

Han Yan

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RESEARCH INTEREST

- Interplay between many-body systems, quantum information, and quantum field theory.
- Strongly correlated systems, particularly frustrated magnets and spin liquids.
- Fracton states of matter, their link to gravity and holography, and their realization.

ACADEMIC POSITIONS

University of Tokyo, Japan *2023/10 - Present*

Assistant Professor

I Institute for Solid State Physics, Quantum Materials Group (led by Prof. Masaki Oshikawa)

Rice University, U.S.A. *2021/01 - 2023/09*

Junior Fellow, Rice University Academy of Fellows

(Jointly) Peter and Ruth Nicholas Postdoctoral Fellow, Smalley-Curl Institute *2022/10 - 2023/09*

Advisor: Prof. Andriy Nevidomskyy, Department of Physics and Astronomy

Okinawa Institute of Science and Technology Graduate University, Japan *2020/05 - 2020/12*

Junior Research Fellow

Advisor: Prof. Nic Shannon, Theory of Quantum Matter Unit

University of Oxford, U.K. *2012/06 - 2012/08*

Research Intern

Advisor: Prof. Nic Shannon, Clarendon Laboratory

LONG-TERM VISITING POSITIONS

University of Cambridge, U.K. *2025/10 - 2025/12*

Visiting Scholar at Cavendish Laboratory, Department of Physics and Trinity College. Host: Prof. Claudio Castelnovo

Max Planck Institute for the Physics of Complex Systems, Germany *2025/04 - 2025/05*

Host: Director Roderich Moessner

EDUCATION

Okinawa Institute of Science and Technology Graduate University, Japan *2013/09 - 2020/04*

Ph.D. in Physics

Advisor: Prof. Nic Shannon, Theory of Quantum Matter Unit

Co-advisor: Prof. Hirotaka Sugawara

Northwestern University, U.S.A. *2012/09 - 2013/07*

Master of Science in Physics

University of Cambridge, U.K. Master of Advanced Study in Applied Mathematics and Theoretical Physics	2011/09 - 2012/06
University of Science and Technology of China, P. R. China Bachelor of Science in Physics	2007/09 - 2011/07

GRANTS, FELLOWSHIPS & HONORS

Grant-in-Aid for Early-Career Scientists Japan Society for the Promotion of Science, 2.9 million JPY for five years	2026 - 2030
Overseas Research Support for long-term visit to the University of Cambridge Yamada Science Foundation, 1 million JPY	2025
Grant-in-Aid for Research Activity Start-up Japan Society for the Promotion of Science, 2 million JPY for two years	2024 - 2025
Toyota Riken Scholar Toyota Physical and Chemical Research Institute, 1 million JPY for one year	2024/04 - 2025/03
Peter and Ruth Nicholas Postdoctoral Fellowship Research Grant Smalley Curl Institute, Rice University, 15,000 USD per year	2022/10 - 2023/09
Peter Gruss Doctoral Dissertation Excellence Award Okinawa Institute of Science and Technology, award to one Ph.D. graduate every year. Mentioned in OIST News <i>Unique ceremony celebrates OIST's newest graduates.</i>	2021/05
Award for Student Excellence in Graduate Research (inaugural awardee) Okinawa Institute of Science and Technology, award to one Ph.D. student every year.	2019/12
Grant-in-Aid for JSPS Fellow Japan Society for the Promotion of Science, 2 million JPY research grant for project <i>Novel Quantum Spin Liquid States from High Energy Theory Point of View.</i>	2018/04 - 2020/03
Research Fellowship for Young Scientists Japan Society for the Promotion of Science, monthly stipend for Ph.D. study.	2018/04 - 2020/03
TOEFL Scholarship TOEFL Organization, awarded to 48 Bachelor graduates advancing to postgraduate study in China.	2011
Outstanding Graduate Student University of Science and Technology of China, ranked top 5% among Bachelor graduates.	2011
Chinese National Grant for Novel Undergraduate Research National Grants for project <i>Precious Prediction of New Physics on LHC.</i>	2010/09 - 2011/07
National Scholarship University of Science and Technology of China, ranked top 1 in Freshman year.	2008

