## EDUCATION

### OREGON HEALTH & SCIENCE UNIVERSITY (OHSU)

PH.D IN NEUROSCIENCE
2016 - 2022

### UNIVERSIDAD NACIONAL DE COLOMBIA (UNAL)

BS IN BIOLOGY
2010 - 2015

## SKILLS

### PROGRAMMING

Experienced:
• Python (NumPy, Pandas, SciPy, Plotly) • git

Familiar:
• Python (SQLAlchemy, FastAPI) • ML frameworks (TensorFlow, PyTorch) • SQL (MySQL, Postgres) • Linux • LaTeX

### LABORATORY

- *In-vivo* multi-electrode array electrophysiology
- *in-vitro* patch-clamp
- sterile surgery
- histology and immunolabeling
- cloning and basic molecular biology

### CONCEPTUAL

- Biological neuronal networks
- Deep artificial neural networks
- Supervised and unsupervised learning
- High dimensional latent spaces and neuronal representations
- Statistics and Montecarlo simulations
- Time series forecasting

### SOFT

- Scientific writing
- Scientific illustration (Inkscape)
- Public speaking and science communication
- Teaching and mentoring
- 3D Modeling and printing (FreeCad)

## LINKS


mateo.lopez.espejo@gmail.com
Github
Google Scholar
Personal Page


# Dr. **Mateo López Espejo**

Neuroscientist, Data scientist, Swordsman

## PROFILE

Scientist with emphasis in sensory systems, and computational neuroscience focused on building explainable models to predict and explain neuronal activity from sensory stimuli.

## EXPERIENCE

### OHSU LABORATORY OF BRAIN, HEARING AND BEHAVIOR

GRADUATE RESEARCHER
Oct. 2017 – Dec. 2022 | Portland, OR
Work explaining how past sound information changes the response to ongoing sound in population of auditory cortex neurons. Related publications listed below.

- Develop sound stimulation paradigm optimizing sound combinations for a limited recording time. Done as an instance of an exact cover problem and solved with the Knuth's Algorithm X.
- Acquire *in vivo*, awake, neuronal population responses of ferrets to auditory stimuli, using silicon microelectrode arrays.
- Identify neuronal sub types using viraly transfected optogenetic tools for optotagging, and spike wave shape analysis.
- Quantify difference between inherently noisy neuronal responses with high sensitivity and low false positive rate using a combination of parametric statistics and Montecarlo methods.
- Quantify the effects of different brain region, sound relationships, and cell types on the measured auditory responses using multivariate linear regression.
- Implement interpretable linear Non-linear models to predict neuronal auditory responses as a function of sound and prior neuronal activity.
- Quantify sound information present in the neuronal population activity using decoder models based on support vector machines.

### UNAL NASI & GOMEZ LABORATORY

UNDERGRADUATE RESEARCHER
2013 – June 2016 | Bogota, Colombia

- develop snail single neuron dissociation protocol for patch clamp
- Identify protein complex implicated in light transduction in squid retina using co-immunoprecipitation
- Amplify and clone genes associates with the identified proteins

## PUBLICATIONS


- **Lopez Espejo, M**, & David, S. V. (2023). A sparse code for natural sound context in auditory cortex. Current Research in Neurobiology. `https://doi.org/10.1016/j.crneur.2023.100118`.
- **Lopez Espejo, M**, Schwartz Z. P., & David, S. V. (2019). Spectral tuning of adaptation supports coding of sensory context in auditory cortex. PLoS Comput Biol 15(10): e1007430. `https://doi.org/10.1371/journal.pcbi.1007430`.


## REFERENCES

### DR. STEPHEN V. DAVID

PH.D ADVISOR
davids@ohsu.edu

### DR. ENRICO NASI LIGNAROLO

BS ADVISOR
enasil@unal.edu.co

## SELECTED ABSTRACTS

- **López Espejo M.**, Amaya Marquez, M. Bee manipulation of flowers constraints foraging preference. Janelia Research Campus, VA: Bridging Diverse Perspectives on the Mechanistic Basis of Foraging, 2024.
- **López Espejo M.**, David, S. V. Sparse representation of sensory context by single neurons in auditory cortex. San Diego, CA: Society for Neuroscience (SFN), 2022.
- **López Espejo M.**, David, S. V. Differential temporal modulation tuning in auditory responses between inhibitory and excitatory neurons in ferret auditory cortex. Chicago, Il: Society for Neuroscience (SFN), 2021.
- Heller C. R., Saderi D, **López Espejo M.**, David, S. V. Task engagement selectively enhances population discrimination of behavior-relevant categories in primary auditory cortex. Denver, CO: Computational and Systems Neuroscience (COSYNE), 2020
- **López Espejo M.**, David, S. V. Long lasting contextual discrimination in non primary auditory cortex. Chicago Il: Advances and Perspectives in Auditory Neuroscience (APAN), 2019.
- Prieto J.D., **López Espejo M.**, Gómez M., & Nasi E. A phototransduction complex in the retina of squid: generality of the transducisome for light signaling. Buenos Aires, Argentina: Congreso latinoamericano de neurociencias, 2017.

## HONORS/AWARDS

2016 Promising scholar award CDI, OHSU.
2010 Best admission exams for Biology, B.S, UNAL.

## TEACHING EXPERIENCE

2017 Systems Neuroscience, TA, OHSU.
2015 Microbiology, TA, UNAL.
2014 Animal physiology, TA, UNAL.