

Manu Kalia (he/him)

PhD candidate in Applied Math, University of Twente, The Netherlands

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Languages: English, Hindi, French, Dutch

Programming: (Preferred) Julia, Python; (Comfortable) C++, Matlab, Mathematica
(Environments) Linux, bash, LaTeX, vim

I'm an applied mathematician by training, with research interests in computational and mathematical neuroscience, dynamical systems and bifurcation theory, and the interaction of machine learning with dynamical systems. Lately deep-diving into Julia for development.

EDUCATION

Current	PhD candidate at Heinrich Heine University, Düsseldorf, Germany and University of Twente, Enschede, The Netherlands
Oct 2017 -	Applying dynamical systems and machine learning methods in mathematical modeling, focusing on models of ischemic stroke. Funded by: DFG (German Research Foundation) FOR 2795, 'Synapses Under Stress' (link). Promoters: Prof. Christine Rose (HHU Düsseldorf) and Prof. Stephan van Gils (Twente).
2015-17	M. Sc. in Applied Mathematics, University of Twente, Enschede, The Netherlands Chair: Applied Analysis, Credits completed: 131/120, Average grade : 8.08/10
2012-15	B.Sc. (with Honours) in Mathematics, University of Delhi, New Delhi, India Average grade : 89.7/100

WORK EXPERIENCE

Jul 2016 -	Intern at Medisch Spectrum Twente, Enschede, The Netherlands
Nov 2016	Modelling extracellular dynamics in a biophysical model for cytotoxic cell swelling. (This work is extended to my PhD project)
Dec 2013-	Researcher and Teaching Assistant at Creative School of Maths and Music, New Delhi, India
Apr 2015	Application of random matrix universality to cricket. Supervisor: Dr. Saugata Ghosh. (arXiv link).
May-	Research Intern at Defense Research and Development Organisation (DRDO), New Delhi, India
Aug 2014	PDE models of the displacement of torsional waves caused by earthquakes in viscoelastic isotropic media.

PEER-REVIEWED PUBLICATIONS

- [1] Manu Kalia et al. "Ion dynamics at the energy-deprived tripartite synapse". In: *PLOS Computational Biology* 17.6 (June 2021), pp. 1–37.
- [2] Manu Kalia, Yuri A Kuznetsov, and Hil G E Meijer. "Homoclinic saddle to saddle-focus transitions in 4D systems". In: *Nonlinearity* 32.6 (May 2019), pp. 2024–2054.

PREPRINTS

- [1] Manu Kalia et al. "Learning normal form autoencoders for data-driven discovery of universal, parameter-dependent governing equations". In: *arXiv:2106.05102* (2021).
- [2] Manu Kalia and Saugata Ghosh. "Cross-Correlation in cricket data and RMT". In: *arXiv:1502.03411* (2015).

TALKS AND POSTERS

1. *Ion dynamics at the tripartite synapse*

- (a) Bonn Brain 2019, Bonn, Germany (Poster)
- (b) ICMNS 2019, Copenhagen, Denmark (Talk)
- (c) CNS 2019, Barcelona, Spain (Poster, award)
- (d) 14th Göttingen Neuroscience Meeting 2021 (Poster, virtual)
- (e) GLIA 2021 (Poster, virtual)
- (f) SMB 2021 (**Invited talk**, virtual)

2. *Learning normal form autoencoders for data-driven discovery of universal, parameter-dependent governing equations*

- (a) NeurIPS workshop on Interpretable Inductive Biases and Physically Structured Learning 2020 (Talk, virtual)
- (b) SIAM DS20 (Talk, virtual, held in 2021)

3. *Estimating Parameters in ODEs with Neural Networks*

- (a) SIAM DS 19, Snowbird, Utah, USA (Poster)
- (b) Lorentz Center Summer School: Data Science for Dynamical Systems 2019, Leiden, The Netherlands (**Invited talk**)
- (c) SIAM MDS 20 (**Invited talk**, virtual)

TEACHING AND SUPERVISION

1. **Teaching:**

- (Graduate) Nonlinear Dynamics: tutorials, homework, substitute lectures
- (Graduate) Dynamical behaviour of neuronal networks: tutorials, homework, lecture

2. **Supervision:**

- Justus Schlenger (Master thesis, 2020), *Modeling postsynaptic responses at the energy deprived tripartite synapse*
- Naomi Hulst (Bachelor thesis, 2018), *Modelling the interaction between the presynaptic terminal and the astrocyte at a glutamatergic synapse*

GRANTS AND AWARDS

2018-2022	DFG FOR 2795 'Synapses under stress' grant for 3 years of PhD.
2019	Poster award for 'Ion dynamics at the tripartite synapse', 28th Annual Computational Neuroscience Meeting.
2015-17	University of Twente Scholarship (UTS) granted by the University of Twente for the full length of the master programme (€25,000 per annum)
2012-15	Scholarship granted by the Indian Naval Benevolent Association for undergraduate students majoring in the sciences (INR 25,000 per annum)