COMMUNITY SERVICE

- **Competitively Selected and Funded Workshops**

Co-organizer of *Generalized Symmetries in Quantum Matter* by the OIST Theoretical Sciences Visiting Program, Japan. 2025/05-2025/07

Co-scientific coordinator of *Topological Quantum Matter in Magnetic and Synthetic Platforms* at Max Planck Institute for the Physics of Complex Systems, Dresden, Germany. 2024/02/13-16

• **Services by Invitation**

Lead organizer of *Joint Theoretical Physics (JTP) Workshop 2026*, Japan 2026/03

Lead organizer of *APS March Meeting, Focus Topic Session Frustrated Magnetism* by American Physical Society, U.S.A.. 2026/03

Co-organizer of *APS March Meeting, Focus Topic Session Frustrated Magnetism* by American Physical Society, U.S.A.. 2025/03

Co-organizer of *KouShare Theoretical Physics Workshop in Japan*. 2024/02/13-16

Session Chair of *APS March Meeting* by American Physical Society, U.S.A.. 2022/03

Jury for the Poster Session, *8th Annual Smalley-Curl Institute Summer Research Colloquium*. 2022

Committee member of the selection of Peter Gruss Doctoral Dissertation Excellence Award. 2022

Committee member of the selection of OIST student council awards. 2019

Reviewer for *Nature Communications*, *PNAS*, *Physical Review Letters*, *Physical Review X*, *Physical Review X Quantum*, *Physical Review Research*, *Physical Review B*, etc..

BOOKS

1. **Lecture Notes on Field Theory for One-Dimensional Quantum Many-Body System**
On-going project. Publisher: Springer Nature. In collaboration with Masaki Oshikawa.
2. **Chinese Translation of Sidney Coleman's Lectures on Relativity**
On-going project. Publisher: Shanghai Scientific & Technical Publishers. In collaboration with Si-Yi Zhou and Jia-Yue Yang.

ACADEMIC PUBLICATIONS

Preprints

1. **Hyperbolic Fracton Model, Subsystem Symmetry and Holography III: Extension to Generic Tessellations**
[arXiv:2510.25994 \[cond-mat.str-el\]](#)
Yosef Shokeeb, Ludovic D.C. Jaubert, [Han Yan](#)
2. **Fragmented Spin Liquid and Shadow Pinch Points in Dipole-Octupole Pyrochlore Spin Systems**
[arXiv:2509.09205 \[cond-mat.str-el\]](#)
Daniel Lozano-Gómez, [Han Yan](#)
3. **Magnetization and magnetostriction measurements of the dipole-octupole quantum spin ice candidate $\text{Ce}_2\text{Hf}_2\text{O}_7$**
[arXiv:2509.09189 \[cond-mat.str-el\]](#)
Edwin Kermarrec, Guanyue Chen, Hiromu Okamoto, Chun-Jiong Huang, [Han Yan](#), Jian Yan, Hikaru Takeda, Yusei Shimizu, Evan M Smith, Avner Fitterman, Andrea D Bianchi, Bruce D Gaulin, Minoru Yamashita
4. **Euler topology in classical spin liquids**
[arXiv:2505.09683 \[cond-mat.str-el\]](#)
Luca Rüegg, Arthur Morris, [Han Yan](#), Robert-Jan Slager

5. **An Atlas of Classical Pyrochlore Spin Liquids**
[arXiv:2411.03547](#) [[cond-mat.str-el](#)]
 Daniel Lozano-Gómez, Owen Benton, Michel JP Gingras, [Han Yan](#)
6. **Zeeman polaritons as a platform for probing Dicke physics in condensed matter**
[arXiv:2409.17339](#) [[quant-ph](#)]
 T. Elijah Kritzell, Jacques Doumani, Tobias Asano, Sota Yamada, Fuyang Tay, Hongjing Xu, [Han Yan](#), Ikufumi Katayama, Jun Takeda, Andriy Nevidomskyy, Hiroyuki Nojiri, Motoaki Bamba, Andrey Baydin, Junichiro Kono
7. **Generalized Kramers-Wanier duality from bilinear phase Map**
[arXiv:2403.16017](#) [[cond-mat.str-el](#)]
[Han Yan](#), Linhao Li
8. **Experimentally tunable QED in dipolar-octupolar quantum spin ice**
[arXiv:2312.11641](#) [[cond-mat.str-el](#)]
 Alaric Sanders, [Han Yan](#), Claudio Castelnovo, Andriy H. Nevidomskyy
9. **Identifying topologically critical band from pinch-point singularities in spectroscopy**
[arXiv:2304.02204](#) [[cond-mat.str-el](#)]
[Han Yan](#)
10. **Y-cube model and fractal structure of subdimensional particles on hyperbolic lattices**
[arXiv:2211.15829](#) [[cond-mat.str-el](#)]
[Han Yan](#), Kevin Slagle, Andriy H. Nevidomskyy

