

Dawei Lu

Curriculum Vitae

June 2015

Institute for Quantum Computing, University of
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Education

- 2012 Ph.D. Hefei National Laboratory for Physical Sciences at Microscale
University of Science and Technology of China
Supervisor: Prof. Jiangfeng Du
Thesis: *Quantum Simulation towards Quantum Chemistry with NMR Simulators*
- 2007 B.Sc. Special Class for Gifted Young
University of Science and Technology of China
Supervisor: Prof. Jiangfeng Du
Thesis: *Application of Strongly Modulating Pulses in Liquid NMR*

Experience

- 2012.09-present Postdoctoral fellow Institute for Quantum Computing and Department of Physics
University of Waterloo
Raymond Laflamme Group
- 2007.09-2012.07 PhD candidate Hefei National Laboratory for Physical Sciences at Microscale
University of Science and Technology of China
Jiangfeng Du Group

Research Interest

- Quantum information processing in nuclear and electron spin magnetic resonance systems.
- Development of spin control techniques to achieve high-fidelity coherent control.
- Benchmarks in large-scale systems.
- Quantum simulation towards large-scale quantum systems.
- Experimental realization of adiabatic quantum computing model.

Honors and Awards

- 2012 CAS Presidential Scholarship
- 2011 Qiu Shi Graduate Student Scholarship
- 2011 First Prize in The Fifth Academic Forum of Hefei National Laboratory for Physical Sciences at Microscale
- 2011 Special Award For The First Annual Conference of Doctoral Students in School of Physical Sciences USTC
- 2010 Guang Hua Graduate Student Scholarship
- 2005 Outstanding Student Scholarship
- 2003 Outstanding Freshman Scholarship (Grade 1)

Publications

1. **D. W. Lu**, H. Li, D. Trottier, J. Li, A. Brodutch, A. P. Krismanich, A. Ghavami, G. I. Dmitrienko, G. Long, J. Baugh, and R. Laflamme, *Experimental Estimation of Average Fidelity of a Clifford Gate on a 7-qubit Quantum Processor*, **Phys. Rev. Lett.** **114**, 140505 (2015).

2. **D. W. Lu**, A. Brodutch, J. Park, H. Katiyar, T. Jochym-O'Connor, and R. Laflamme, *NMR quantum information processing*, **arXiv:1501.01353** (2015).
3. J. Li, **D. W. Lu**, Z. H. Luo, R. Laflamme, X. H. Peng, and J. F. Du, *Maximally Accessible Purity in Coherently Controlled Open Quantum Systems: Application to Quantum State Engineering*, **arXiv:1412.4146** (2014).
4. **D. W. Lu**, J. Biamonte, J. Li, H. Li, T. Johnson, V. Bergholm, M. Faccin, Z. Zimborás, R. Laflamme, J. Baugh and S. Lloyd, *Chiral Quantum Walks*, **arXiv:1405.6209** (2014).
5. Z. K. Li, H. Zhou, C. Y. Ju, H. W. Chen, W. Q. Zheng, **D. W. Lu**, X. Rong, C. K. Duan, X. H. Peng, and J. F. Du, *Experimental Realization of a Compressed Quantum Simulation of a 32-Spin Ising Chain*, **Phys. Rev. Lett.** **112**, 220501 (2014).
6. **D. W. Lu**, A. Brodutch, J. Li, H. Li, and R. Laflamme, *Experimental realization of post-selected weak measurements on an NMR quantum processor*, **New J. Phys.** **16**, 053015 (2014).
7. **D. W. Lu**, B. R. Xu, N. Y. Xu, Z. K. Li, H. W. Chen, X. H. Peng, R. X. Xu and J. F. Du, *Quantum chemistry simulation on quantum computers: Theories and Experiments*, **Phys. Chem. Chem. Phys. Perspective**, **14**, 9411 (2012).
8. **D. W. Lu**, N. Y. Xu, B. R. Xu, Z. K. Li, H. W. Chen, X. H. Peng, R. X. Xu and J. F. Du, *Experimental study of the quantum simulation towards quantum chemistry with an NMR simulator*, **Phil. Trans. R. Soc. A**, **370**, 4734 (2012).
9. N. Y. Xu, J. Zhu, **D. W. Lu**, X. Y. Zhou, X. H. Peng and J. F. Du, *Quantum factorization of 143 on a dipolar-coupling NMR system*, **Phys. Rev. Lett.**, **108**, 130501 (2012).
10. Z. K. Li, M. H. Yung, H. W. Chen, **D. W. Lu**, J. D. Whitfield, X. H. Peng, A. Aspuru-Guzik and J. F. Du, *Solving quantum ground-state problems with nuclear magnetic resonance*, **Scientific Reports** **1**, 88 (2011).
11. **D. W. Lu**, N. Y. Xu, R. X. Xu, H. W. Chen, J. B. Gong, X. H. Peng, and J. F. Du, *Simulation of chemical isomerization reaction dynamics on a NMR quantum simulator*, **Phys. Rev. Lett.** **107**, 020501 (2011).
12. H. W. Chen, **D. W. Lu**, B. Chong, G. Qin, X. Y. Zhou, X. H. Peng, and J. F. Du, *Experimental demonstration of probabilistic quantum cloning*, **Phys. Rev. Lett.** **106**, 180404 (2011).
13. J. F. Du, C. Lei, G. Qin, **D. W. Lu**, and X. H. Peng, *Search via quantum walk*, Search Algorithms and Applications, Nashat Mansour (Ed.), InTech, Available from: <http://www.intechopen.com/articles/show/title/search-via-quantum-walk> (2011)
14. **D. W. Lu**, J. Zhu, P. Zhou, X. H. Peng, Y. H. Yu, S. M. Zhang, Q. Chen, and J. F. Du, *Experimental implementation of a quantum random-walk search algorithm using strongly dipolar coupled spins*, **Phys. Rev. A** **81**, 022308 (2010).
15. J. F. Du, N. Y. Xu, X. H. Peng, P. F. Wang, S. F. Wu, and **D. W. Lu**, *NMR implementation of a molecular hydrogen quantum simulation with adiabatic state preparation*, **Phys. Rev. Lett.** **104**, 030502 (2010).
16. C. L. Ren, **D. W. Lu**, X. H. Peng, M. J. Shi, and J. F. Du, *Experimentally simulating the violation of Bell-type inequalities for generalized GHZ states*, **Phys. Lett. A** **373**, 46, 4222-4226 (2009).

