# 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, machine learning, complexity theory, and connections with physics

**APPOINTMENTS HELD**

| 11/2024– | Affiliated professor, Institut quantique, Université de Sherbrooke, QC |
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| 08/2024– | Assistant professor of computer science, Université de Sherbrooke, QC |
| 08/2021– | FRHTP Postdoctoral Fellow, Center for Quantum Information and Control, University of New Mexico, Albuquerque, NM |
| 2020–2022 | Postgraduate Affiliation, Vector Institute, ON |
| 07/2019–07/2021 | Postdoctoral Fellow in Computer Science, University of Toronto, ON 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

**HONORS AND AWARDS**

| 2025–2030 | IBM Quantum Research Chair ($575,000 CAD over 5 years) |
|---|---|
| 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 |
| 2009–2012 | University Scholarships Capital Normal University, Beijing, China |

**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    *Advancing Quantum Algorithm Development in Québec*, Quantum Forum 2025, Troy, NY, Apr. 2025 (Keynote)

*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*, $23^{rd}$ 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 |

TEACHING EXPERIENCE

**Université de Sherbrooke:**

Summer 2025    Instructor, Topics in Quantunm Algorithms

**University of New Mexico:**

Summer 2024    Instructor, Optimization and Quantum Foundations

**University of Notre Dame:**

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|---|---|---|
| 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 |

SERVICE

**Université de Sherbrooke**

2025–    Organizer, Quantunm Algorithms Research Seminar (QARS)

**University of New Mexico**

2023    Organizer, CQuIC Seminar
2022    Organizer, SDP & Approximation Algorithms Seminar

**Program committees**

2022    Southwest Quantum Information and Technology (SQuInT)

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