曲东雪

个人简历

现居地：加拿大安大略省滑铁卢市
出生年月日：*1991.02.28*
(+86) 191 8059 9347 (中国)
☎ (+1) 226 698 8421 (加拿大)
✉ dqu@perimeterinstitute.ca

有两年加拿大工作经验，四年半美国博士研究生学习经验，是个有效率的执行者；
具有很强的逻辑思维和团队协作能力，擅长数值计算、英语沟通和英语写作。

主要研究方向

2017.09 – 目前 **圈量子引力，量子引力中的数值方法，Spinfoam 模型中的数值计算，量子宇宙学，量子黑洞**.

工作经验

2022.08 – 目前 **博士后研究员**, *Perimeter Institute for Theoretical Physics (PI)*, 加拿大.

教育经历

2017.09 – 2022.04 **物理学博士**, *Florida Atlantic University (FAU)*, 美国.
- 博士论文: *Computational Aspects of Quantum Gravity: Numerical methods in Spinfoam models*
- 博士导师：韩慕辛教授
- 博士研究方向：量子引力中的数值方法，圈量子引力中的 Spinfoam 模型

2014.09 – 2017.06 **凝聚态物理学，硕士**, 北京交通大学, 理学院, 中国.

2010.09 – 2014.06 **光信息科学与技术，学士**, 北京交通大学, 理学院, 中国.

荣誉与奖项

2023 - 目前 **Blaumann Foundation**, 意大利, Blaumann 基金会研究奖学金的受益人，并获得其研究资助.

2021 - 2022 **Graduate Fellowship for Academic Excellence**, *FAU*, 因出色的学术表现获研究生学院学术卓越研究生奖学金.

2020 - 2021 **The Nathan W. Dean Award**, *FAU*, 因杰出成就获美国 FAU 物理系 Nathan W. Dean 奖.

2016 - 2017 **优秀硕士毕业生**, 北京交通大学.

2014 - 2015 **中央高校基本科研业务费（研究生科研创新平台）项目，项目负责人**, 中国, 牵头开展 “光量子相位测量的数值仿真” 研究 (项目编号：2015YJS170).

教学经历

2022.09 - 2024.05 与韩慕辛教授共同指导 FAU 博士研究生宋世聪，硕士研究生周雨彤

2023.08 北京师范大学圈量子引力暑期学校“Spinfoam 模型”讲座特邀讲师

2017 - 2022 FAU 物理系普通物理实验课 I 和 II 讲师

2014 - 2017 北京新东方高中物理兼职教师

我具有丰富的教学经验和扎实的专业背景，能够胜任不同层次的物理课程教学，可中，英文教授大学物理，四大力学，计算物理，量子场论等课程。从 *2017* 年至 *2022* 年，我在 *FAU* 物理系担任普通物理实验课 *I* 和 *II* 的讲师，积累了教授大学物理课程的实战经验。此外，在博士期间，我在四大力学课程中取得了优异成绩（全部课程均为优秀），具备深厚的理论基础，能够胜任相关课程的教学工作。

在研究生培养方面，我还与 *FAU* 的韩慕辛教授共同指导了博士研究生和硕士研究生，为学生的学术发展提供指导。*2023* 年，我作为北京师范大学圈量子引力暑期学校的特邀讲师，讲授“*Spinfoam* 模型”课程，向学生系统地讲解了该领域的前沿知识。

在早期教学经历中，我在北京新东方教育机构担任高中物理兼职教师，并成为高中物理明星教师。这四年的教学经历不仅培养了我的课堂组织能力和教学表达技巧，也让我更加了解如何有效地激发学生的学习兴趣和动力。

组织经历

2025.06 将担任 “Lee’s Fest: Quantum Gravity and the Nature of Time” 研讨会的联合组织者，负责协调发言人、安排会议日程，并在整个活动中促进讨论。

2024 - 2025 PI 量子引力组组会负责人，负责每周组会的组织与协调，包括议题策划、研究进展跟踪、内部与外部沟通。

相关技能

中文 **母语**

英文 **近母语** 能与外国人流畅沟通与工作

编程语言 **C, Python, Julia, Mathematica** 熟练使用

期刊基金审稿

2021 - 目前 Physical Review Letters，Physical Review D，波兰自然科学基金 (the National Science Center)

主要国际学术报告与研讨会

⋆ **Spikes and spines in 3D and 4D Lorentzian simplicial quantum gravity**.