Published scientific journal articles

2025

1. **Conformal Boundary as Holographic Dual to the Hyperbolic Fracton Model**
Phys. Rev. B (Letter) **112** L220401 (2025), [arXiv:2411.05662](#) [[cond-mat.str-el](#)]
 Alejo Costa Duran, Mauricio Sturla, Ludovic D.C. Jaubert, [Han Yan](#)
2. **Dipolar-octupolar correlations and hierarchy of exchange interactions in $\text{Ce}_2\text{Hf}_2\text{O}_7$**
Phys. Rev. B (Letter) **112** L180404 (2025), [arXiv:2305.08261](#) [[cond-mat.str-el](#)]
 Victor Porée, Anish Bhardwaj, Elsa Lhotel, Sylvain Petit, Nicolas Gauthier, [Han Yan](#), Vladimir Pomjakushin, Jacques Ollivier, Jeffrey A Quilliam, Andriy H. Nevidomskyy, Hitesh J Changlani, Romain Sibille
3. **Magnons, Phonons, and Thermal Hall Effect in Candidate Kitaev Magnet $\alpha - \text{RuCl}_3$**
Phys. Rev. B **112** 134413 (2025), [arXiv:2301.07401](#) [[cond-mat.str-el](#)]
 Shuyi Li, [Han Yan](#), Andriy H. Nevidomskyy
4. **p -adic Holography from the Hyperbolic Fracton Model**
Journal of High Energy Physics **2025** 96 (2025), [arXiv:2306.07203](#) [[hep-th](#)]
[Han Yan](#), Christian B Jepsen, Yaron Oz
5. **Human-machine collaboration: ordering mechanism of rank-2 spin liquid on breathing pyrochlore lattice**
Phys. Rev. Research **7** 033061 (2025), [arXiv:2402.10658](#) [[cond-mat.str-el](#)]
 Nicolas Sadoune, Ke Liu, [Han Yan](#), Ludovic D.C. Jaubert, Nic Shannon, Lode Pollet
 - Featured on OIST News *Human-AI ‘collaboration’ makes it simpler to solve quantum physics problems*
6. **Thermodynamics of the dipole-octupole pyrochlore magnet $\text{Ce}_2\text{Hf}_2\text{O}_7$ in applied magnetic fields**
Phys. Rev. B **111** 155137 (2025), [arXiv:2402.08723](#) [[cond-mat.str-el](#)]

Anish Bhardwaj, Victor Porée, Han Yan, Nicolas Gauthier, Elsa Lhotel, Sylvain Petit, Jeffrey A. Quilliam, Andriy H. Nevidomskyy, Romain Sibille, Hitesh J. Changlani

7. **Classical \mathbb{Z}_2 spin liquid on the generalized four-color Kitaev model**
Phys. Rev. Research (Letter) **7** L012052 (2025), [arXiv:2409.04061 \[cond-mat.str-el\]](#)
Han Yan, Rico Pohle
8. **Evidence for fractional matter coupled to an emergent gauge field in a quantum spin ice**
Nature Physics **21**, 83-88 (2025), [arXiv:2304.05452 \[cond-mat.str-el\]](#)
Victor Porée*, Han Yan*, Félix Desrochers*, Sylvain Petit, Elsa Lhotel, Markus Appel, Jacques Ollivier, Yong Baek Kim, Andriy H. Nevidomskyy, Romain Sibille (*co-first author)
 - Highlighted in the *Journal Club for Condensed Matter Physics* article *A step towards emergent QED in $d = 3 + 1$ with high-resolution neutron scattering* by Roderich Moessner, MPI-PKS Dresden.

