Laurent MacKay

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PROFESSIONAL SUMMARY

Interdisciplinary researcher with expertise in mathematical physiology, strong computational skills, and a collaborative mindset. Experienced in developing quantitative and mechanistic models of biological processes across scales, leveraging numerical methods, parameter estimation, data analysis, and statistical tools to deliver impactful insights. Proficient in MATLAB, Python, and R, with a passion for writing clean, well-documented code and effectively communicating complex ideas to diverse audiences.

EDUCATION

- Ph.D., Physiology, McGill University, Montreal, Canada (2015–2020)
 - **Research Focus:** Mathematical model of cellular signalling and motility
 - Key Techniques: Nonlinear dynamics, stochastic processes, data analysis pipelines, machine learning
- M.Sc., Physics, McGill University, Montreal, Canada (2013–2015)
 - Research Focus: Markov models of ligand-gated transmembrane proteins
 - Key Techniques: Numerical ODE solvers, Bayesian inference (MCMC), model fitting/optimization
- B.Sc., Biophysics, Concordia University, Montreal, Canada (2008–2013)
 - Specialization: Computational chemistry

TECHNICAL SKILLS

• Programming Languages: MATLAB, Python, R, FORTRAN, Java, Javascript, C++

Postdoctoral Fellow: Dept. of Mathematics, University of British Columbia

- Data Analysis: Timeseries analysis, nonlinear regression analysis, regularization methods
- Data Visualization: matplotlib, ggplot2, Gnuplot, OpenGL
- Machine Learning: Bayseian inference (MCMC), cluster analysis
- Software Tools: VS Code, Eclipse, Jupyter, RStudio, Vim, JIRA, Git
- Computational Expertise: Numerical ODE/PDE simulation, parameter estimation, dynamical systems theory

EMPLOYMENT HISTORY

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- Designed and implemented high-performance computational models and tools for developmental biology research using MATLAB and Python.
 - Analyzed datasets to uncover trends and identified parameter regimes in mathematical models.
 - Employed advanced analytical techniques to delineate qualitatively distinct model behaviors.
 - Collaborated with biologists and clinicians to bridge experimental and theoretical insights.
 - Supported hypothesis testing and delivered actionable insights for study design.
 - Taught calculus and differential equations to undergraduate students
- Digital Signal Processing Developer: Oscilloscape, Hartford CT, USA
 - Simulated neural auditory processing using high-performance numerical methods in Python.
 - Authored comprehensive documentation and rigorously tested algorithms for performance validation.

• Digital Signal Processing Intern: Interaxon, Toronto, Canada

- Designed, implemented, and tested algorithms for EEG signal processing in an Agile environment.
- Created Python-based tools for robust EEG data analysis.
- Web Developer: Centre for Structural and Functional Genomics, Montreal, Canada
 - Developed web-based and desktop applications for data visualization and pipeline management.
 - Facilitated communication between biologists and software engineers, enhancing project outcomes.

(June 2021-July 2024)

(May 2019-Aug 2019)

(Sept 2020-May 2021)

(2009-2013)