

**CIFRE PhD PROJECT:**  
**Joint PhD between IPBR (Lyon) and Montreal University (Montréal)**  
**In partnership with International Flavors & Fragrances (IFF)**

**RESEARCH FIELD:** Computational Neuroscience – Cognitive Neuroscience

**LOCATION:** Institut Paul Bocuse research center in Lyon (France) & Montreal University (Canada)

**SUPERVISION:** Dr. Anne-Lise Saive (IPBR, Lyon) – Dr. Karim Jerbi (UdeM, Montréal)  
In collaboration with Dr. Johannes Frasnelli (UQTR, Trois-Rivières)

**SALARY:** 28K€ /year for 3 years (annual gross salary)

**APPLICATION DEADLINE:** December 2022, but open until a suitable candidate is found

**PROJECT DESCRIPTION >> Fully-funded 3-year PhD position in human olfactory electrophysiology using MEG**

How do our brains perceive smells? Are all odors encoded in the same way? What rules govern their neural representations? This research project lies at the crossroads of computational and cognitive neuroscience, and requires a combination of skills in neuroscience, data analytics and machine learning. With the aim to advance our understanding of the electrophysiological brain mechanisms that mediate olfactory perception in humans, the proposed research will integrate brain imaging with computational and experimental approaches to analyze neuromagnetic brain data and probe how olfactory perception arises from the coordinated activity of distributed brain areas.

Most odorants stimulate both the olfactory and trigeminal systems, allowing individuals with smell loss to distinguish odorants based on freshness, burning, or tickling sensations. Both sensory systems work closely together and are modulated by each other. Simultaneous presentation of olfactory and trigeminal stimulation would increase the intensity of trigeminal perception but reduce purely olfactory perception. In this project, we aim at decoding how the brain represents and processes olfactory and trigeminal scents by uncovering the rules that govern their distinct neural representations using magnetoencephalography (MEG), signal processing and machine-learning tools.

**Main aims of the project**

- Characterization of the oscillatory signatures evoked by olfactory and trigeminal aromatics using MEG in a healthy population, bringing unique spatial and temporal resolution.

- Decoding how aromatics, and their olfactory and trigeminal dimensions, are mapped in the brain as a function of their perceptual quality (i.e., familiarity, complexity, elicited emotions and feelings) using AI tools and multivariate statistics.
- Characterization of the temporal dynamics and functional connectivity between brain areas involved in processing olfactory and trigeminal stimuli.

### Ideal candidate

We are seeking a candidate with good skills in programming, machine learning and data analytics, and who is also passionate about advancing neuroscience research. Previous experience or at least a strong interest in sensory systems, including in particular the sense of smell, is an important bonus. More specifically, the ideal candidate would have:

- A MSc or engineering school degree in statistics/computational science, computational neuroscience, bioengineering and modelling or related fields
- Solid programming skills in Python
- Experience with machine learning libraries
- A strong interest in neuroscience and cognitive science
- Team spirit & excellent communication and organizational skills
- Strong written and spoken English skills

### How to apply?

Motivated, curious and self-driven individuals interested in joining us should upload a single pdf document with (i) a cover letter describing their research experience and alignment of their future research interests with the proposed project, (ii) a full CV including a list of publications, and (iii) a list of up to 3 references. The single PDF file should be sent to [anne-lise.saive@institutpaulbocuse.com](mailto:anne-lise.saive@institutpaulbocuse.com) & [karim.jerbi@umontreal.ca](mailto:karim.jerbi@umontreal.ca). Applications from students planning to defend their Master's thesis in the near future are also welcome as the starting date is negotiable.

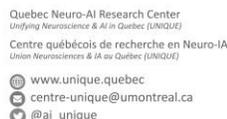
We are strongly committed to equity, diversity and inclusion. We therefore welcome applications from racialized persons/visible minorities, women, Indigenous persons, persons with disabilities, ethnic minorities, and persons of minority sexual orientations and gender identities.

A selection will be made among eligible applicants on an overall basis, and candidates selected for an interview will be contacted.

Feel free to contact us if you have any questions regarding this position.

### More information

**Institut Paul Bocuse Research Center (IPBR)** - Since 2008, the IPBR has been created at the crossroads between Science and Gastronomy to better understand taste, eating behaviours and food practices. A



key role of IPBR is to promote bidirectional research between scientists and Gastronomy and spearhead efforts to establish a high-impact food research discipline. IPBR mission is to develop one-of-a-kind interdisciplinary research in collaboration with local and international partners as well as private industrials. In the [Cognition & AI team](#), we are particularly interested in the early detection of eating disorders and in the development of innovative ways to promote culinary and olfactory expertise in both naive and expert populations using advanced ML tools and VR/AR setups.

**University of Montreal, Psychology Department** - The Université de Montréal Department of Psychology, founded in 1942, is among the top 100 universities on the planet in psychology and neuroscience. Research at the Cognitive and Computational Neuroscience lab combines state-of-the-art electrophysiological brain imaging techniques and machine learning to advance our understanding of the role of large-scale neural networks in healthy cognition, their modulation across states of consciousness and their breakdown in brain disorders. The lab is headed by Dr Karim Jerbi and has access to high-temporal resolution imaging techniques including magneto- and electro-encephalography (MEG/EEG). Karim Jerbi is also director of the [UNIQUE Neuro-AI](#) Research Center and director of the MEG Center at UdeM.

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