Qianxiao Li

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Employment

CURRENT EMPLOYMENT

Department of Mathematics, NUS   *Singapore*
ASSISTANT PROFESSOR (PRESIDENTIAL YOUNG PROFESSOR)   *May. 2019 - Present*

Institute for Functional Intelligent Materials, NUS   *Singapore*
PRINCIPAL INVESTIGATOR   *May. 2022 - Present*

PAST EMPLOYMENT

Institute of High Performance Computing, A*STAR   *Singapore*
SCIENTIST   *Nov. 2016 - Nov. 2021*

Department of Mathematics, National University of Singapore   *Singapore*
ADJUNCT ASSISTANT PROFESSOR   *Feb. 2017 - May. 2019*

Institute of High Performance Computing, A*STAR   *Singapore*
RESEARCH ENGINEER   *Aug. 2010 - Aug. 2011*

Education

Princeton University   *Princeton, NJ, USA*
PHD IN APPLIED AND COMPUTATIONAL MATHEMATICS   *Sep. 2011 - Apr. 2016*

University of Cambridge   *Cambridge, UK*
B.A. IN MATHEMATICS   *Oct. 2007 - May. 2010*

Selected Talks

PLENARY TALKS

Mathematical and Scientific Machine Learning, MSML 2021   *Lausanne, Switzerland*
PLENARY TALK   *Aug. 2021*
Machine learning and dynamical systems - approximation, optimization and beyond

OTHER TALKS

ICIAM 2023   *Tokyo, Japan*
MINISYMPOSIUM TALK   *Aug. 2023*
Approximation theory of deep learning for sequence modelling

ICOSAHOM 2023   *Seoul, Korea*
MINISYMPOSIUM TALK   *Aug. 2023*
Reduction and closure of dynamical systems using deep learning

Dynamical systems and Semi-algebraic geometry: interactions with Optimization and Deep Learning   *Dalat, Vietnam*
INVITED LECTURE SERIES   *Jul. 2023*
Deep Learning, Dynamics and Control

International Workshop on Reduced Order Methods

INVITED TALK

Learning parametric Koopman operators for prediction, identification and control

Singapore

May. 2023

EASIAM Workshop

INVITED TALK

Approximation theory of deep learning for sequence modelling

Singapore

May. 2023

SIAM CSE 2023

MINISYMPOSIUM TALK

Approximation theory of deep learning for sequence modelling

Amsterdam, Netherlands

Mar. 2023

IMS Workshop on Multiscale Analysis and Methods for Quantum and Kinetic Problems

INVITED TALK

Reduction and closure fo dynamical systems using deep learning

Singapore

Feb. 2023

IMS Workshop on Multiscale Analysis and Methods for Quantum and Kinetic Problems

INVITED TALK

Reduction and closure fo dynamical systems using deep learning

Singapore

Feb. 2023

Inverse Problems Seminar, CUHK

INVITED TALK

Approximation Theory of Deep Learning from the Dynamical Systems Viewpoint

Hongkong, China

Nov. 2022

SDSC/HKIDS seminar, CityU-HK

INVITED TALK

Approximation Theory of Deep Learning for Sequence Modelling

Hongkong, China

Oct. 2022

SIAM Conference on Mathematics of Data Science (MDS)

MINISYMPOSIUM TALK

Approximation Theory of Deep Learning for Sequence Modelling

San Diego, USA

Sep. 2022

Third Symposium on Machine Learning and Dynamical Systems, The Fields Institute

INVITED TALK

Approximation Theory of Deep Learning for Sequence Modelling

Toronto, Canada

Sep. 2022

KSIAM-MINDS-NIMS International Conference on Machine Learning and PDEs

INVITED TALK

Approximation Theory of Deep Learning for Sequence Modelling

Seoul, South Korea

Aug. 2022

SIAM Annual Meeting (AN22)

MINISYMPOSIUM TALK

Approximation Theory for Deep Learning in Time Series Analysis

Pittsburgh, USA

Jul. 2022

Machine Learning for the Working Mathematician, The University of Sydney

INVITED TALK

Deep Learning for Sequence Modelling

Sydney, Australia

May. 2022

Numerical Analysis and Scientific Computing Seminar, Courant Institute, NYU

INVITED TALK

Approximation Theory of Deep Learning for Sequence Modelling

New York, USA

Apr. 2022

Mean Field Approach in Machine Learning and Statistics, Univeristy of Chicago

INVITED MINI-COURSE

Deep Learning, Dynamical Systems and Optimal Control

Chicago, USA

Oct. 2021

Workshop on theory of deep learning, INI, University of Cambridge

INVITED TALK

Approximation theory for machine learning and dynamical systems

Cambridge, UK

Aug. 2021

2021 Wutong Forum, CUHK-Shenzhen

INVITED TALK

Machine Learning and Dynamical Systems

Shenzhen, China

Aug. 2021

Joint Workshop on Mathematical Finance, Machine Learning and Statistics, SJTU
Shanghai, China

