeting*, University of California, Los Angeles. November 10-11, 2022.
- B. Herrera**, J. D. Schall, J. J. Riera. "Cell-specific mechanisms of neocortical slow oscillations: a computational modeling study." *Biomedical Engineering Society Annual Meeting*, San Antonio, Texas. October 12-15, 2022.
- J. Oliva, **B. Herrera**, J. Schall, J. Riera Diaz. "An ANN approach to emulate eye performance monitoring in macaque monkeys." *Annual TBBS and BSI Research Symposium*, Florida International University, Miami, Florida. June 2022.
- B. Herrera**, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera. "Theta spike-field synchronization for error monitoring in medial frontal cortex: empirical findings and biophysical modeling." *11<sup>th</sup> Annual BME Graduate Research Day*, Department of Biomedical Engineering, Florida International University, Miami, Florida. Mar. 9, 2022.
- B. Herrera**, A. Sajad, S. P. Errington, J. D. Schall, J. J. Riera. "Low frequency spike-field coupling for error monitoring in medial frontal cortex: Empirical findings and biophysical modeling." *Society for Neuroscience 50<sup>th</sup> Annual Meeting*, Virtual Experience. November 8-10, 2021.
- Beatriz Herrera**, Amirsaman Sajad, Geoffrey F. Woodman, Jeffrey D. Schall, Jorge J. Riera. "A Minimal Biophysical Model of L5 Pyramidal Cells: Implications for Frontal Cortex Microcircuitry and Field Potential Generation". *Graduate Student Appreciation Week 2021 – Scholarly Forum*, Florida International University, Miami. Apr. 7, 2021.
- Beatriz Herrera**, Jeffrey D. Schall, Jorge J. Riera. "Assessing the validity of the EEG dipolar approximation in rats, monkeys, and humans: a computational modeling study." *10<sup>th</sup> Annual BME Graduate Research Day*, Department of Biomedical Engineering, Florida International University, Miami, Florida. Mar. 12, 2021. (1<sup>st</sup> Place Poster Presentation Award)
- Beatriz Herrera**, Amirsaman Sajad, Geoffrey F. Woodman, Jeffrey D. Schall, Jorge J. Riera. "A Minimal Biophysical Model of Neocortical Pyramidal Cells: Implications for Frontal Cortex Microcircuitry and Field Potential Generation." *4<sup>TH</sup> Annual Neural Engineering Research Symposium*, Institute for Neural Engineering, University of Miami, Miami, Florida. October 26-27, 2020. (1st Place Outstanding Poster Presentation Award)
- Jorge Riera, **Beatriz Herrera**, Jeffrey D Schall, Jorge Bosch. "EEG signatures of Ca<sup>2+</sup> resonance in cortical pyramidal neurons: from monkeys to the BigBrain". *4<sup>th</sup> BigBrain Workshop: Launch of the Helmholtz International BigBrain Analytics and Learning Laboratory (HIBALL) - OHBM satellite event*. Jun. 26, 2020.

**Beatriz Herrera**, Amirsaman Sajad, Geoffrey F. Woodman, Jeffrey D. Schall, Jorge J. Riera. "A Minimal Biophysical Model of Neocortical Pyramidal Cells: Implications for Frontal Cortex Microcircuitry and Field Potential Generation." *9<sup>th</sup> Annual Graduate Research Day*, Department of Biomedical Engineering, Florida International University, Miami, Florida, United States. Mar. 6, 2020.

**B. Herrera**, A. Sajad, G. F. Woodman, J. D. Schall, J. J. Riera. "Microcircuitry of agranular frontal cortex: A stochastic 2-compartment model of neocortical pyramidal cells". *Society for Neuroscience 49<sup>th</sup> Annual Meeting*, Chicago, Illinois, United States. October 19-23, 2019.

R. Doubnia\*, A. Sajad\*, **B. Herrera\***, J. Schall, J. Riera, G. Woodman. "Microcircuitry of agranular frontal cortex: Laminar phase-amplitude coupling for cognitive control." *Society for Neuroscience 49<sup>th</sup> Annual Meeting*, Chicago, Illinois, United States. October 19-23, 2019. \***Equal contribution authors**.

**Herrera B.**, Moshkforoush A., and Riera J. "A stochastic 2-compartment model of neocortical pyramidal cells". *3<sup>rd</sup> Annual Neural Engineering Research Symposium 2019*, Institute for Neural Engineering, University of Miami, Miami, Florida. April 4-5, 2019.

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## SERVICE & OUTREACH

Jan. 2021 – present    **Organizer** – NMD lab meetings.

Sept. 18, 2023        **Organizer** – Mini Symposium between Dr. Jorge J. Riera's and Dr. Ying Zheng's lab.

Mar. 22, 2022        **Judge** – 2022 Undergraduate Research Conference at Florida International University

Sept. 24, 2021       **Judge** – BME 2021 Undergraduate Research Day

Sept. 24, 2021       **Tour Guide** – BME open house tour for first-year and sophomore students at the BME 2021 Undergraduate Research Day, FIU.

