Curriculum Vitae
Khanh Dao Duc

Contact Information

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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

Academic Positions

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

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

Teaching Experience

2013-14 **EPITA Graduate School of Computer Science,** Paris, France
Mathematics Instructor
Teaching undergraduate courses for international students

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)
Numerical Methods for ODE, 3rd year (2011)
Linear Algebra, 2nd year (2010)
Linear Regression Methods, 3rd year (2012)

Research Supervision:

Two undergraduate students and two graduate students (department of Mathematics and Computer Science division) of UC Berkeley, one undergraduate and one graduate student (Physics department) of Penn, and three undergraduate students of Ecole Normale Supérieure.

Honors, Awards and Fellowships

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

(*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

Preprints:

17. **K. Dao Duc,** S. Batra, N. Bhattacharya, J.H.D. Cate, Y.S. Song, *Differences in the path to exit the ribosome across the three domains of life* (under review), bioRxiv 357970;
16. D.D. Erdmann-Pham, **K. Dao Duc,** Y.S. Song, *The key parameters that govern translation efficiency* (under review), arXiv : 1803.05609

Publications in peer reviewed journals:

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* (accepted in Opera Medica et Physiologica) (*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, pp. 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, pp. 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 89.3 (2014): 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, pp. 180-184

In Preparation: 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*

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:

- *Theoretical analysis of the distribution of isolated particles in the TASEP : Application to mRNA translation rate estimation,* 2018, APS March Meeting, Los Angeles, USA
- *Probabilistic modeling and inference of translation dynamics using ribosome profiling data*, 2017, Dynamics of translation summer school, Erice, Italy
- *Quantitative analysis and modeling of translation using ribosome profiling data : How biophysical properties of the ribosome exit tunnel and the nascent polypeptide modulate the elongation rate,* 2017, 61st Biophysica Society meeting, New Orleans, USA
- *Identification and quantitative analysis of the major determinants of translation elongation rate variation,* 2017, New York Area Population Genetics workshop, New York, USA
- *Stochastic models in biology,* 2015, Biophysics seminar, Ecole Normale Supérieure, Paris
- *Stochastic modeling and analysis of telomere length dynamics across cell divisions*, CTEG seminar, 2014, Berkeley, USA

Poster presentations:

- *Differences in the ribosome exit tunnel across the three domains of life,* 2018, SMBE, Yokohama, Japan
- *The evolution of the ribosome exit tunnel and its impact on translation dynamics,* 2018, 62nd Biophysical Society meeting, San Francisco, USA

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*

Other Research Experiences

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

Research Intern (3 months)

Research subject: Mathematical modeling of the HIV immune response

2006 Institut de Recherche pour le Développement, Bondy, France

Research Intern (3 months)

Research subject: Aggregation methods for prey predator systems

Society Memberships

Member of the *American Physics Society* and the *Biophysical Society*

Past member of *the Society for Industrial and Applied Mathematics (2011-13)*