2024. 10 International Loop Quantum Gravity Seminar (ILQGS)，邀请报告 (1h)，国际组织

⋆ **Covariant LQG in numerics: real, complex critical points, and ongoing developments**.

2024. 09 Quantum Gravity on the computer 2.0 Workshop，邀请报告 (1h)，德国

2024. 05 **2024 年 Loop quantum gravity 大会，大会报告，美国**

⋆ **Cosmological Dynamics from Covariant Loop Quantum Gravity with Scalar Matter**.

2024. 08 QuIST VII, The 8th International Conference on Quantum Information, Spacetime, and Topological Order, 邀请报告 (1h), 大连

⋆ **Complex critical points in Lorentzian spinfoam quantum gravity: 4-simplex amplitude and effective dynamics on double-Δ_3 complex** .

2023. 06 FAU^2 workshop, 邀请报告 (1h), 德国

⋆ **Complex critical points and curved geometries in Lorentzian EPRL spinfoam amplitude**.

2022. 12 Perimeter Institute Quantum Gravity Seminar, 邀请报告 (1h), 加拿大

2022. 10 International Loop Quantum Gravity Seminar (ILQGS), 邀请报告 (1h), 国际组织

⋆ **Numerical computations of next-to-leading order corrections in spinfoam large-j asymptotics**.

2022. 10 International Conference on Physics, 邀请报告 (1h), 美国迈阿密

发表文章

已发表和接收文章

2025. 01 M. Han, H. Liu, **DQ**†: *"A Mathematica program for numerically computing real and complex critical points in 4-dimensional Lorentzian spinfoam amplitude"*, **Phys.Rev.D 111 (2025)2,024021**, arXiv: 2404.10563.（唯一通讯作者）

2024. 12 M. Han, **DQ**, C. Zhang: *"Spin foam amplitude of the black-to-white hole transition"*, **Phys.Rev.D 110 (2024)12, 124055**, arXiv: 2404.02796.（作者按姓氏字母顺序排列）

2024. 10 *J. Borissova, B. Dittrich,* ***DQ****, M. Schiffer "Spikes and spines in 4D Lorentzian simplicial quantum gravity".* **JHEP 10 (2024) 150**, arXiv: 2406.19169.（作者按姓氏字母顺序排列）

2024. 06 *J. Borissova, B. Dittrich,* ***DQ****, M. Schiffer "Spikes and spines in 3D Lorentzian simplicial quantum gravity".* **Classical and Quantum Gravity** 接收, arXiv: 2406.19169.（作者按姓氏字母顺序排列）

2023. 07 M. Han, H. Liu, **DQ**†: *"Complex critical points in Lorentzian spinfoam quantum gravity: 4-simplex amplitude and effective dynamics on double-Δ_3 complex"*, **Phys.Rev.D 108 (2023) 2, 026010**, arXiv: 2301.02930.（唯一通讯作者）

2023. 04 R. Meer, Z. Huang, M. Anguita, **DQ**, P. Hooijschuur, H. Liu, M. Han, J. Renema, L. Cohen: *"Experimental Simulation of Loop Quantum Gravity on a Photonic Chip"*, **npj Quantum Inf. 9 (2023) 1, 32**, arXiv: 2207.00557.

