

# Curriculum Vitae

## Khanh Dao Duc

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### 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 Maths+X 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)

Linear Regression Methods, 3rd year (2012)

Numerical Methods for ODE, 3rd year (2011)

Linear Algebra, 2nd year (2010)

### 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

**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 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

### Preprints:

18. 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* (submitted)
17. D.D. Erdmann-Pham, **K. Dao Duc**, Y.S. Song, *The key parameters that govern translation efficiency* (under review), arXiv : 1803.05609, biorXiv 440693

### Publications in peer reviewed journals:

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
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 (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, 180-184

### In Preparation:

- **K. Dao Duc**, Y. Huang, Y.S. Song, *Local selection of slow synonymous codons promotes SRP binding in yeast*
- Y. Sun, **K. Dao Duc**, Q. Zeng, H. Luo, *Genome evolution of Prochlorococcus links to the Neoproterozoic glaciations and the Permian-Triassic ocean euxinia*

### 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:

- 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* (upcoming special issue)

### Other Research Experiences

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

*Summer Research Intern (3 months)*

Research subject: Mathematical modeling of the HIV immune response

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

*Summer Research Intern (3 months)*

Research subject: Aggregation methods for prey predator systems