Dong Zhou

zhou.dong@gmail.com (917) 207-8391 (mobile)
nosarthur.github.io US green card holder

Summary

Scientist and programmer. Author of 30+ papers with 1000+ citations, Erdös number ≤ 5. Familiar with magnetic resonance imaging, quantum computing, and biophysics.

Skills

Python, Go, C/C++, aws/gcloud
Computational physics/mathematics, Image processing, Machine learning

Experience

- Senior scientist/Senior developer I, Schrödinger Inc. 2016-present

  Implement crystal structure prediction library (Python). Maintain atom mapping module (subgraph isomorphism) for free energy perturbation. Implemented analysis library for molecular dynamics trajectories (Python, C++). Maintained scientific computing web services for FEP+ (aws/gcloud, Go, Python, PostgreSQL, gRPC, Docker, Polymer.js).

- Postdoc in radiology, Weill Medical College of Cornell University 2012–2016

  Solved ill-posed inverse problems such as magnetic susceptibility and susceptibility tensor imaging, magnetic quadrupole imaging, 3D phase unwrapping (Matlab, C/C++). Developed probes for transcranial magnetic stimulation both in simulation (COMSOL multiphysics) and on hardware (electronics, 3D printing).

- Postdoc in physics, Yale University 2011–2012

  Developed state preparation scheme using quantum bath engineering, and adiabatic phase based two-qubit CNOT gate scheme on circuit QED hardware (3D transmon). Simulated these schemes using Python package QuTip.

- Research assistant, University of Wisconsin-Madison 2007–2011

  Solved open quantum systems dynamics in the presence of classical stochastic noises both analytically and numerically (Matlab). Developed schemes for quantum gate, quantum control, and entanglement preparation for quantum dot systems. Developed algorithm for graph isomorphism problem using continuous-time quantum random walk. Performed experiments and data analyses for nacre and other biological samples (machining, X-ray diffraction, X-ray absorption near edge spectroscopy and microscopy using synchrotron radiation @ SRC and LLNL). Implemented GUI program for spectra analysis (KaleidaGraph).

  Reviewer for J. Phys. A, IEEE TBME, PLOS ONE, Quantum Information Processing, New J. Phys., Medicine, J. Neuroscience Methods, NeuroImage, Magnetic Resonance in Medicine, Medical Physics, NMR in Biomedicine, Int. J. Mod. Phys. B, Physica Scripta

Education

- Ph.D in physics, University of Wisconsin-Madison (GPA 4.0, CR 71) 2006–2011
- Graduate study in physics, University of Georgia-Athens (GPA 4.0, CR 49) 2004–2006
- B.S. from Honored Mixed Class, Zhejiang University, China (GPA 3.8, CR 196) 2000–2004

Honors and Awards

- International Society for Magnetic Resonance in Medicine (ISMRM) Merit Award, Magna Cum Laude, 2014
- International Student Academic Achievement Award, UW-Madison, 2011
- Ray and Anne Herb Award for Wisconsin Distinguished Graduate Fellowship, 2008
- Emanuel R. Piore Award for Highest Scorer on the Qualifier Exam, UW-Madison, 2007
- University Housing's Favorite Instructor Award for Fall 2006, UW-Madison, 2006
- Van Vleck Fellowship for Graduate Students in Physics, UW-Madison, 2006
- Honored Graduate of Zhejiang University, China, 2004
- Honorary Enrollment, Zhejiang University, China, 2000
- Tan Jiazhen (C. C. Tan) Scholarship for Outstanding High School Student in Biology, 1999
- Kang Hui Scholarship for Highest Scorer in High School Entrance Exam, Hangzhou, China, 1996

Patents

1. *Magnetic resonance imaging systems and methods for optimized parallel receive, excite, and shim (oPRES)*
   Hui Han, Yi Wang, John Stager, Junghun Cho, and **Dong Zhou**, pending

