

Curriculum Vitae

Khanh Dao Duc

Contact Information

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Academic Positions

2019-present Department of Mathematics, University of British Columbia (UBC)
Assistant Professor (Research Tenure Track)

Departments of Computer Science and Zoology, UBC
Associate member

2014-2019 Computer Science Division, University of Berkeley, California
Postdoctoral scholar
Advisor: Yun Song

2015-17 Mathematics and Biology Departments, University of Pennsylvania
Simons Maths+X Postdoctoral Fellow
Advisor: Yun Song

Education

2013 Ph. D., Applied Mathematics
Ecole Normale Supérieure, Paris, France
Title: *Modeling and analysis of neuronal networks, stochastic chemical reactions in cellular microdomains and telomere length dynamics*
Advisor: David Holcman

2009 M.S., Applied Mathematics
Université Pierre Marie Curie, Paris 6, France

2008 Agrégation de Mathématiques
(In France, "the Agrégation de Mathématiques" is the most prestigious nationwide competition selecting people to teach mathematics in the French public education system)

2007 B.S., Mathematics
Ecole Normale Supérieure, Lyon, France

2007 B.S., History and Philosophy of Sciences
Université Lyon 1, Lyon, France

Teaching and Supervision

- 2019-20** **University of British Columbia**
MATH 303: Introduction to stochastic processes (main instructor)
MATH 215: Elementary differential equations
- 2013-14** **EPITA Graduate School of Computer Science, Paris, France**
Mathematics Instructor
Undergraduate courses for international students (1st and 2nd year)
- 2012-13** **University of Paris 7, Paris, France**
Teaching Assistant
Analysis and Algebra, 2nd year of Bachelor degree
- 2009-12** **University of Paris 6, Paris, France**
Teaching Assistant
Calculus, 1st year (2009-12)
Linear Regression Methods, 3rd year (2012)
Numerical Methods for ODE, 3rd year (2011)
Linear Algebra, 2nd year (2010)

Supervision:

- 2019-20** *Mentor for the UBC undergraduate Research Experience Program (REX): 6 mentees (two 4th year, one 3rd year, one 2nd year and two 1st year students)*

Honors, Awards and Fellowships

- 2018** *Runner-up of the DSWeb SIAM 2018 Software Contest* (competition for dynamical system software)
- 2015-17** **Simons *Math+X* Postdoctoral Fellowship** from the Simons Foundation
- 2014** **Pierre Gilles de Gennes PhD Prize**, awarded by the Institut de Biologie Physico-Chimique and the Pierre Gilles de Gennes Foundation (national French prize for best PhD in Biophysics)
- 2013** **Physics Research spotlight**: R.A. Blythe and C.E McPhee, *The Life and Death of Cells*, *Physics* (2013), 6, 129
- 2009-12** **PhD Fellowship** from Ecole Normale Supérieure, Lyon
- 2005-08** **Civil servant student (“Normalien”) in Mathematics**, Ecole Normale Supérieure, Lyon

(The Ecole Normale Supérieure is a type of publicly funded higher education in France. A portion of the student body who are French civil servants are called “Normaliens”. They are selected by a difficult examination, with only 3% of candidates eventually admitted (source: Wikipedia)).

Publications

In preparation / Preprints:

20. F. Poitevin, **K. Dao Duc**, *The multiple scales of ribosome heterogeneity: recent advances and computational challenges in cryoEM* (invited contribution to *Molecules*)
19. W. Son, **K. Dao Duc**, D.D. Erdmann-Pham, Y.S. Song, *CIVET : A computational tool to quantify the dynamics of biophysical transport processes from the inhomogeneous l-TASEP*
18. Y. Sun, Y. Sung, Q. Zeng, **K. Dao Duc**, H. Luo, Prochlorococcus Evolution coincided with Neoproterozoic Oxygenation and Glaciation (submitted)

Publications in peer reviewed journals:

17. D.D. Erdmann-Pham, **K. Dao Duc**, Y.S. Song, *The key parameters that govern translation efficiency*, Cell Systems (2020)
16. **K. Dao Duc**, S. Batra, N. Bhattacharya, J.H.D. Cate, Y.S. Song (2019), *Differences in the path to exit the ribosome across the three domains of life*, Nucleic Acids Research, gkz106 (**recommended by F1000Prime**)
15. **K. Dao Duc**, Y.S. Song (2018), *Identification and quantitative analysis of the major determinants of translation elongation rate variation*, PLoS Genetics 14(1) : e1007166
14. **K. Dao Duc**, Z.H. Saleem, Y.S. Song (2018), *Theoretical analysis of the distribution of isolated particles in the TASEP : Application to mRNA translation rate estimation*, Physical Review E 97, 012106 (**selected as Editor's suggestion**)
13. N. Rouach N., **K. Dao Duc***, J. Sibille*, D. Holcman (2018), *Dynamics of ion fluxes between neurons, astrocytes and the extracellular space during neurotransmission*, Opera Medica et Physiologica, 4(1), 1-18 (* equal contribution)
12. M. Wang, **K. Dao Duc**, J. Fischer, Y.S. Song (2017), *Operator Norm Inequalities between Tensor Unfoldings on the Partition Lattice*, Linear Algebra and its Applications 520, 44-66
11. **K. Dao Duc**, Z. Schuss, D. Holcman (2016), *Oscillatory Survival Probability : Analytical, Numerical Study for oscillatory narrow escape and applications to neural network dynamics*, SIAM Multiscale Modeling and Simulations 14-2, 772-798
10. **K. Dao Duc**, P. Parutto, X. Chen, J. Epsztein, A. Konnerth, D. Holcman (2015), *Synaptic Dynamics and Neuronal Network Connectivity are reflected in the Distribution of Times in Up states*, Frontiers in Computational Neuroscience, 9, 96
9. **K. Dao Duc**, C.Y. Lee, P. Parutto, D. Cohen, M. Segal, N. Rouach, D. Holcman (2015), *Bursting Reverberation as a Multiscale Neuronal Network Process Driven by Synaptic Depression-Facilitation*, PLoS One 10(5) : e0124694

