Dian Wu (吴 典)

PhD in Physics

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Research Interests

Computational physics; Many-body systems; Disordered and frustrated magnets; Variational Monte Carlo; Numerical optimization; Machine learning

Education

- PhD: Computational Quantum Science Laboratory, École polytechnique fédérale de Lausanne (EPFL), supervised by Giuseppe Carleo — Oct. 2020 – Nov. 2024
- Summer research: Condensed Matter Physics Group, University of California San Diego (UCSD), supervised by Yi-Zhuang You — July 2018
- Undergraduate research: Institute of Physics, Chinese Academy of Sciences, supervised by Lei Wang — Sept. 2017 – July 2020
- BSc: School of Physics, Peking University — Sept. 2016 – July 2020
- Early life in Hangzhou, China

Publications

Variational Monte Carlo using autoregressive neural networks for many-body systems

- I. Biazzo, D. Wu, G. Carleo, "Sparse autoregressive neural networks for classical spin systems", Mach. Learn.: Sci. Technol. **5**, 025074 (2024)
- D. Wu, R. Rossi, G. Carleo, "Unbiased Monte Carlo cluster updates with autoregressive neural networks", Phys. Rev. Res. **3**, L042024 (2021)
- D. Wu, L. Wang, P. Zhang, "Solving statistical mechanics using variational autoregressive networks", Phys. Rev. Lett. **122**, 080602 (2019)

Other computational studies including exact diagonalization and tensor networks

- D. Wu, R. Rossi, F. Vicentini, *et al.*, "Variational benchmarks for quantum many-body problems", Science **386**, 296 (2024)
- D. Wu, F. Yang, G. Carleo, "Unveiling nonmagnetic phase and many-body entanglement in two-dimensional random quantum magnets $Sr_2CuTe_{1-x}W_xO_6$", arXiv:2407.05917
- D. Wu, R. Rossi, F. Vicentini, G. Carleo, "From tensor-network quantum states to tensorial recurrent neural networks", Phys. Rev. Res. **5**, L032001 (2023)
- F. Vicentini, D. Hofmann, A. Szabó, D. Wu, *et al.*, "NetKet 3: Machine learning toolbox for many-body quantum systems", SciPost Phys. Codeb. **7** (2022)

Collaboration on machine learning in other fields

- Z. Zhong, J. An, D. Wu, *et al.*, "A machine learning strategy for enhancing the strength and toughness in metal matrix composites", Int. J. Mech. Sci. **281**, 109550 (2024)
- H.-Y. Hu, D. Wu, Y.-Z. You, B. Olshausen, Y. Chen, "RG-Flow: A hierarchical and explainable flow model based on renormalization group and sparse prior", Mach. Learn.: Sci. Technol. **3**, 035009 (2022)

Teaching experience

Teaching assistant for: Computational physics; Quantum physics; Computational quantum physics

Skills

- Programming languages: Python, Julia, C/C++ (daily use); Haskell, Fortran, Mathematica, MATLAB (academic experience); JavaScript, C#, Rust, Lisp, Prolog... (it is not hard to learn a new language after knowing some programming language theory)
- Software frameworks: JAX, PyTorch, TensorFlow, NetKet, ITensor, Qiskit
- Experienced in Linux and high performance computing (HPC) clusters
- Amateur interest in compiler optimization and symbolic computation
- Amateur experience of training and fine-tuning large language and image models

Last update: 2024-11-13