INVITED TALK
June. 2021

Approximation theory for machine learning and dynamical systems

SIAM Conference on Applications of Dynamical Systems (DS21)
Virtual

MINISYMPOSIUM TALK
May. 2021

On the Curse of Memory in Recurrent Neural Networks

JSML Workshop
Virtual

INVITED TALK
Apr. 2021

Machine Learning and Dynamical Systems

Workshop on Data Driven Scientific Computing, SUSTech
Shenzhen, China

INVITED TALK
Nov. 2020

On the Curse of Memory in Recurrent Neural Networks

Seminar at AMSS, Chinese Academy of Sciences
Beijing, China

INVITED TALK
Oct. 2020

Machine Learning and Dynamical Systems, Approximation and Optimization Aspects

Seminar at Center for Control, Dynamical-systems and Computation, UC Santa Barbara
Santa Barbara, USA

INVITED TALK
Oct. 2020

Machine Learning and Dynamical Systems, Approximation and Optimization Aspects

Seminar at the Center for Mathematical Sciences, HUST
Wuhan, China

INVITED TALK
Oct. 2020

Machine Learning and Dynamical Systems, Approximation and Optimization Aspects

Second Symposium on Machine Learning and Dynamical Systems, The Fields Institute
Toronto, Canada

INVITED TALK
Sep. 2020

On the Curse of Memory in Recurrent Neural Networks

Foundation of Computational Science, Harvard University
Cambridge, USA

INVITED TALK
Aug. 2019

A Dynamical Systems Approach to Deep Learning

CSIAM Big Data and AI Conference
Kunming, China

INVITED TALK
Jul. 2019

A mean-field optimal control formulation of deep learning

Machine Learning Theory Workshop, Peking University
Beijing, China

INVITED TALK
Jun. 2019

Continuous-time methods for stochastic optimization and batch normalization

36th International Conference on Machine Learning (ICML)
Long Beach, USA

CONFERENCE ORAL PRESENTATION
Jun. 2019

A quantitative analysis of the effect of batch normalization on gradient descent

Analysis and PDE Seminar, NUS Mathematics Department
Singapore

INVITED TALK
Mar. 2019

Deep learning as mean field optimal control

Workshop on Machine Learning and Dynamical Systems, Imperial College
London, UK

INVITED TALK
Feb. 2019

Dynamical systems, optimal control and deep learning

Seminar at School of Computing, NUS
Singapore

INVITED TALK
Oct. 2018

Dynamical systems, optimal control and deep learning

Workshop on accelerated materials development for manufacturing, A*STAR
Singapore

INVITED TALK
Aug. 2018

Materials property prediction and inverse design

35th International Conference on Machine Learning (ICML) *Stockholm, Sweden*
CONFERENCE ORAL PRESENTATION *Jul. 2018*
An optimal control approach to deep learning and applications to discrete-weight neural networks

Seminar at the College of Control Science and Engineering, Zhejiang University *Hangzhou, China*
INVITED TALK *Jun. 2018*
An optimal control approach to deep learning

Machine Learning Theory Workshop, Peking University *Beijing, China*
INVITED TALK *Jun. 2018*
An optimal control approach to deep learning

SIAM Conference on Imaging Science (SI18) *Bologna, Italy*
MINISYMPOSIUM TALK *Jun. 2018*
Maximum principles based algorithms for deep learning

Learning, Modelling and Simulation Workshop, CSML, Princeton University *Princeton, USA*
INVITED TALK *Feb. 2018*
Maximum principles based algorithms for deep learning

Theory of Deep Learning Workshop, IAS, Hong Kong University of Science and Technology *Hong Kong, China*
INVITED TALK *Jan. 2018*
Maximum principles based algorithms for deep learning

2017 NUS-PKU Joint Workshop, Peking University *Beijing, China*
INVITED TALK *Aug. 2017*
Method of successive approximations for training deep neural networks

35th International Conference on Machine Learning (ICML) *Sydney, Australia*
CONFERENCE PRESENTATION *Aug. 2017*
Stochastic modified equations and dynamics of stochastic gradient algorithms

2017 PKU Workshop on Deep Learning, Peking University *Beijing, China*
INVITED TALK *Jul. 2017*
Dynamics of stochastic gradient algorithms