2022. 10 M. Han, Z. Huang, H. Liu and **DQ**†: *"Complex critical points and curved geometries in four-dimensional Lorentzian spinfoam quantum gravity"*, **Phys.Rev.D 106 (2022) 4, 044005**, arXiv: 2110.10670.（唯一通讯作者）

2021. 04 M. Han, Z. Huang, H. Liu and **DQ**, Y. Wan: *"Spinfoam on Lefschetz Thimble: Markov Chain Monte-Carlo computation of Lorentzian spin foam propagator"*, **Phys.Rev.D 103 (2021) 8, 084026**, arXiv: 2012.11515.（作者按姓氏字母顺序排列）

2021. 01 M. Han, Z. Huang, H. Liu and **DQ**†: *"Numerical computations of next-to-leading order corrections in spinfoam large-j asymptotics"*, **Phys.Rev.D 102 (2020) 12, 124010**, arXiv: 2007.01998.（唯一通讯作者）

2020. 12 L. Cohen, A. Brady, Z. Huang, H. Liu, **DQ**, J. Dowling, M. Han: *"Efficient Simulation of Loop Quantum Gravity – A Scalable Linear-Optical Approach"*, **Phys. Rev. Lett. 126, 020501**, arXiv: 2003.03414.

2019. 04 K. Li, M. Han, **DQ**, Z. Huang, G. Long, Y. Wan, D. Lu, B. Zeng, R. Laflamme: *"Measuring Holographic Entanglement Entropy on a Quantum Simulator"*, **npj Quantum Inf. 5 (2019) 30**, arXiv: 1705.00365.

2017. 04 **DQ**†: *"Optimal Coherent-State Superposition for Quantum Phase Estimation"*, **Nanoscience and Nanotechnology Letters**, Volume 9, Number 4, April 2017, pp. 593-597(5).（唯一作者）

预发表文章

2025. 01 H. Li, M. Han, H, Liu, S. Song, **DQ**†: *"Properties of 4D spinfoam quantum geometry: Results from next-to-leading order spinfoam large-j asymptotics of 1-5 Pachner move"*, arXiv: 2404.02796.（唯一通讯作者, 已投 Phys.Rev.D）

2024. 02 M. Han, H. Liu, **DQ**†, F. Vidotto, C. Zhang: *"Cosmological Dynamics from Covariant Loop Quantum Gravity with Scalar Matter"*, arXiv: 2402.07984.（唯一通讯作者, 已投 Phys.Rev.D）

所有与研究相关的程序均已发布于个人的 GitHub 页面： `https://github.com/dqu2017`

Dongxue Qu

Postdoctoral Researcher

Nationality: Chinese

Waterloo, ON, Canada

+1 (226) 698 8421

dqu20177.wixsite.com/qudx

dqu@perimeterinstitute.ca

About me

I have over two years of work experience in Canada and four and a half years of Ph.D. research in the USA. I am highly organized, efficient, and collaborative, with strong execution skills and a positive personality. I am proficient in numerical computation in physics and skilled in English writing. Additionally, I have multiple years of teaching experience, and I am capable of teaching courses such as **Computational Physics, Quantum Field Theory**, and **General Relativity**, among others.

Skills

Programming:

Mathematica

Julia

Python

C

Languages:

Chinese (native),

English (fluent).

(*)[The skill scale is from 0 (Fundamental Awareness) to 5 (Expert).]

Research Interests

- Numerical methods in Quantum Gravity (QG)
- Spinfoam models in Loop Quantum Gravity (LQG)
- Quantum Black Holes and Quantum Cosmology
- Quantum computing in QG

Job appointment

2022.08-present **Postdoctoral Researcher** — Waterloo, ON, Canada
Perimeter Institute for Theoretical Physics (PI)

Education

2017.08-2022.04 **Ph.D. in Physics** — Boca Raton, FL, USA
Florida Atlantic University (FAU)
Ph.D. Thesis: *Computational Aspects of Quantum Gravity: Numerical methods in Spinfoam models*
Supervisor: Prof. Muxin Han