8. J Sibille*, **K. Dao Duc***, N. Rouach, D. Holcman (2015) *The neuroglial potassium cycle during neurotransmission : role of Kir4.1 channels*, PLoS Computational Biology 11(3) : e1004137. (* equal contribution)
7. D. Holcman, **K. Dao Duc**, A. Jones, H. Byrne, K. Burrage (2015), *Post-transcriptional regulation in the nucleus and cytoplasm : study of mean time to threshold (MTT) and narrow escape problem*, Journal of Mathematical Biology, 70.4: 805-828
6. **K. Dao Duc**, Z. Schuss, D. Holcman (2014), *Oscillatory decay of the survival probability of activated diffusion across a limit cycle*, Physical Review E (Rapid Communications) 89.3: 030101
5. **K. Dao Duc**, D. Holcman (2013), *Computing the length of the shortest telomeres*, Physical Review Letters 111, 228104 (**highlighted in Physics viewpoint**)
4. Z. Xu, **K. Dao Duc**, D. Holcman, T. Teixeira (2013), *The length of the shortest telomere as the major determinant of the onset of replicative senescence*, Genetics 194(4)
3. **K. Dao Duc**, D. Holcman (2012), *Using default constraints of the spindle assembly checkpoint to estimate the associated chemical rates*, BMC Biophysics; 5(1):1
2. **K. Dao Duc**, D. Holcman (2010), *Threshold activation for stochastic chemical reactions in microdomains*, Physical Review E 81 (4(1)) : 041107
1. **K. Dao Duc**, P. Auger, T. Nguyen Huu (2008), *Predator density dependent prey dispersal in a patchy environment with a refuge for the prey*, South African Journal of Science, vol. 104, no5-6, 180-184

Others:

Textbook: **K. Dao Duc**, D. Delaunay, (2015) Probabilités CPGE scientifiques 1ère-2e année, De Boeck Supérieur, Louvain (Probability for undergraduate students - in French)

Peer-reviewed article in History of Science: **K. Dao Duc**, (2013), *Leibniz dans l'Encyclopédie*, Recherches sur Diderot et sur l'Encyclopédie, (48), pp.123-142

Selected presentations

Invited talks:

- Life Science Seminar, Chinese University of Hong Kong, Hong Kong, China (2020)
- 7th International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (ICMA VII), Tempe, USA (2019)
- Arizona State University Biophysics seminar, Tempe, USA (2019)
- UBC Math-bio seminar, Vancouver, Canada (2019)
- UBC Algorithms seminar, Vancouver, Canada (2019)
- Biological Chemistry seminar, Hebrew University of Jerusalem, Israel (2019)
- 1st annual Day of Theory, CZ Biohub, San Francisco, USA (2019)

- Carnegie Mellon Physics Colloquium, Pittsburgh, USA (2019)
- UofT mathematics seminar, Toronto, Canada (2019)
- UBC mathematics Colloquium, Vancouver, Canada (2019)
- UCI Biophysics Seminar, Irvine, USA (2019)
- Center for Theoretical Evolutionary Genomics (CTEG) seminar, Berkeley, USA (2018)
- APS March Meeting, Los Angeles, USA (2018)
- Dynamics of translation summer school, Erice, Italy (2017)
- 61st Biophysical Society meeting, New Orleans, USA (2017)
- New York Area Population Genetics workshop, New York, USA (2017)
- Biophysics seminar, Ecole Normale Supérieure, Paris (2015)
- CTEG seminar, Berkeley, USA (2014)

Poster presentations:

- Biology and Mathematics in the Bay Area 12, Stanford, USA (2018)
- SMBE, Yokohama, Japan (2018)
- 62nd Biophysical Society meeting, San Francisco, USA (2018)
- The Biology of Genomes Meeting, Cold Spring Harbor, USA (2017)

Academic Service

- **Organizing** the *2018 workshop on Reverse methods for molecular dynamics in single cell*, at the Centro di Ricerca Matematica Ennio de Giorgi, Pisa, Italy (<http://www.crm.sns.it/event/425/>)
- **Organizing** the *2016 and 2017 Penn Symposium on Mathematical and Computational Biology* (<http://bio.math.upenn.edu/symposia.html>)
- **Organizing** the *Maths Bio seminar at Penn (2015-2017)*
- **Reviewer** for *Frontiers in Computational Neuroscience, Frontiers in Physics, Frontiers in Physiology, RNA Biology, PLoS Computational Biology*
- **Guest editor** for *Physical Biology* Special issue on *Reverse methods for molecular dynamics in single cell* (Sept 2019)

Other Research Experience

2007 South African Centre for Epidemiological Modelling and Analysis,
Stellenbosch, South Africa

Summer Research Intern (3 months)

Research Project: Mathematical modeling of the HIV immune response

2006 French Research Institute for Development (IRD), Bondy, France

Summer Research Intern (3 months)

Research Project: Aggregation methods for prey predator systems