Applied and Computational Mathematics Seminar, NUS *Singapore*
INVITED TALK *Aug. 2017*
Dynamics of stochastic gradient algorithms

SIAM Conference on Mathematical Aspects of Material Science (MS16) *Philadelphia, USA*
MINISYMPOSIUM TALK *May. 2016*
Modeling rare events in non-equilibrium systems

Teaching

Department of Mathematics, Peking University *Beijing, China*
MACHINE LEARNING AND DYNAMICAL SYSTEMS *2020*
   Summer school on applied mathematics

Tianyuan Mathematical Center in Northeast China, Jilin University *Jilin, China*
OPTIMAL CONTROL THEORY / PDE AND THEIR APPLICATIONS IN DEEP LEARNING *2020*
   Summer school on PDE and applications

Department of Mathematics, National University of Singapore *Singapore*
MA5232 - MODELLING AND NUMERICAL SIMULATIONS *2020-Present*
   Part III: Optimal control theory and methods

Department of Mathematics, National University of Singapore *Singapore*
DSA5204 - DEEP LEARNING AND APPLICATIONS *2020-2022*
   Course in DSA programme at NUS

Department of Mathematics, National University of Singapore *Singapore*
DSA5102/DSA5102X - FOUNDATIONS OF MACHINE LEARNING *2019-2020*
   Course in DSA programme at NUS

Department of Mathematics, National University of Singapore *Singapore*
Invited Talk, NUS Mathematics DSA Day *Mar. 2018*
Outreach program for prospective university students

Department of Mathematics, National University of Singapore *Singapore*
Supervisor for Individual Final Year Project *2017 - 2020*

Service

Editorial Service and Program Committee

Mathematical Control and Related Fields *AIMS*
Associate Editor *2023 - Present*

Journal of Machine Learning *Global Science*
Managing Editor *2021 - Present*

Physica D *Elsevier*
Guest Editor, Special Issue on Machine Learning and Dynamical Systems *2019 - 20, 2022 - Present*

Mathematical and Scientific Machine Learning *PMLR*
Program Committee *2019 - Present*

Conference and Seminar Organization

One World Seminar Series on the Mathematics of Machine Learning *Online*
Board Member *Aug. 2023-Present*

IMS Workshop on Machine Learning and its Applications, NUS *Singapore*
Co-organizer *Oct. 2022*

Third Conference on Mathematical and Scientific Machine Learning *Beijing*
Co-chair *Aug. 2022*

Reviewer

Conferences. CDC, ICLR, ICML, ITSC, MSML, NeurIPS

Journals. AIAA Journal, Advances in Computational Mathematics, Applied Mathematics and Optimization, Communications in Mathematical Sciences, Digital Discovery, European Journal of Applied Mathematics, IEEE Transactions on Signal Processing, IEEE Control Systems Letters, IEEE Transactions on Pattern Analysis and Machine Intelligence, Journal of European Mathematical Society, Journal of Machine Learning Research, Journal of Scientific Computing, Journal of Computational Physics, Machine Learning, Mathematical Finance, Nature Computational Science, Nature Machine Intelligence, Neural Computation, Neural Networks, Nonlinear Analysis, Physica D, Research in the Mathematical Sciences, SIAM Journal on Mathematical Analysis, SIAM Journal on Scientific Computing, SIAM Journal on Numerical Analysis, SIAM Review, SN Partial Differential Equations and Applications, Transactions on Machine Learning Research

Grants. FWF Austrian Science Fund

Professional Memberships

Member **Society for Industrial and Applied Mathematics**, USA *2022 - Present*
Member **BAAI Qingyuan Club**, China *2022 - Present*

Honors & Awards

2022	**Faculty Teaching Award**, FOS, NUS	*Singapore*
2021	**NRF Fellowship, Class of 2021**, National Research Foundation	*Singapore*
2019	**Presidential Young Professorship**, National University of Singapore	*Singapore*
2011	**NSS(PhD) Scholarship**, Agency for Science, Technology and Research (A*STAR)	*Singapore*
2010	**Foundation Scholarship**, Jesus College, University of Cambridge	*Cambridge, UK*
2009	**Exhibitioner Award**, Jesus College, University of Cambridge	*Cambridge, UK*
2008	**Scholarship Award**, Jesus College, University of Cambridge	*Cambridge, UK*
2007	**Cambridge Commonwealth Trust Scholarship**, University of Cambridge	*Cambridge, UK*
2007	**NSS(BS) Scholarship**, Agency for Science, Technology and Research (A*STAR)	*Singapore*