

Cunlu Zhou

CONTACT INFORMATION +1 (819) 821-8000 x62406 Département d'informatique (D4)
cunlu.zhou@usherbrooke.ca Université de Sherbrooke
Homepage: cunluzhou.com 2500 Boul. de l'Université
Google Scholar Profile: link Sherbrooke (Québec), Canada, J1K 2R1

RESEARCH INTERESTS quantum computing, optimization, complexity theory, quantum many-body physics

APPOINTMENTS HELD 08/2024– Assistant Professor in Computer Science, Université de Sherbrooke
08/2021– FRHTP Postdoctoral Fellow, Center for Quantum Information and Control,
University of New Mexico, Albuquerque, NM
07/2019– Postdoctoral Fellow in Computer Science, University of Toronto
07/2021 Supervisor: Henry Yuen

EDUCATION **University of Notre Dame** **Notre Dame, IN, USA**

Ph.D. in Mathematics May 2019

- Dissertation Title: *Entropy, Optimization, and Coding Theory*
- Advisors: Roxana Smarandache and Leonid Faybusovich

Capital Normal University **Beijing, China**

M.S. in Mathematics June 2012

- Thesis: *A Remark on Calc. Var. Partial Differential Equations, 329-344 (2002)*
- Advisor: Zhaoli Liu

Chongqing Normal University **Chongqing, China**

B.A. in Mathematics June 2009

PUBLICATIONS Yi, C., **Zhou, C.**, and Takahashi, J., *Quantum Phase Estimation by Compressed Sensing*, Quantum **8**, 1579, 2024. doi:10.22331/q-2024-12-27-1579

Takahashi, J., Rayudu, C., **Zhou, C.**, King, R., Thompson, K., and Parekh, O., *An $SU(2)$ -symmetric Semidefinite Programming Hierarchy for Quantum Max Cut*, arXiv:2307.15688, Jul. 2023. Accepted to TQC 2024. Submitted.

Wiersema, R., **Zhou, C.**, Carrasquilla, J. F., and Kim, Y. B., *Measurement-induced entanglement phase transitions in variational quantum circuits*, SciPost Phys. **14**, 147, Jun. 2023. doi:10.21468/SciPostPhys.14.6.147

Wiersema, R., **Zhou, C.**, de Sereville, Y., Carrasquilla, J. F., Kim, Y. B., and Yuen, H., *Exploring entanglement and optimization within the Hamiltonian Variational Ansatz*. PRX Quantum **1**, 020319, Dec. 2020. doi:10.1103/PRXQuantum.1.020319

Faybusovich, L. and **Zhou, C.**, *Long-Step Path-Following Algorithm in Quantum Information Theory: Some Numerical Aspects and Applications*, Numerical Algebra, Control & Optimization, 12(2):445-467, Jun. 2022. doi:10.3934/naco.2021017

Faybusovich, L. and **Zhou, C.**, *Self-Concordance and Matrix Monotonicity with Applications to Quantum Entanglement Problems*, Applied Mathematics and Computation, 375:125071, Jun. 2020. doi:10.1016/j.amc.2020.125071

Faybusovich, L. and **Zhou, C.**, *Long-Step Path-Following Algorithm for Solving Symmetric Programming Problems with Nonlinear Objective Functions*, *Comput Optim Appl*, 72(3):769-795, Apr. 2019. doi:10.1007/s10589-018-0054-7

Zhou, C., Mitchell, D. G. M., and Smarandache, R., *Free Pseudodistance Growth Rates for Spatially Coupled LDPC Codes over the BEC*, 2018 IEEE Information Theory Workshop (ITW), pp. 1-5, Guangzhou, 2018. doi:10.1109/ITW.2018.8613507

PRESENTATIONS

Quantum phase estimation by compressed sensing, 10th International Conference on Quantum Information and Quantum Control, The Fields Institute, Toronto, Ontario, Aug. 2024 (talk)

Algorithms, Complexity, and Quantum Many-body Physics, University of Calgary, Calgary, Alberta, Apr. 18, 2024 (talk)

Algorithms, Complexity, and Quantum Many-body Physics, University of Pittsburgh, Pittsburgh, PA, Mar. 4, 2024 (talk)

Algorithms, Complexity, and Quantum Many-body Physics, Université de Montréal, Montréal, Québec, Feb. 28, 2024 (talk)

Some recent results on Quantum Phase Estimation and Quantum MaxCut, University of Miami, Coral Gables, FL, Feb. 9, 2024 (talk)

Some recent results on Quantum Phase Estimation and Quantum MaxCut, Université de Sherbrooke, Sherbrooke, Québec, Jan. 22, 2024 (talk)

Quantum phase estimation by compressed sensing, Quantum Days 2024, Calgary, AB, Feb. 2024 (poster)

An $SU(2)$ -symmetric Semidefinite Programming Hierarchy for Quantum MaxCut, IPAM UCLA, Nov. 2023 (poster)

Quantum Phase Estimation by Compressed Sensing, SQUINT2023, Albuquerque, NM, Oct. 2023 (poster)

An $SU(2)$ -symmetric Semidefinite Programming Hierarchy for Quantum MaxCut, Université de Sherbrooke, Sherbrooke, Québec, Oct. 2023 (invited talk)

Quantum Phase Estimation by Compressed Sensing, INTRIQ Meeting, Bromont, Quebec, Oct. 2023 (poster)

