

# Robert Tromm

Neuroscience student interested in computational neuroscience, complex systems, and bio-inspired AI.

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## Education

- 2021–2023 **MSc Cognitive and Clinical Neuroscience**, Maastricht University  
○ **Grades:** 8.45/10; Equivalent to US 3.97/4.0 GPA  
○ **Selected coursework:** Advanced statistics, psychiatric neuroscience, neuroanatomy, biomedical imaging, neuropsychopharmacology
- 2016–2020 **BS Neuroscience**, Brandeis University  
○ **Grades:** 3.5/4.0 (*Cum laude*)  
○ **Selected coursework:** Computational neuroscience, data structures & algorithms, neurobiology, biochemistry, data analysis and statistics, philosophy of mind

## Research Experience

- Sept 2024 – **Neuronal Circuits & Brain Dynamics**, Paris Brain Institute, Paris, France,  
Present Research Engineer (Supervisor: Nikolas Karalis)  
Interhemispheric decoupling of neuromodulation during fearful states
- Mar 2023 – **Department of Psychiatry**, University of Oxford, Oxford, UK,  
Nov 2023 Visiting Researcher (Supervisor: Morten Kringelbach)  
Whole-brain modeling of information-theoretic properties of altered state representations
- June 2019 – **Volen National Center for Complex Systems**, Brandeis University, Boston, USA,  
May 2020 Research Assistant (Supervisor: Eve Marder)  
Worked on improving biophysical realism of leaky integrate-and-fire neurons employing calcium-dependent homeostatic tuning rules

## Publications

- In preparation *Adaptive reorganization of brain functional hierarchy by psychedelics and cannabis*. **R. Tromm\***, C. Timmermann, P. Mallaroni, N. Mason, R.L. Carhart-Harris, G. Deco, J. Ramaekers, and M. Kringelbach.
- In press *The role of the dorsolateral prefrontal cortex in ego dissolution and emotional arousal during the psychedelic state*. C. Coleman, K. Shinozuka\*, **R. Tromm**, et al. *Human Brain Mapping* (in press). Preprint: [bioRxiv](#)

## Presentations and Speaking Opportunities

- 2024 *Brain hierarchy under psychoactive substances*. **R. Tromm\***, C. Timmermann, P. Mallaroni, N. Mason, R.L. Carhart-Harris, G. Deco, J. Ramaekers, and M. Kringelbach. ASSC 27. Ritsumeikan University, Tokyo, Japan. Poster.
- 2023 *'The anarchically organized brain: changes in functional hierarchy in altered states.'* **R. Tromm\***, C. Timmermann, P. Mallaroni, N. Mason, R.L. Carhart-Harris, G. Deco, J. Ramaekers, and M. Kringelbach. ALPS 2023. University of Geneva, Geneva, Switzerland. Poster.
- 2019 *Dual homeostatic mechanisms can reproduce diverse ion channel correlations*. **R. Tromm\***, C. Guerini\*, S. Gorur-Shandilya, E. Marder. SciFest IX, Brandeis University, Waltham, United States. Poster.

## Projects

## 2024 Behavioral state classification from EEG using conventional and deep learning approaches

○ **Supervisors:** Noah Benson, Ariel Rokem

○ **Summary:** Benchmarked CNNs, LSTMs, random forests, and gradient boosting models on 64-channel EEG to classify ocular state; evaluated model performance on preprocessed time-series data to identify optimal architecture for behavioral decoding. [\[Code\]](#)

## Master thesis (2023) Changes in brain hierarchy following acute and chronic use of psychoactive substances

○ **Supervisor:** Morten Kringelbach and Jan Ramaekers

○ **Summary:** Developed a novel information-theoretic metric to quantify irreversibility in fMRI time series; combined this with Hopf-based whole-brain modeling to assess changes in trophic coherence under psychoactive substances, revealing reorganization of functional brain hierarchy. [\[Code\]](#)

## Bachelor thesis (2020) Variability in homeostatic tuning rules produces diverse correlations in ion channels

○ **Supervisor:** Eve Marder

○ **Summary:** Simulated neuronal behavior under diverse homeostatic regulation conditions to explore sources of ion channel correlation. Demonstrated that variability in transcription time constants uniquely replicates experimentally observed patterns of conductance variability and correlation structure. [\[Code\]](#)

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## Activities & Societies

2024 – Present **Student Committee**, *Association for the Scientific Study of Consciousness*, Remote  
Organizing student events at the annual ASSC conference

2019 – 2021 **Research and Professional Development**, *Intercollegiate Psychedelics Network*, Remote  
Organized first iteration of PsychedelX, a virtual conference and talk competition.

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## Selected Honors & Awards

2023, 2024 **Usona Institute Scholarship**, *Usona Institute*  
Twice awarded \$7500 USD for academic and research achievements in psychedelic studies

2024 **Polaris Fellowship**, *Entrepreneur First*  
Fellowship programme for highly technical individuals to pursue commercial research projects. £3000 GBP stipend and pitching opportunity.

2020 **Justice Brandeis Scholarship**, *Brandeis University*  
Awarded \$140,000 USD. The most prestigious scholarship offered by Brandeis.

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## Additional Training

June 2025 **Gatsby Bridging Programme**, *Gatsby Computational Neuroscience Unit, UCL*, London, UK  
Mathematics summer school in linear algebra, calculus, probability, differential equations, and Fourier analysis

Aug 2024 **Neurohackademy**, *University of Washington*, Washington, USA  
Highly competitive summer school in neuroimaging and data science

June 2024 **QStr Summer School**, *ATR; Monash University*, Kyoto, Japan  
Summer school on category theory and information theory in cognitive science

June 2020 **Computational Neuroscience**, *Neuromatch Academy*, Remote  
Course in approaches to modeling single-neuron, dynamical systems, and stochastic systems

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## Skills

**Computational** fMRI analysis (general linear modeling; graph theory; network neuroscience), signal processing, data visualization, machine learning, statistical analysis

**Programming** Scientific computing (SciPy, NumPy, Pandas, R, MATLAB), Neuroimaging frameworks (SPM/FSL/FreeSurfer), C++, Git, Java, Bash,  $\LaTeX$

**Research** Literature search and review, project management, public speaking, collaboration