Publications

1. *Quantitative susceptibility mapping of magnetic quadrupole moments*
   J. Cho, **D. Zhou**, Y. Kee, P. Spincemaille, and Y. Wang, Concepts Magn Reson Part A, accepted (2019)
2. *Cardiac Quantitative Susceptibility Mapping (QSM) for Heart Chamber Oxygenation*
   Y. Wen, T.D. Nguyen, Z. Liu, P. Spincemaille, **D. Zhou**, A. Dimov, Y. Kee, K. Deh, J. Kim, J. Weinsaft, and Y. Wang, Magn Reson Med 79 (3), 1545 (2018)
3. *Quantitative Susceptibility Mapping (QSM)-Based Cerebral Metabolic Rate of Oxygen Mapping with Minimum Local Variance*
   J. Zhang, J. Cho, **D. Zhou**, T.D. Nguyen, P. Spincemaille, A. Gupta, and Y. Wang, MRM 79 (1), 172 (2018)
4. *Susceptibility underestimation in a high susceptibility phantom: dependence on imaging resolution, magnitude contrast and other parameters*
   D. Zhou, J. Zhang, P. Spincemaille, Y. Wang, Magn Reson Med, 78 (3), 1080 (2017)
5. *Preconditioned Total Field Inversion (TFI) Method for Quantitative Susceptibility Mapping*
   Z. Liu, Y. Kee, **D. Zhou**, Y. Wang, and P. Spincemaille, Magn Reson Med 78 (1), 303 (2017)
6. *Cerebral Metabolic Rate of Oxygen (CMRO2) Mapping with Hyperventilation Challenge using Quantitative Susceptibility Mapping (QSM)*
   J. Zhang, **D. Zhou**, T.D. Nguyen, P. Spincemaille, A. Gupta, Y. Wang, Magn Reson Med, 77 (5), 1762 (2017)
7. *Three-dimensional MR Phase Unwrapping via Dual Decomposition*
   J. Dong, F. Chen, **D. Zhou**, T. Liu, Z. Yu, and Y. Wang, Magn Reson Med 77 (3), 1353 (2017).

8. *On the influence of zero-padding on the nonlinear operations in Quantitative Susceptibility Mapping*
   S. Eskreis-Winkler, **D. Zhou**, T. Liu, A. Gupta, S. A. Gauthier, Y. Wang, and P. Spincemaille, MRI 35, 154 (2017)

9. *Quantitative susceptibility mapping and R2* measured changes during white matter lesion development in multiple sclerosis: myelin breaking down, myelin debris degradation and removal, and iron accumulation*
   Y. Zhang, S.A. Gauthier, A. Gupta, W. Chen, J. Comunale, G.C.-Y. Chiang, **D. Zhou**, G. Askin, W. Zhu, D. Pitt, Y. Wang, AJNR 37 (9) 1629 (2016).

10. *Longitudinal change in magnetic susceptibility of new enhanced multiple sclerosis (MS) lesions measured on serial quantitative susceptibility mapping (QSM)*
    Y. Zhang, S.A. Gauthier, A. Gupta, J. Comunale, G. C.-Y. Chiang, **D. Zhou**, W. Chen, A.E. Giambrone, W. Zhu, Y. Wang, JMRI 44 (2) 426 (2016).

11. *Increase in magnetic susceptibility after MS lesion formation and potential diagnostic utility*
    Y. Zhang, S. Gauthier, L. Tu, A. Gupta, J. Comunale, G.C.-Y. Chiang, **D. Zhou**, Y. Wang, Multiple Sclerosis Journal 21 502 (2016).

12. *Simultaneous Phase Unwrapping and Removal of chemical Shift (SPURS) using Graph Cuts: Application in Quantitative Susceptibility Mapping*
    J. Dong, T. Liu, F. Chen, **D. Zhou**, A. Dimov, A. Raj, Q. Cheng, P. Spincemaille, and Y. Wang, IEEE TMI 34 (2) 531 (2015).

13. *Background field removal by solving the Laplacian boundary value problem*
    D. Zhou, T. Liu, P. Spincemaille, and Y. Wang, NMR in Biomedicine, 27 (3), 312 (2014).

14. *An Iterative Spherical Mean Value (iSMV) Method for Background Field Removal in MRI*
    Y. Wen, **D. Zhou**, T. Liu, P. Spincemaille, and Y. Wang, Magn Reson Med 72 (4) 1065 (2014).

15. *Magnetic susceptibility anisotropy: cylindrical symmetry from macroscopically ordered anisotropic molecules and accuracy of MRI measurements using few orientations*
    C. Wisnieff, T. Liu, P. Spincemaille, S. Wang, **D. Zhou**, and Y. Wang, NeuroImage 70, 363 (2013).