2024

9. **Pinch points and half moons encode Berry curvature**
Phys. Rev. B **110** 195117 (2024), [arXiv:2304.02203 \[cond-mat.str-el\]](#)
Han Yan, Andreas Thomasen, Judit Romhányi, Nic Shannon
10. **Classification of Classical Spin Liquids: Topological Quantum Chemistry and Crystalline Symmetry**
Phys. Rev. B **110** 054421 (2024), [arXiv:2309.12652 \[cond-mat.str-el\]](#)
Yuan Fang, Jennifer Cano, Andriy H. Nevidomskyy, Han Yan
 - **Editors' suggestion** by Physical Review B.
11. **Magnetic properties of the spiral spin liquid and surrounding phases in the square lattice XY model**
Phys. Rev. B **110** 085106 (2024), [arXiv:2404.00100 \[cond-mat.str-el\]](#)
Matías G. Gonzalez, Anna Fancelli, Han Yan, Johannes Reuther
12. **Classification of Classical Spin Liquids: Typology and Resulting Landscape**
Phys. Rev. B (Letter) **110** L020402 (2024), [arXiv:2305.00155 \[cond-mat.str-el\]](#)
Han Yan, Owen Benton, Roderich Moessner, Andriy H. Nevidomskyy
13. **Gravitational wave analogues in spin nematics and cold atoms**
Phys. Rev. B **109** L220407 (2024), [arXiv:2310.10078 \[cond-mat.str-el\]](#)
Leilei Chojnacki, Rico Pohle, Han Yan, Yutaka Akagi, Nic Shannon
 - **Editors' suggestion** by Physical Review B.
 - Featured on OIST News *Can quantum particles mimic gravitational waves?*
14. **Classification of Classical Spin Liquids: Detailed Formalism and Suite of Examples**
Phys. Rev. B **109** 174421 (2024), [arXiv:2305.19189 \[cond-mat.str-el\]](#)
Han Yan, Owen Benton, Andriy H. Nevidomskyy, Roderich Moessner
15. **Phonon induced rank-2 U(1) nematic liquid states**
Phys. Rev. B **109** 075102 (2024), [arXiv:2108.11484 \[cond-mat.str-el\]](#)
Han Yan, Andriy H. Nevidomskyy

2023

16. **Beyond single tetrahedron physics of the breathing pyrochlore compound $\text{Ba}_3\text{Yb}_2\text{Zn}_5\text{O}_{11}$**
Phys. Rev. B (Letter) **107** L140409 (2023), [arXiv:2210.06534 \[cond-mat.str-el\]](#)
Rabindranath Bag, Sachith E Dissanayake, Han Yan, Zhenzhong Shi, David Graf, Eun Sang Choi,

Casey Marjerrison, Franz Lang, Tom Lancaster, Yiming Qiu, Wangchun Chen, Stephen J Blundell, Andriy H. Nevidomskyy, Sara Haravifard

17. **Evidence for Topological Magnon-Phonon Hybridization in a 2D Antiferromagnet down to the Monolayer Limit**

Nano Letters 2023 23, 2023-2030 (2023)

Jiaming Luo, Shuyi Li, Zhipeng Ye, Rui Xu, Han Yan, Junjie Zhang, Gaihua Ye, Lebing Chen, Ding Hu, Xiaokun Teng, William A Smith, Boris I Yakobson, Pengcheng Dai, Andriy H. Nevidomskyy, Rui He, Hanyu Zhu

2022

18. **Magnetic field effects in an octupolar quantum spin liquid candidate**

Phys. Rev. B **106** 094425 (2022), arXiv:2209.04590 [cond-mat.str-el]