Mar. 25, 2021        **Judge** – 2021 Undergraduate Research Conference at Florida International University.

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## TRAINING

July 13-14, 2023    **Allen Institute 2023 Modeling Software Workshop**

In-person, Allen Institute, Seattle, WA, United States.

*Description:* Interactive seminars and hands-on computational work focused on building and simulating complex and heterogeneous network models employing the Allen Institute computational tools: BMTK, SONATA file format, and VND.

Mar. 9, 2023        **Cosyne 2023 Tutorial Session: Methods in Reinforcement Learning for Neuroscience**

In-person, COSYNE 2023 Conference, Montreal, Canada.

Mar. 9, 2023        **Learn to Use the Dandi Archive for Neurophysiology Data and the Neurodata Without Borders Data Standard Tutorial**

In-person, COSYNE 2023 Conference, Montreal, Canada.

Oct. 18, 2022 – Jan. 15, 2022            **Course: Machine learning in Python with scikit-learn.**

Inria Online Course.

Oct. 19<sup>th</sup>, 2022       **UCL Neuropixels Course 2022**

Online seminar.

*Description:* "A day of practical talks outlining a soup-to-nuts Neuropixels experiment."

Sept. 13<sup>th</sup>, 2022    **BCI & Neurotech Masterclass Florida 1.0**

Online.

*Description:* latest achievements and applications in Brain-Computer Interfaces from Florida researchers.

- Sep. 29-30 & Oct. 1, 2021 **Workshop: "Towards multipurpose neural network models II: Model testing and model fitting".**  
Online.
- Feb. 3-4, 2021 **HIBALL 2021 Winter School**  
Virtual Meeting on Zoom.  
*Description:* The courses offered introductions and practical firsthand sessions regarding BigBrain, related datasets, and tools: IT-Infrastructure, image analysis, visualization, and annotation.
- Jul. 22, 2020 **Workshop 9 – OCNS Annual Meeting: Machine learning and mechanistic modeling for understanding the brain in health and disease.**  
Online  
*Description:* The workshop aimed to highlight research that bridges the disciplines of machine learning and multiscale modeling in computational neuroscience. Speakers addressed open questions and discussed potential challenges and limitations in three topical areas: differential equations, data-driven approaches, and theory-driven approaches.
- July 21-22, 2020 **Workshop 4 – OCNS Annual Meeting: Tools and resources for developing and sharing models in Computational Neuroscience.**  
Online.  
*Description:* The workshop focused on recent advances in software tools for modeling neurons and neuronal networks at distinct levels of resolution.

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## PROFESSIONAL SKILLS

<b>Research</b>	Multiscale Biophysical Modeling – neurons, circuits, LFP, M/EEG   Data Processing and Analysis – Filter Design, Artifact Removal, Dimensionality Reduction (PCA, ICA), Epoching and Averaging, Spike Sorting, Spectral Analysis   Machine Learning (scikit-learn, MATLAB)   Source Modeling of electrophysiology recordings (EEG, magnetoencephalography – MEG, electrocorticography – ECoG, local field potential – LFP)   Image analysis – MRI registration and segmentation   Electrophysiology Recordings (electrocardiography - ECG, electroencephalography - EEG)   Design of visual cognitive tasks in Psychtoolbox.
<b>Biosignal Processing and Neuroimaging Software</b>	Brainstorm, FieldTrip, WaveClus, EEGLab, FreeSurfer, SPM, ANTS, AFNI, BrainVision Analyzer, BrainVision Recorder, Psychtoolbox.
<b>Statistical Software</b>	MATLAB, R, Wolfram Mathematica, Qtiplot, OriginPro 8.0.
<b>Software</b>	Latex, Microsoft Office (Word, Excel, and PowerPoint), VND.
<b>Simulation Environments</b>	Brian2, NEURON, LFPy, BMTK.
<b>Programming Languages</b>	Python, C, C++, UNIX / Linux shell scripting.
<b>Parallel Computing</b>	High-performance computing (SLURM), MPI
<b>Operative System</b>	Windows, Linux, Mac.
<b>Teaching</b>	5+ years of experience as a Teaching Assistant and Lab Instructor.
<b>Other</b>	Jupyter Notebooks   Git   GitHub   IRB Protocol Development/Writing   Project Management   Leadership

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## PERSONAL SKILLS

<b>Writing Skills</b>	3+ Peer-reviewed Journal Articles and Abstracts, Preprints, and Manuscripts in Progress
<b>Presentation Skills</b>	16+ Scientific Presentations, Conference Abstracts and Invited Lectures



**Personal Skills**

Professionalism | Autodidact | Honesty | Strong Work Ethic | Transparency | Confidence | Creative | Enthusiasm | Open-mindedness | Determination | Critical Thinking | Self-motivation | Creative Problem Solving | Re-prioritization

**PROFESSIONAL AFFILIATIONS**

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Society for Neuroscience – Graduate Student Membership

May 2019 – Present

Biomedical Engineering Society – Student Membership

August 2022 – Present

**LANGUAGES**

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**Spanish:** Native

**English:** Proficient