

## Kwok Yee Michael Wong (Updated April 2022)

### Academic qualifications:

- Ph.D. in Physics (UCLA, 1986)
- M.S. in Physics (UCLA, 1981)
- B.Sc. in Physics (HKU, 1978)

### University positions:

- Director, MSc program in Data-Driven Modeling (2019-now)
- Professor Emeritus (2021-now)
- Professor (HKUST, 2006-2021)
- Associate Professor (HKUST, 1998-2006)
- Lecturer (HKUST, 1992-1997)
- Postdoc (Oxford, 1989-1991)
- Postdoc (Imperial, 1986-1989)

### Professional positions and honors:

- Physical Society of Hong Kong: Secretary (1996-1999), Council (1995-2001, 2016-2018), Council Chairman (2002-2006)
- Member, Institute of Physics, American Physical Society, Organization of Computational Neuroscience
- Editor, Journal of Statistical Mechanics: Theory and Experiment (2007-2021)
- Guest Editor, Special Issue of Philosophical Magazine on David Sherrington's 70<sup>th</sup> Birthday (2011)
- Guest Editor, Research Topic on Neural Information Processing with Dynamical Synapses, Frontiers in Computational Neuroscience (2012-2013)
- EPL Distinguished Referee 2014

### Teaching in 2018-now

- Introduction to Stellar Astrophysics (PHYS 3071)
- Physics of Management Science (PHYS 4059)
- Stochastic Processes and Applications (MSDM 5003)
- Numerical Optimization and Applications (MSDM 5059)

### Research interest

Physics of complex and disordered systems; optimization; computational neuroscience; multiagent systems; spin glasses; machine learning; optimal control in telecommunications networks.

### Publications

194 published, 6 in preparation, 1 software, 2 book reviews

### Representative publications in recent five years

- Tianqi Hou, K. Y. Michael Wong, and Haiping Huang, "Minimal Model of Permutation Symmetry in Unsupervised Learning", *J. Phys. A: Math. Theor.* 52, 414001 (2019).
- Wen-Hao Zhang, He Wang, Aihua Chen, Yong Gu, Tai Sing Lee, K. Y. Michael Wong, and Si Wu, "Complementary Congruent and Opposite Neurons Achieve Concurrent Multisensory Integration and Segregation", *eLife* 43753 (2019).
- Bo Li and K. Y. Michael Wong, "Optimizing Synchronization Stability of the Kuramoto

Model in Complex Networks and Power Grids”, *Phys. Rev. E* **95**, 012207 (2017).

- Si Wu, K. Y. Michael Wong, C. C. Alan Fung, Yuanyuan Mi, Wenhao Zhang, “Continuous Attractor Neural Networks: Candidate of a Canonical Model for Neural Information Representation”, *F1000 Research* **5**, 156 (2016).
- Sheng-Jun Wang, Guang Ouyang, Jing Guang, Mingsha Zhang, K. Y. Michael Wong, and Changsong Zhou, “Stochastic Oscillation in Self-Organized Critical States of Small Systems: Sensitive Resting State in Neural Systems”, *Phys. Rev. Lett.* **116**, 018101 (2016).

#### Representative publications beyond the recent five-year period

- Chi Ho Yeung, David Saad and K. Y. Michael Wong, “From the Physics of Interacting Polymers to Optimizing Routes on the London Underground”, *Proc. Natl. Acad. Sci. USA* **110**, 13717-13722 (2013).
- C. C. Alan Fung, K. Y. Michael Wong, He Wang, and Si Wu, “Dynamical Synapses Enhance Neural Information Processing: Gracefulness, Accuracy, and Mobility”, *Neural Computation* **24**, 1147-1185 (2012).
- C. C. Alan Fung, K. Y. Michael Wong, and Si Wu, “A Moving Bump in a Continuous Manifold: A Comprehensive Study of the Tracking Dynamics of Continuous Attractor Neural Networks”, *Neural Computation* **22**, 752-792 (2010).
- S. Wu, K. Y. M. Wong and B. Li, “A Dynamic Call Admission Policy with Precision QoS Guarantee Using Stochastic Control for Mobile Wireless Networks”, *IEEE/ACM Trans. on Networking* **10**, 257-271 (2002).
- H. Nishimori and K. Y. Michael Wong, “Statistical Mechanics of Image Restoration and Error-Correcting Codes”, *Phys. Rev. E* **60**, 132-144 (1999).

#### Recent invited talks

- 6<sup>th</sup> International Workshop on Statistical Physics and Mathematics for Complex Systems (SPMCS 2019), Xiamen, 2020.
- Conference on Perception and Sensorimotor System, Shanghai, 2019.
- Statistical Physics and Neural Computation (SPNC-2019), Guangzhou, 2019.
- Conference on Complex Systems, Singapore, 2019.
- 10<sup>th</sup> Cross-Strait Conference on Statistical Physics, Taipei, 2019.
- International Conference on Soft Computing and Machine Learning (SCML 2019), Wuhan, 2019.
- International Workshop on Physics, Inference and Learning (PIL2018), Beijing, 2018.
- Asian Network of Complexity Scientists Workshop, Singapore, 2017.
- 5<sup>th</sup> International Workshop on Statistical Physics and Mathematics for Complex Systems (SPMCS 2017), Wuhan, 2017.
- 9<sup>th</sup> Joint Meeting of Chinese Physicists Worldwide (OCPA9), Beijing, 2017.
- Chinese Physical Society Fall Meeting, Beijing, 2016.

#### Recently Supervised MPhil and PhD Theses

- Tianqi Hou, “Application of statistical mechanics in unsupervised learning and associative memory” (PhD 2021)
- Kin Yau Tsang, “Optimizing Network Stability against Fluctuations by Bandwidth Allocation and Resource Adjustment” (PhD 2020)
- Ming Tony Shing, “Optimal route planning for probabilistic landscape exploration” (MPhil 2020)
- Min Yan, “Neural interactions and information transmission: multisensory processing and predictive information” (PhD 2019)

- Tat Shing Choi, “Measurement of Basic Quantities in Traffic Congestion” (PhD 2018)
- Chun Pang Chiu, “Understanding Convolutional Neural Networks with Augmented Examples, Layer Analysis and Controllable Datasets” (MPhil 2018)
- Bo Li, “Network Dynamics and Optimization: Oscillator Synchronization, Network Flows and Deep Neural Networks” (PhD 2018)
- He Wang, “Optimal Multisensory Integration in Modular Neural Networks” (PhD 2017)
- Tsz Ki Chau, “Ground State Domain Patterns in Modulated Systems” (MPhil 2017)
- Kai Yin Leung, “Temporal Integration and Predictive Information in Continuous Attractor Neural Networks” (MPhil 2017)