Bin Gao, Tong Chen, Han Yan, Chunruo Duan, Chien-Lung Huang, Xu Ping Yao, Feng Ye, Christian Balz, J Ross Stewart, Kenji Nakajima, Seiko Ohira-Kawamura, Guangyong Xu, Xianghan Xu, Sang-Wook Cheong, Emilia Morosan, Andriy H. Nevidomskyy, Gang Chen, Pengcheng Dai

19. **Low-energy structure of spiral spin liquids**

Phys. Rev. Research **4** 023175 (2022), arXiv:2112.10676 [cond-mat.str-el]

Han Yan, Johannes Reuther

20. **Sleuthing out exotic quantum spin liquidity in the pyrochlore magnet $Ce_2Zr_2O_7$**

npj Quantum Materials **7** 51 (2022), arXiv:2108.01096 [cond-mat.str-el]

Anish Bhardwaj, Shu Zhang, Han Yan, Roderich Moessner, Andriy H. Nevidomskyy, Hitesh J Changlani

- Featured on Rice University News *Computational sleuthing confirms first 3D quantum spin liquid.*

2021

21. **Fracton excitations in classical frustrated kagome spin models**

Phys. Rev. B **104** 064406 (2021), arXiv:2012.08167 [cond-mat.str-el]

Max Hering, Han Yan, Johannes Reuther

22. **Theory of $Ca_{10}Cr_7O_{28}$ as a bilayer breathing-kagome magnet: Classical thermodynamics and semiclassical dynamics**

Phys. Rev. B **104** 024426 (2021), arXiv:2103.08790 [cond-mat.str-el]

Rico Pohle, Han Yan, Nic Shannon

2020

23. **Geodesic string condensation from symmetric tensor gauge theory: A unifying framework of holographic toy models**

Phys. Rev. B (Rapid Comm.) **102** 161119(R) (2020), arXiv:1911.01007 [cond-mat.str-el]

Han Yan

24. **Rank-2 $U(1)$ Spin Liquid on the Breathing Pyrochlore Lattice**

Phys. Rev. Lett **124** 127203 (2020) arXiv:1902.10934 [cond-mat.str-el]

Han Yan, Owen Benton, Ludovic D.C. Jaubert, Nic Shannon

- **Editors' suggestion** by Physical Review Letters.
- Highlighted by APS Physics Magazine Synopsis: *A Recipe for Finding Fractons (Physics 13, s40).*
- Featured on Quanta Magazine *The 'Weirdest' Matter, Made of Partial Particles, Defies Description.*

2019

25. **Hyperbolic fracton model, subsystem symmetry, and holography. II. The dual eight-vertex model**
Phys. Rev. B **100** 245138 (2019), [arXiv:1906.02305 \[hep-th\]](#)
[Han Yan](#)
26. **Identification of emergent constraints and hidden order in frustrated magnets using tensorial kernel methods of machine learning**
Phys. Rev. B **100** 174408 (2019), [arXiv:1907.12322 \[cond-mat.str-el\]](#)
Jonas Greitemann, Ke Liu, Ludovic D.C. Jaubert, [Han Yan](#), Nic Shannon, Lode Pollet
- Featured on OIST News *Man versus machine: can AI do science?*
27. **Hyperbolic fracton model, subsystem symmetry, and holography**
Phys. Rev. B **99** 155126 (2019), [arXiv:1807.05942 \[hep-th\]](#)
[Han Yan](#)
- **Editors' suggestion** by Physical Review B.
 - Featured on OIST News *Theories Past and Present Show Quantum Connections.*
- 2018**
28. **Half moons are pinch points with dispersion**
Phys. Rev. B (Rapid Comm.) **98** 140402(R) (2018), [arXiv:1806.08520 \[cond-mat.str-el\]](#)
[Han Yan](#), Rico Pohle, Nic Shannon
- **Editors' suggestion** by Physical Review B
 - Featured on OIST News *Half Moons and Pinch Points: Same Physics, Different Energy.*
29. **Experimental signatures of emergent quantum electrodynamics in Pr₂Hf₂O₇**
Nature Physics **14** 711-715 (2018), [arXiv:1706.03604 \[cond-mat.str-el\]](#)
Romain Sibille, Nicolas Gauthier, [Han Yan](#), Monica Ciomaga Hatnean, Jacques Ollivier, Barry Winn, Uwe Filges, Geetha Balakrishnan, Michel Kenzelmann, Nic Shannon, Tom Fennell
- Featured on OIST News *Seeing the Light? Study Illuminates How Quantum Magnets Mimic Light.*
 - Featured on PSI Scientific Highlights *Spin ice goes quantum.*
- 2017**
30. **Competing Spin Liquids and Hidden Spin-Nematic Order in Spin Ice with Frustrated Transverse Exchange**
Phys. Rev. X **7** 041057 (2017), [arXiv:1705.00148 \[cond-mat.str-el\]](#)
Mathieu Taillefumier, Owen Benton, [Han Yan](#), Ludovic D.C. Jaubert, Nic Shannon
31. **Theory of multiple-phase competition in pyrochlore magnets with anisotropic exchange with application to Yb₂Ti₂O₇, Er₂Ti₂O₇, and Er₂Sn₂O₇**
Phys. Rev. B **95** 094422 (2017), [arXiv:1603.09466 \[cond-mat.str-el\]](#)
[Han Yan](#), Owen Benton, Ludovic D.C. Jaubert, Nic Shannon
- 2016**
32. **A spin-liquid with pinch-line singularities on the pyrochlore lattice**
Nature Communications **7** 11572 (2016), [arXiv:1510.01007 \[cond-mat.str-el\]](#)
Owen Benton, Ludovic D.C. Jaubert, [Han Yan](#), Nic Shannon
- Featured on OIST News *A New Spin on Reality.*
- 2012**
33. **W_H/Z_H production associated with a T -odd (anti)quark at the LHC in next-to-leading order QCD**