2014.09-2017.05 **M.Sc. in Condensed Matter Physics** — Beijing, China
Beijing Jiaotong University (BJTU)

2010.09-2014.05 **B.Sc. in Optical Information Science and Technology** — Beijing, China
Beijing Jiaotong University

Grants & Awards

2023.07-present **Recipient of Blaumann Foundation Research Grants** — Italy
Currently supported by the Blaumann Foundation Research Grant Program

2014-2015 **Principal Investigator** — China
I was the recipient of graduate research funding, benefiting from the Fundamental Research Funds for Central Universities through the grant 2015YJS170

2021-2022 **Graduate Fellowship for Academic Excellence** — FAU, USA
Awarded by Graduate College for outstanding academic performance

2020-2021 **The Nathan W. Dean Award** — FAU, USA
Recognized for exceptional achievement

2016-2017 **Outstanding Master's Graduate** — BJTU, China

Teaching

2023.08 **Invited Lecturer at Beijing Normal University (BNU)** — Beijing, China
Introduction to Spinfoam Model Lectures

2022.09-2024.05 **Co-Supervising Ph.D. students** — FAU
Shicong Song and Yutong Zhou

2017-2022 **Physics Lab Instructor** — FAU, USA
General Physics I and II Labs, Department of Physics

2014-2017 **Physics Lecturer (part-time)** — Beijing, China
High School Physics at New Oriental

Organizing Activities

2025.06 **Co-organizer of workshop** PI
I will be the organizer for the workshop *Lee's Fest: Quantum Gravity and the Nature of Time*, responsible for coordinating speakers, scheduling sessions, and facilitating discussions throughout the event.

2024.08-2025.06 **Coordinator of Quantum Gravity group meeting** PI
Responsibilities include organizing and coordinating weekly meetings, planning agendas, tracking research progress, and managing internal & external communications

Journal & Funding Referee

2021 - current **Physical Review Letters, Physical Review D, the National Science Center (Poland)**

International Talks and Seminars

⋆ **Spikes and spines in 3D and 4D Lorentzian simplicial quantum gravity**

2024. 10 International Loop Quantum Gravity Seminar (ILQGS), **Invited talk** (1h), International organization

⋆ **Covariant LQG in numerics: real, complex critical points, and ongoing developments**

2024. 09 Quantum Gravity on the computer 2.0 Workshop, **Invited talk** (1h), Jena, Germany

2024. 05 Loops24 conference, **Plenary talk**, Florida, USA

⋆ **Cosmological Dynamics from Covariant Loop Quantum Gravity with Scalar Matter**

2024. 08 QuIST VII, The 8th International Conference on Quantum Information, Spacetime, and Topological Order, **Plenary talk**, Dalian, China

⋆ **Complex critical points in Lorentzian spinfoam quantum gravity: 4-simplex amplitude and effective dynamics on double-Δ_3 complex**

2023. 06 FAU^2 workshop, **Invited talk** (1h), Erlangen, Germany

⋆ **Complex critical points and curved geometries in Lorentzian EPRL spinfoam amplitude**

2022. 10 International Loop Quantum Gravity Seminar (ILQGS), **Invited talk** (1h), International organization

2022. 12 Perimeter Institute Quantum Gravity Seminar, **Invited talk** (1h), Canada

⋆ **Numerical computations of next-to-leading order corrections in spinfoam large-j asymptotics**

2022. 10 International Conference on Physics, **Invited talk** (1h), Mia, USA

Publications

Published Articles

2025. 01 M. Han, H. Liu, **DQ**† : *"A Mathematica program for numerically computing real and complex critical points in 4-dimensional Lorentzian spinfoam amplitude"*, **Phys.Rev.D 111 (2025)2,024021**, arXiv: 2404.10563 (only one corresponding author).

