

# Julien Corbo

Research Associate

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## Research Experience

**Research Associate** — Rutgers University - Center for Molecular and Behavioral Neuroscience - Polack Lab  
*Neuronal correlates of perceptual decisions* 2023–present

Using calcium imaging, electrophysiology and whole-brain protein mapping in mice to characterize computations underlying perceptual decisions.

**Postdoctoral Associate** — Rutgers University - Center for Molecular and Behavioral Neuroscience - Polack Lab  
*Contextual modulation of early sensory processing in the primary visual cortex* 2019–2022

Using calcium imaging in behaving mice to study how behavioral, multisensory, and temporal contexts shape visual stimulus representation.

**PhD Thesis Research** — Aix-Marseille University — Laboratoire de Neurosciences Intégratives et Adaptatives (UMR 7260) - with Yoh'i Zennou-Azogui, Nicolas Catz 2014–2018

*Time-dependent coding of space in the primary somatosensory cortex*

Cortical representation of simultaneous and delayed two-point stimuli with multi-electrode arrays (single units, LFP) and voltage-sensitive dye imaging in rats.

**Master's Degree 2nd-year Internship** — Aix-Marseille University — Laboratoire de Neurosciences Intégratives et Adaptatives (UMR 7260) - with Nicolas Catz 2014

*Time-dependent coding of space in the primary somatosensory cortex*

Using extracellular electrophysiology to study the cortical representation of tactile multi-stimuli patterns

**Master's Degree 1st-year Internship** — Aix-Marseille University — Laboratoire de Neurosciences Cognitives (UMR 7291) - with Vincent Hok 2013

*Functional role of frequency recoding in hippocampal place cells*

Tetrode implantations and CA1 recordings in rats exploring different environments to study frequency recoding in place cells.

## Education

- **PhD in Neuroscience**, Aix–Marseille University, 2018. *Thesis: From tactile illusions to spatiotemporal integration in the primary somatosensory cortex: impact of the timing of cutaneous stimuli on their cortical representation.*
- **Doctoral Program Coursework (ICN PhD Program, 100h)**, Aix–Marseille University, 2014–2017. Courses: Neuroanatomy, Statistics, Computational Neuroscience, tutored seminars.
- **Master's Degree in Neuroscience**, Aix–Marseille University, 2014. *High honor (rank 1/47).*
- **Bachelor's Degree in Neuroscience**, Aix–Marseille University, 2012. *Highest honor (rank 1/25).*
- **High School Diploma in Science**, Lycée Frédéric Joliot-Curie, 2009. *Highest honor.*

## Teaching Experience

**Instructor, BNS PhD Program** — Rutgers University 2021–present

Course: Neuroscience Foundations.

Somatosensory system, pain and touch (1st-year PhD students; 4h).

**Temporary Research and Teaching Associate** — Aix–Marseille University 2017–2018  
*Full-time teaching ( 288h/year).*

Neural functions modeling with Python (3rd-year Bachelor); Scientific programming with Python (2nd-year Bachelor); Applied Statistics with R (2nd-year Bachelor).

**Tutor** — Aix–Marseille University 2014–2017  
*Part-time teaching ( 64h/year).*

Neural functions modeling with Python (3rd-year Bachelor); Basic Genetics (1st-year Bachelor).

## Technical Skills

**Experimental methods:** rodent surgery; in vivo electrophysiology (multi-electrode arrays); voltage-sensitive dye imaging; two-photon calcium imaging; whole-brain clearing and protein mapping (iDISCO).

**Data analysis & modeling:** population coding; dimensionality reduction and manifold analysis; representational geometry; statistical modeling; machine learning for neural decoding.

**Programming:** MATLAB; Python; R.  
**Languages:** French (native); English (fluent).

## Honors and Awards

- 2023 — CMBN Mini Symposium, Best Poster Award (Conference award).
- 2022 — FENS Travel Award (Conference award).
- 2019–2021 — Fyssen Foundation Postdoctoral Fellowship (2-year postdoc funding).
- 2014–2017 — Bourse du Ministère de l’Enseignement supérieur, de la Recherche et de la Technologie (3-year PhD funding).

## Academic Service

### Reviewer

Reviewed manuscripts for *Frontiers*, *eNeuro*, and *PLOS ONE*.

### Organisation

- 2015 — Organizing Committee Member, *PhD Days (ICN PhD Program)* — public and scientific conferences.
- 2010–2012 — Vice-President, local neuroscience students’ association — organized yearly conferences, debates, exhibitions.