Phys. Rev. D **85** 015017 (2012), [arXiv:1112.5225 \[hep-ph\]](#)

Zhang Ren-You, [Han Yan](#), Ma Wen-Gan, Wang Shao-Ming, Guo Lei, Han Liang

2011

34. QCD next-to-leading order predictions to W -pair production in association with a massive (anti)bottom jet at the LHC

Phys. Rev. D **84** 014009 (2011), [arXiv:1106.2890 \[hep-ph\]](#)

[Han Yan](#), Shao-Ming Wang, Wen-Gan Ma, Ren-You Zhang, Lei Guo

Other articles

1. Neutron scattering signatures of a quantum spin ice

Swiss Neutron News **53**, 12-22 (2019), [1911.00968 \[cond-mat.str-el\]](#)

Romain Sibille, Nicolas Gauthier, [Han Yan](#), Monica Ciomaga Hatnean, Jacques Ollivier, Barry Winn, Uwe Filges, Geetha Balakrishnan, Michel Kenzelmann, Nic Shannon, Tom Fennell

- Selected as cover article.

INVITED TALKS AND INVITED SEMINARS

- Invited talk**, Durham University, U.K. 2026/08
TBA
Workshop “UK-Japan Workshop on Quantum Gravity”
- Invited talk**, YITP, The University of Kyoto, Japan 2026/06
TBA
Workshop “Emergent Phenomena in Quantum Matter: From Symmetry to Dynamics”
- Invited seminar**, Shizuoka University, Japan 2026/04/13
Searching for Quantum Codes Immune to Partial Noise.
Workshop “Topology, Entanglement, and Dynamics in Quantum Many-Body Systems”
- Invited talk**, ISSP, The University of Tokyo, Japan 2025/12/22
Searching for Quantum Codes Immune to Partial Noise.
Workshop “Topology, Entanglement, and Dynamics in Quantum Many-Body Systems”
- Invited seminar**, TCM Group, The Cavendish Laboratory, University of Cambridge, U.K. 2025/11/07
Hyperbolic Fracton Models: Bridging AdS/CFT and Self-Correcting Code.
- Invited seminar**, Queen Mary University of London, U.K. 2025/11/06
Hyperbolic Fracton Models: Bridging AdS/CFT and Self-Correcting Code.
- Invited seminar**, LOMA, University of Bordeaux, France 2025/10/21
Designing Light in an Artificial Universe
- Invited talk**, Paul Scherrer Institute & Herzberg, Switzerland 2025/10/15
Dipolar-Octupolar Spin Ice in Magnetic Field.
Second International Workshop on Quantum Spin Ice
- Invited talk**, Okinawa, Japan 2025/06/17
Designing Light in an Artificial Universe of QED.
TSVP Symposium: Aspects of Generalized Symmetries, OIST
- Invited talk**, Ingelheim, Germany 2025/05/07
Introduction to Spin Liquid, Topological Order, and Fracton Order.
Quantum Geometry and Transport of Collective Excitations in (Non-)Magnetic Insulators Workshop, GICC
- Invited seminar**, Institute of Theoretical Physics, TU Dresden, Germany 2025/04/25
Designing Light in an Artificial Universe