Quantum Phase Estimation by Compressed Sensing, APQC Workshop, Estes Park, Colorado, Oct. 2023 (poster)

An $SU(2)$ -symmetric Semidefinite Programming Hierarchy for Quantum MaxCut, 2023 Modeling and Optimization: Theory and Applications (MOPTA), Lehigh University, Bethlehem, Pennsylvania, Aug. 2023 (talk)

A singlet projector based NPA hierarchy for the Quantum MaxCut problem, Vector Institute, Toronto, Jun. 2023 (invited talk)

A singlet projector based NPA hierarchy for the Quantum MaxCut problem, 2023 CMS summer meeting, Ottawa, Jun. 2023 (invited talk)

Entanglement and optimization within the Hamiltonian Variational Ansatz, Fermilab, Batavia, IL, Jan. 2021 (invited talk)

Entanglement and optimization within the Hamiltonian Variational Ansatz, Dahlem Center for Complex Quantum Systems, Freie Universität Berlin, Berlin, Dec. 2020 (invited talk)

Entanglement and optimization within the Hamiltonian Variational Ansatz, 2020 Quantum Techniques in Machine Learning (QTML), Cambridge, Massachusetts, Nov. 2020 (invited talk)

A Long-Step Path-Following Algorithm for Quantum Entropy Optimization, IQC, Waterloo, Jan. 2019 (invited talk)

Long-Step Path-Following Algorithm for Nonlinear Symmetric Problems with Applications to Quantum Entropy Optimization, 2019 Joint Mathematics Meetings (JMM), Baltimore, Maryland, Jan. 2019 (talk)

Free Pseudodistance Growth Rates for Spatially Coupled LDPC Codes over the BEC, 2018 IEEE Information Theory Workshop (ITW), Guangzhou, Nov. 2018 (talk)

Long-Step Path-Following Algorithm for Nonlinear Symmetric Programming Problems, 23rd International Symposium on Mathematical Programming (ISMP), University of Bordeaux, Bordeaux, Jul. 2018 (talk)

EXTENDED
PROFESSIONAL
TRAVEL

November	2023	Institute for Pure and Applied Mathematics, Los Angeles, USA
October	2023	Vector Institute, Toronto, Canada
February	2022	Kavli Institute for Theoretical Physics, Santa Barbara, USA
February	2020	Simons Institute for the Theory of Computing, Berkeley, USA
December	2019	Israel Institute for Advanced Studies, Jerusalem, Israel
Summer	2018	IBM Research Lab, Dublin, Ireland
October	2015	Mathematical Coding Theory in Multimedia Streaming, Banff International Research Station (BIRS), Banff, Canada
Summer	2015	École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

HONORS AND
AWARDS

2023	Postdoctoral Travel Award (\$1500 USD) University of New Mexico, Albuquerque, NM, USA
2023	Travel Award (\$1000 CAD) qConnect 2023, Calgary, AB, Canada
2021–2023	NSF FRHTP Postdoctoral Fellowship (~\$70,000 USD per year) Center for Quantum Information and Control, University of New Mexico, Albuquerque, NM, USA
2020–2021	Postgraduate Affiliate Award (\$12,000 CAD) Vector Institute, Toronto, ON, Canada
2018	Student Travel Award 2018 IEEE Information Theory Workshop, Guangzhou, China
2009–2012	University Scholarships Capital Normal University, Beijing, China

GRANTS

2018	Professional Development Grant (\$1700 USD) University of Notre Dame, Notre Dame, IN, USA
2018	GSU Conference Presentation Grant (\$350 USD) University of Notre Dame, Notre Dame, IN, USA

TEACHING
EXPERIENCE

University of New Mexico:

Summer 2024 Instructor, Optimization and Quantum Foundations

University of Notre Dame:

Spring 2018 Teaching Assistant, Calculus III
Spring 2017 Instructor, Calculus B
Fall 2016 Teaching Assistant, Linear Algebra and Differential Equations
Spring 2015 Teaching Assistant, Linear Algebra and Differential Equations
Fall 2014 Teaching Assistant, Linear Algebra and Differential Equations
Spring 2014 Teaching Assistant, Calculus B
Fall 2013 Teaching Assistant, Calculus B

RELEVANT
SKILLS

Languages: Fluent in English and Chinese
Computer Skills: Proficient in Python and MATLAB

REFERENCES

Roxana Smarandache (Ph.D. advisor), Professor

Department of Mathematics and Electrical Engineering,
University of Notre Dame, Notre Dame, IN, USA
rsmarand@nd.edu

Leonid Faybusovich (Ph.D. advisor), Professor

Department of Mathematics, University of Notre Dame, Notre Dame, IN, USA
lfaybuso@nd.edu

Henry Yuen (Postdoc supervisor), Professor

Department of Computer Science, Columbia University, New York City, NY, USA
hyuen@cs.columbia.edu

Juan Felipe Carrasquilla, Professor

Institute for Theoretical Physics, ETH Zürich, 8093 Zürich, Switzerland
juanfelipe.carrasquilla@gmail.com

Yong Baek Kim, Professor

Department of Physics, University of Toronto, Toronto, ON, Canada
ybkim@physics.utoronto.ca

Ojas Parekh, Principal Member of Technical Staff

Sandia National Labs, Albuquerque, NM, USA
odparek@sandia.gov