2024. 12 M. Han, **DQ**, C. Zhang: *"Spin foam amplitude of the black-to-white hole transition"*, **Phys.Rev.D 110 (2024)12, 124055**, arXiv: 2404.02796 (ordered alphabetically).

2024. 10 J. Borissova, B. Dittrich, **DQ**, M. Schiffer: *"Spikes and spines in 4D Lorentzian simplicial quantum gravity"*, **JHEP 10 (2024) 150**, arXiv: 2407.13601 (ordered alphabetically).

2024. 06 J. Borissova, B. Dittrich, **DQ**, M. Schiffer, *"Spikes and spines in 3D Lorentzian simplicial quantum gravity"*, arXiv: 2406.19169. (Accepted by **Classical and Quantum Gravity**, and ordered alphabetically.)

2023. 07 M. Han, H. Liu, **DQ**†: *"Complex critical points in Lorentzian spinfoam quantum gravity: 4-simplex amplitude and effective dynamics on double-Δ_3 complex"*, **Phys.Rev.D 108 (2023) 2, 026010**, arXiv: 2301.02930 (only one corresponding author)

2023. 04 R. Meer, Z. Huang, M. Anguita, **DQ**, P. Hooijschuur, H. Liu, M. Han, J. Renema, L. Cohen: *"Experimental Simulation of Loop Quantum Gravity on a Photonic Chip"*, **npj Quantum Inf. 9 (2023) 1, 32**, arXiv: 2207.00557.

2022. 10 M. Han, Z. Huang, H. Liu and **DQ**†: *"Complex critical points and curved geometries in four-dimensional Lorentzian spinfoam quantum gravity"*, **Phys.Rev.D 106 (2022) 4, 044005**, arXiv: 2110.10670 (only one corresponding author).

2021. 04 M. Han, Z. Huang, H. Liu and **DQ**, Y. Wan: *"Spinfoam on Lefschetz Thimble: Markov Chain Monte-Carlo computation of Lorentzian spin foam propagator"*, **Phys.Rev.D 103 (2021) 8, 084026**, arXiv: 2012.11515 (ordered alphabetically).

2021. 01 L. Cohen, A. Brady, Z. Huang, H. Liu, **DQ**, J. Dowling, M. Han: *"Efficient Simulation of Loop Quantum Gravity – A Scalable Linear-Optical Approach"*, **Phys. Rev. Lett. 126, 020501**, arXiv: 2003.03414.

2020. 12 M. Han, Z. Huang, H. Liu and **DQ**†: *"Numerical computations of next-to-leading order corrections in spinfoam large-j asymptotics"*, **Phys.Rev.D 102 (2020) 12, 124010**, arXiv: 2007.01998. (only one corresponding author).

2019. 04 K. Li, M. Han, **DQ**, Z. Huang, G. Long, Y. Wan, D. Lu, B. Zeng, R. Laflamme: *"Measuring Holographic Entanglement Entropy on a Quantum Simulator"*, **npj Quantum Inf. 5 (2019) 30**, arXiv: 1705.00365.

2017. 04 **DQ**†: *"Optimal Coherent-State Superposition for Quantum Phase Estimation"*, **Nanoscience and Nanotechnology Letters**, Volume 9, Number 4, April 2017, pp. 593-597(5) (only one author).

Preprint Articles

2025. 01 H. Li, M. Han, H, Liu, S. Song, **DQ**†, *"Properties of 4D spinfoam quantum geometry: Results from next-to-leading order spinfoam large-j asymptotics of 1-5 Pachner move"*, arXiv: 2501.16094. (Submitted to Phys.Rev.D, and only one corresponding author)

2024. 02 M. Han, H. Liu, **DQ**†, F. Vidotto, C. Zhang: *"Cosmological Dynamics from Covariant Loop Quantum Gravity with Scalar Matter"*, arXiv: 2402.07984. (Submitted to Phys.Rev.D, and only one corresponding author)

All Codes are posted on: https://github.com/dqu2017