Subject: Prospective PhD — Observation-aware target trials, multilevel matching, and time-resolved causal decomposition with Neural SDEs

Dear Prof. Pimentel,

Hope this email finds you well!

My name is Yuting Fang (Student ID: 5518340). I am currently completing a Bachelor of Mathematics & Statistics (Honours) at UNSW Sydney, supervised by Professor Quoc Le Gia (School of Maths&Stats) and Professor Flora Salim(School of Computer Science and Engineering). My thesis centers on Neural Stochastic Differential Equations (Neural SDEs) for continuous-time dynamics, with applications to irregularly sampled medical and neuroimaging time series. I’m aiming to pursue a computational neuroscience PhD (2026 entry) and would be honoured to explore opportunities in your group.

Your recent advances on calibrated sensitivity for weighted causal decompositions and your continued development of multilevel matching via network flows (matchMulti) resonate deeply with my interests in design-based, interpretable causal inference.

If there’s a potential fit, I’d love to contribute along three concrete threads:

1. Observation-aware target trial + interval sensitivity.  
   Jointly model the measurement/visit process (who is observed and when) with a Neural SDE for patient trajectories, then embed its parameters into your calibrated sensitivity framework to report interval conclusions robust to both unmeasured confounding and informative observation.
2. Continuous-time features for multilevel matching.  
   Extract time-dynamic covariates (drift/diffusion, event-intensity summaries) from Neural SDEs and plug them into matchMulti to improve cluster- and unit-level balance; pair with permutation inference and post-design sensitivity reporting.
3. Time-resolved causal decomposition with amplification.  
   Combine SDE exposure trajectories with your two-parameter amplification to generate interpretable “how much hidden bias would overturn this component?” decomposition curves for disparities analyses.

My background equips me to contribute effectively to these directions: I have a strong foundation in mathematics and statistics, hands-on experience with Neural SDE implementation and time-series inference, and a track record of applying rigorous evaluation methods—including held-out prediction, counterfactual validation, and calibrated uncertainty analysis. Beyond technical skills, I bring genuine enthusiasm for developing high-quality, falsifiable models that are tightly integrated with experimental design and validation.

I am confident that my proficiency in PyTorch, torchsde/torchdyn, probabilistic modeling, and data analysis (including tools like Suite2p and CaImAn) will allow me to make meaningful contributions to these research topics. I would be very grateful for the opportunity to discuss potential PhD projects with you—whether as a thesis student, visiting researcher, or intern. I am happy to arrange an online discussion via any online platform at your convenience, and I can also share my CV, academic transcript, and a detailed research outline beforehand for your reference.

Thank you for your time and consideration. I greatly admire the interdisciplinary rigor of your lab and would be honored to contribute to your research.

Warm regards,  
Yuting Fang

Bachelor of Science with Honors

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