## Publications

### Peer-reviewed Articles

- CORBO J.**, ERKAT OB., MCCLURE J., KHDOUR H., and POLACK PO. (2025). “Discretized representations in V1 predict suboptimal orientation discrimination”. In: *Nature communications* 16.1, p. 41.
- MCCLURE J., ERKAT OB., **CORBO J.**, and POLACK PO. (2022). “Estimating How Sounds Modulate Orientation Representation in the Primary Visual Cortex Using Shallow Neural Networks”. In: *Frontiers in Systems Neuroscience* 16.
- CORBO J.**, MCCLURE J., ERKAT OB., and POLACK PO. (2022a). “Dynamic distortion of orientation representation after learning in the mouse primary visual cortex”. In: *Journal of Neuroscience* 42.21, pp. 4311–4325.
- CARON-GUYON J., **CORBO J.**, ZENNOU-AZOGUI Y., XERRI C., KAVOUNOUDIAS A., and CATZ N. (2020). “Neuronal Encoding of Multisensory Motion Features in the Rat Associative Parietal Cortex”. In: *Cerebral Cortex* 30.10, pp. 5372–5386.
- CORBO J.** and CARON-GUYON J. (2018). “Sensory-evoked propagating waves of activity in the primary sensory cortices: poorly understood, yet ubiquitous”. In: **Commentary article**, *J. Neurophysiology* 120. doi: 10.1152/jn.00319.2018.
- CORBO J.**, ZENNOU-AZOGUI Y., XERRI C., and CATZ N. (2018). “Cortical merging in S1 as a substrate for tactile input grouping”. In: *eNeuro* 5 (1). doi: 10.1523/ENEURO.0342-17.2017.

## Presentations

### Invited Talks

- CORBO J.** (2025). “Experience-Driven Restructuring of Sensory Representations in the Visual Cortex”. *Institut de Neurosciences de la Timone*. 2025.
- CORBO J.**, CATZ N., XERRI C., and ZENNOU-AZOGUI Y. (2016). “Cortical merging of tactile inputs in S1: micro and mesoscopic substrate of sensory funneling”. *French Somatosensory Club annual meeting*. 2016.

### Conference Presentations

- CAGLAR L., **CORBO J.**, ERKAT OB., and POLACK PO. (2025a). “The geometry of primary visual cortex representations is dynamically adapted to task performance”. **Poster**, *International Conference on Mathematical Neuroscience*. 2025.
- (2025b). “The geometry of primary visual cortex representations is dynamically adapted to task performance”. **Poster**, *Computational and Cognitive Neuroscience CCN*. 2025.
- (2025c). “The geometry of primary visual cortex representations is dynamically adapted to task performance”. **Poster**, *Computational Neuroscience Society CNS*. 2025.
- KHDOUR H., **CORBO J.**, ERKAT OB., and POLACK PO. (2024). “Distortions of the orientation representation space after perceptual training in the different layers of the mouse primary visual cortex”. **Poster**, *CSHL Neural circuits*. 2024.
- ERKAT OB., **CORBO J.**, MCCLURE J., KHDOUR H., and POLACK PO. (2023). “The Timecourse of Distorted Representations in the Primary Visual Cortex”. **Poster**, *Journal of Vision*. 2023.

- ERKAT OB., **CORBO J.**, MCCLURE J., KHDOUR H., and POLACK PO. (2022). "Distortion of orientation representation before, during and after learning in the mouse primary visual cortex". **Poster**, *CSHL Neural circuits*. 2022.
- CORBO J.**, ERKAT OB., MCCLURE J., KHDOUR H., and POLACK PO. (2022b). "When the visual cortex stops caring about orientation: feature and category representation in V1 during orientation discrimination". **Poster**, *FENS annual meeting*. 2022.
- (2022c). "When the visual cortex stops caring about orientation: feature and category representation in V1 during orientation discrimination". **Poster**, *CSHL Neural circuits*. 2022.
- CORBO J.**, MCCLURE J., KHDOUR H., and POLACK PO. (2019). "Coincident sound modulates visual processing in V1 and improve the mouse's ability to discriminate orientations". **Poster**, *SfN annual meeting*. 2019.
- CORBO J.**, ZENNOU-AZOGUI Y., XERRI C., and CATZ N. (2017). "Time-dependent population responses underlying spatial representations in the primary somatosensory cortex: the cortical body map revisited?" *SfN annual meeting*. 2017.
- (2015). "Time-dependent population responses underlying spatial representations in the primary somatosensory cortex: the cortical body map revisited". **Poster**, *Société des Neurosciences annual meeting*. 2015.