- Invited seminar**, Max Planck Institute for the Physics of Complex Systems, Germany 2025/04/22
Designing Light in an Artificial Universe
- Invited seminar**, TCM Group, The Cavendish Laboratory, University of Cambridge, U.K. 2024/05/22
Topological defects in spiral spin liquids
- Invited talk**, Minneapolis, U.S.A. 2024/03/04
Classification of Classical Spin Liquids
American Physical Society March Meeting
- Invited seminar**, TQM Unit, Okinawa Institute of Science and Technology, Japan 2024/02/26
Designing Light in an Artificial Universe
- Invited talk**, Online 2024/02/14
Designing Light in an Artificial Universe
KouShare Theoretical Physics Workshop in Japan
- Invited seminar**, School of Physics, Southeast University, China 2024/01/25
p-adic Holography from the Hyperbolic Fracton Model
- Invited seminar**, Southeast University, China 2024/01/23
Designing Light in an Artificial Universe
- Invited talk**, Chongqing University, China 2023/12/18
p-adic Holography from the Hyperbolic Fracton Model
Conference on Cosmology and Fundamental Physics,
- Invited talk**, University of Hong Kong and University of Chinese Academy of Sciences, China 2023/11/30
Designing Light: Emergent QED in Quantum Spin Ice and Clean Control of Its Dynamics
HKU-UCAS Young Physicist Forum
- Invited seminar**, ISSP, The University of Tokyo, Japan 2023/10/20
Seeking Robust Quantum Bit Memory: Topological and Fracton Order
- Invited talk**, Aspen Center for Physics, U.S.A. 2023/06/07
Classification of classical spin liquid in the large-S limit
Workshop “Exotic Phases, Gauge Field Theories, and Dynamics in Systems with Constraints”
- Invited seminar**, Motome Group, The University of Tokyo, Japan 2023/02/21
Classification of classical spin liquid in the large-S limit
- Invited seminar**, ISSP, The University of Tokyo, Japan 2023/02/08
Fracton orders in hyperbolic space and its excitations with fractal mobility
- Invited seminar**, CMSA, Harvard University, U.S.A. 2023/02/03
Fracton orders in hyperbolic space and its excitations with fractal mobility
- Invited seminar**, QunaSys Inc., Japan 2022/11/18
Topological and Fracton Order: Toward Robust Quantum Memory
- Invited seminar**, ISSP, The University of Tokyo, Japan 2022/08/22
Classification of classical spin liquid in the large-S limit
- Invited seminar**, TQM Unit, Okinawa Institute of Science and Technology, Japan 2022/08/17
Classification of classical spin liquid in the large-S limit
- Invited seminar**, Oak Ridge National Laboratory, U.S.A. 2022/07/27
Low energy structure of spiral spin liquid – momentum vortices and connection to smectic and rank-2 U(1) gauge theory
- Invited seminar**, University of Pennsylvania, U.S.A. 2022/06/29
Low energy structure of spiral spin liquid – momentum vortices and connection to smectic and rank-2

