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Education

B.S. Software Engineering, Nanjing Institution of Science and Technology, 2008–2012.

Ph.D. Physics, Nanjing University, 2012–2017. (Advisor: Prof. Qiang-Hua Wang)

Awards

First prize of Physics Olympiad in JiangSu Province, 2007

Academic Excellence Scholarship, 2016

First prize of ZTE Fantastic Algorithm, 2017

Research interest & experience

I am good at computational physics, especially **tensor networks** and **quantum differentiable programming**. With these two powerful kills, I am able to solve some valuable problems in the cross discipline of quantum physics and computer sciences. I am also the maintainer of several open source projects (listed at the end of this CV), as well as an organizer of QuantumBFS and numeric club. I list my research experiences as the following:

1 When I was a colledge student, I read a book named "Quantum Computation and Quantum Information" by Michael A. Nielsen. I was deeply impressed by the beautiful computation framework in the book, and decided to learn more about quantum computing in Prof. Yang Yu's group in Nanjing University.

2 After one year, I was transfered to Prof. Qiang-Hua Wang's group since I was more interested in theories and numerics rather than experiments. I mastered tensor networks algorithms and renormalizationing group theories, and became a geek in simulating quantum many body systems. Most of my works are about designing numeric algorithms to solve important problems in physics, like multi-channel Kondo problem and fractional topological excitations.

3 In the last year as a doctor candidate, I won the first prize in ZTE fantastic algorithm that worth $15,000, which is a good proof of my solid algorithmic background of matrix computation and combinatorial optimization. Then I became a postdoc of a young and charming guy Lei-Wang. Besides providing valuable suggestions in my research, he also creates a lot of opportunities for me, like encouraging me to give lectures and talks in international meetings and summer schools.

4 Now, it is the second year of my postdoc career in IOP, CAS. My current research interest is quantum machine learning, this is a field that can incubate several killer Apps. I have not only published several sounding papers in this field, but also developed the quantum differentiable learning framework Yao.jl together with a genuine Julia lover Xiu-Zhe Luo.

Publications

1 **Jin-Guo Liu**, Da Wang and Qiang-Hua Wang, Quantum impurities in channel mixing baths. Phys. Rev. B **93**, 035102 (2016).

2 **Jin-Guo Liu**, Zhao-Long Gu, Jian-Xin Li and Qiang-Hua Wang, Sub-system fidelity for ground states in one dimensional interacting systems. arXiv:1609.09309 (2016).

3 Yang Yang, Wan-Sheng Wang, **Jin-Guo Liu**, Hua Chen, Jian-Hui Dai and Qiang-Hua Wang, Superconductivity in doped Sr_2IrO_4: A functional renormalization group study. Phys. Rev. B **89**, 094518 (2014).

4 Yao Wang, **Jin-Guo Liu**, Wan-Sheng Wang, and Qiang-Hua Wang, Electronic order near the type-II van Hove singularity in BC_3. Phys. Rev. B **97**, 174513 (2018)

5 Zi Cai, and **Jin-Guo Liu**, Approximating quantum many-body wave functions using artificial neural networks. Phys. Rev. B **97**, 035116 (2018).

6 **Jin-Guo Liu**, and Lei Wang, Differentiable learning of quantum circuit Born machine. arXiv:1804.04168 (2018).

7 JinFeng Zeng, YuFeng Wu, **JinGuo Liu***, Lei Wang and JiangPing Hu, Learning and Inference on Generative Adversarial Quantum Circuits. arXiv:1808.03425 (2018)

Conferences

1 Statistic Physics and Machine Learning (An Qing), talk: "Machine Learning in frustrated quantum spin system".

2 The FOR 1807 Winter School on Numerical Methods for Strongly Correlated Quantum Systems (Marburg), lecture: "Deep learning and quantum many body systems".

3 The 8th Workshop on Quantum Many-Body Computation (Hang Zhou), poster: "Differentiable learning of quantum circuit Born machine"

4 Computational Approaches for Quantum Many Body Systems 2016 (Bei Jing), talk: "Local indistinguishability and topological phase of matter"

5 The First International Conference on Machine Learning and Physics (Bei Jing), poster: "Differentiable learning of quantum circuit Born machine"

6 Julia Meetup in BeiJing 2018, talk: Tutorial for high performance matrix computations, in Julia

7 Quantum Information for Developers 2018 (Zurich), Hackathon: "Funny Tensor Networks"

Slection of Repositories

viznet: network (neural network, tensor networks and quantum circuit) visualization toolbox.

Layers: computation graph framework with complex value support.

Yao.jl: quantum circuit simulator aiming for quantum machine learning.

QuAlgotithmZoo.jl: quantum algorithm zoo based on Yao.jl, including Grover Search, HHL, QuGAN, QCBM, Hamiltonian Solver et. al.

marbug: neural network for physicists tutorial code.

FunnyTN.jl: Tensor Network Pictograph.

CuYao.jl: GPU extension for Yao.jl.

Last updated: November 8, 2018