16. *Mediated gates between spin qubits*
    J. Fei, **D. Zhou**, Y.-P. Shim, S. Oh, X. Hu, and M. Friesen, Phys. Rev. A 86, 062328 (2012). arXiv:1207.6063

17. *Cavity-assisted quantum bath engineering with a superconducting qubit*
    K. W. Murch, U. Vool, **D. Zhou**, S. J. Weber, S.M. Girvin, and I. Siddiqi, Phys. Rev. Lett. 109, 163602 (2012); arXiv:1207.0053

18. *Phenomenological noise model for superconducting qubits: two-state fluctuators and 1/f noise*
    D. Zhou and R. Joynt, Supercond. Sci. Techno. 25, 045003 (2012); arXiv:1102.5766

19. *Topology of entanglement evolution of two qubits*
    D. Zhou, G.-W. Chern, J. Fei, and R. Joynt, Int. J. Mod. Phys. B 26, 1250054 (2012); arXiv:1007.1749

20. *Disappearance of entanglement: a topological point of view*
    D. Zhou and R. Joynt, QIP 11, 571 (2012); arXiv:1006.5474

21. *Suppression of decoherence and disentanglement by the exchange interaction*
    A. De, A. Lang, **D. Zhou**, and R. Joynt, Phys. Rev. A 83, 042331 (2011); arXiv:1006.5943

22. *Quasi-Hamiltonian Method for Computation of Decoherence Rates.*
    R. Joynt, **D. Zhou** and Q.-H. Wang, Int. J. Mod. Phys. B 25, 2115 (2011); arXiv:0906.2843

23. *Noise-induced looping on the Bloch sphere: Oscillatory effects in dephasing of qubits subject to broad-spectrum noise.*
D. Zhou and R. Joynt, Phys. Rev. A 81, 010103 (2010); arXiv:0907.0463

24. *Nacre Protein Fragment Templates Lamellar Aragonite Growth*
RA Metzler, JS Evans, CE Killian, **D Zhou**, TH Churchill, N Appathurai, SN Coppersmith, PUPA Gilbert, J. Am. Chem. Soc. 132, 6329-6334 (2010).

25. *X-ray photoelectron emission spectromicroscopic analysis of arborescent lycopsid cell wall composition and Carboniferous coal ball preservation.*
C. K. Boyce, M. Abrecht, **D. Zhou**, and P.U.P.A. Gilbert, Int. J. Coal Geol. 83, 146-153 (2010).

26. *Disentanglement and decoherence from classical non-Markovian noise: Random telegraph noise.*
D. Zhou, A. Lang, and R. Joynt, QIP 9, 727 (2010); arXiv:0912.3313

27. *Two-particle quantum walks applied to the graph isomorphism problem.*
J. Gamble, M. Friesen, **D. Zhou**, R. Joynt, and S.N. Coppersmith, Phys. Rev. A 81, 052313 (2010); arXiv:1002.3003

28. *A high-resolution chemical and structural study of framboidal pyrite formed within a low-temperature bacterial biofilm.*
L.C.W. MacLean, T. Tyliszczak, P.U.P.A. Gilbert, **D. Zhou**, T.J. Pray, T.C. Onstott, G. Southam. Geobiology 6, 471-480 (2008).

29. *Gradual Ordering in Red Abalone Nacre.*
P.U.P.A. Gilbert, R. A. Metzler, **D. Zhou**, A. Scholl, A. Doran, A. Young, M. Kunz, N. Tamura, S. N. Coppersmith. J. Am. Chem. Soc. 130, 17519-17527 (2008); arXiv:0710.4573

30. *Assignment of polarization-dependent peaks in carbon K-edge spectra from biogenic and geologic aragonite.*
D. Zhou, R.A. Metzler, T. Tyliszczak, J. Guo, M. Abrecht, S.N. Coppersmith, P.U.P.A. Gilbert. J. Phys. Chem. B 112, 13128-13135 (2008).

31. *Probing the organic-mineral interface in model biominerals.*
R. A. Metzler, I.-W. Kim, K. Delak, J.S. Evans, **D. Zhou**, E. Beniash, F. Wilt, M. Abrecht, J.-W. Chiou, J. Guo, S.N. Coppersmith, P.U.P.A. Gilbert. Langmuir 24, 2680-2687 (2008).

32. *Polarization-dependent imaging contrast in abalone shells.*
R.A. Metzler, **D. Zhou**, M. Abrecht, J.-W. Chiou, J. Guo, D. Ariosa, S.N. Coppersmith, P.U.P.A. Gilbert. Phys. Rev. B 77, 064110 (2008).