U(1) gauge theory

- Invited seminar**, Quantum Group Seminar, Rice University, U.S.A. 2022/06/23
Higher-Rank Spin Liquid by Design, with Experimental Applications
- Invited talk**, SCGP, Stony Brook University, U.S.A. 2022/04/19
Higher-Rank Spin Liquid by Design, with Experimental Applications
Workshop “Geometrical Aspects of Topological Phases of Matter: Spatial Symmetries, Fractons and Beyond”
- Invited talk**, Chicago, U.S.A. 2022/03/16
Low Energy Structure of Spiral Spin Liquid
American Physical Society March Meeting
- Invited seminar**, TQM Unit, Okinawa Institute of Science and Technology, Japan 2022/01/25
Low Energy Structure of Spiral Spin Liquid
- Junior Presentation**, Institute for Complex Adaptive Matter 2022/01/11
Low Energy Structure of Spiral Spin Liquid
ICAM Week of Science Conference
- Invited seminar**, Free University Berlin, Germany 2021/11/12
Low Energy Structure of Spiral Spin Liquid
- Invited seminar**, Max Planck Institute for the Physics of Complex Systems, Germany 2021/11/04
Low energy structure of classical spiral spin liquids
- Invited seminar**, Universidad del Valle, Colombia 2021/09/02
Overview of Fracton States of Matter
- Invited talk**, University of Oxford, U.K. 2021/07/03
Rank-2 U(1) spin liquid on the breathing pyrochlore lattice
Workshop “Theoretical and Experimental Magnetism Meeting”
- Invited seminar**, Watanabe group, The University of Tokyo, Japan 2020/07/30
Universal picture of holographic toy models from rank-2 U(1) theory (or Lifshitz gravity)
- Invited seminar**, PCTS, Princeton University, U.S.A. 2019/11/21
Fracton States of Matter as Toy Models of Holography
- Invited seminar**, Condensed Matter Theory Group, MIT, U.S.A. 2019/11/12
Rank-2 U(1) spin liquid on the breathing pyrochlore lattice
- Invited seminar**, CTQM, University of Colorado Boulder, U.S.A. 2019/10/25
Fracton States of Matter as Toy Models of Holography
- Invited seminar**, High Energy Theory Group, KEK, Japan 2019/09/19
Fracton States of Matter as Toy Models of Holography
- Invited talk**, Southeast University, China 2019/08/21
Fracton States of Matter as Toy Models of Holography
Youth Symposium on Theoretical High Energy Physics
- Invited seminar**, Condensed Matter Theory Group, Paul Scherrer Institute, Switzerland 2019/08/06
Rank-2 U(1) spin liquid on the breathing pyrochlore lattice
- Invited seminar**, Condensed Matter Theory Group, Technical University of Munich, Germany 2019/08/01
Fracton Model and Holography
- Invited seminar**, LOMA, University of Bordeaux, France 2019/07/03
Fracton Model and Holography

Invited seminar , IQIM, California Institute of Technology, U.S.A. <i>Fracton Topological Order and Holography</i>	2018/11/15
GLAM Special seminar , GLAM, Stanford University, U.S.A. <i>Fracton Topological Order and Holography</i>	2018/07/17
Invited seminar , Condensed Matter Theory Group, YITP, Kyoto University, Japan <i>Fracton Topological Order: Toy Models of Holography?</i>	2018/05/10
Invited seminar , High Energy Theory Group, YITP, Kyoto University, Japan <i>Fracton Topological Order: Toy Models of Holography?</i>	2018/05/08
Invited seminar , Okinawa Institute of Science and Technology, Japan <i>Topological States: New Paradigm of Phases of Matter</i>	2017/12/08

TEACHING AND OUTREACH ACTIVITIES

Condensed Matter for Dummies Seminar , Max Planck Institute for the Physics of Complex Systems, Germany <i>Introduction to Spin Liquid, Topological Order, and Fracton Order.</i>	2025/05/09
OIST Café , Tokyo, Japan Presentation of my life at OIST and advertised OIST Ph.D. program to undergraduate students.	2023/11/02
Invited talk , USTC and Lanzhou University, China <i>Fracton states of matter - a new kind of quantum many-body system</i> Program “Physics Student Salon”	2020/09/20
Interview , OIST, Japan American Physics Society TV Film of Theory of Quantum Matter Unit at OIST	2020/03/02
Short course , Variational Method in Physics, OIST, Japan	2018
Teaching Assistant for course Statistical Physics, OIST, Japan	2018
Short course , Linear Algebra, OIST, Japan	2018