Invited Talks

The First Annual Conference of Doctoral Students in School of Physical Sciences USTC, 2011, USTC
Simulating quantum chemistry on an NMR quantum computer

Weekly Brainstorming in International Center for Quantum Design of Functional Materials, 2011, USTC
Quantum simulation

Contributed Talks

Seminar Talk in Department of Modern Physics, 2015, USTC
Advanced techniques in NMR quantum computing and benchmarking a 7-qubit NMR system

Joint IQC-Technion Workshop, 2014, University of Waterloo
Brief Introduction to NMR quantum computing: experiments and techniques

Seminar Talk in Department of Mathematics and Statistics, 2014, University of Guelph
Experimental estimation of average fidelity of a Clifford gate on a 7-qubit quantum processor

Quantum Innovators Workshop, 2014, University of Waterloo

Experimental estimation of average fidelity of a Clifford gate on a 7-qubit quantum processor

IQC Seminar, 2012, University of Waterloo

Simulation of quantum chemistry on an NMR quantum computer

The Chinese Physical Society Conference, 2010, Nankai University

Factoring 143 adiabatically using an NMR quantum computer

Workshop on Quantum Engineering and Physics of Coherence Device, 2010, South China Normal University

Implementing quantum random-walk search algorithm using strongly coupled systems

Poster Presentations

Quantum Information Science Program Meeting, 2014, University of Waterloo

Experimental Estimation of Average Fidelity of a Clifford Gate on a 7-qubit Quantum Processor

Quantum Information Science Program Meeting, 2014, University of Waterloo

Post selection and weak measurements with an ensemble quantum processor

Spin-based Quantum Information Processing, 2014, University of Konstanz

Randomized Benchmarking on a 7-qubit NMR system

IQC Poster Session, 2014, University of Waterloo

Post selection and weak measurements with an ensemble quantum processor

IQC Poster Session, 2013, University of Waterloo

Benchmarking Quantum Information Processing on a 12-Qubit System

Conference on Quantum Information and Quantum Control, 2011, University of Toronto

Simulation of chemical isomerization reaction dynamics on a NMR quantum simulator

Teaching Experience

Course: Undergraduate School on Experimental Quantum Information Processing (USEQIP), 2015, University of Waterloo

Level: Undergraduate

Duties: Teaching students NMR basis and supervising them using the NMR spectrometer

Course: Prospects of Quantum Information Processing (Seminar Course), 2009, USTC

Level: Graduate

Duties: Preparing homework assignments, quizzes and grading

Course: Electromagnetics, 2008, USTC

Level: Undergraduate

Duties: Preparing homework assignments, quizzes and grading

Course: Classical Mechanics, 2007, USTC

Level: Undergraduate

Duties: Preparing homework assignments, quizzes and grading

References

Prof. Raymond Laflamme, Postdoctor Supervisor (2012.09-present)

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Prof. Jiangfeng Du, PhD Supervisor (2007.09-2012.07)

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Prof. Jonathan Baugh, Collaborator (2012.09-present)

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Prof. Xinhua Peng, PhD Supervisor (2007.09-2012.07)

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