Koichiro Takahashi

University of New Hampshire (UNH)
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LinkedIn Google Scholar
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Projects and Publications:

"GPTArticleExtractor: An automated workflow for magnetic material database construction"
Authors: Yibo Zhang, Suman Itani, Kamal Khanal, Emmanuel Okyere, Gavin Smith, **Koichiro Takahashi**, Jiadong Zang
Citation: Journal of Magnetism and Magnetic Materials, 2024, Volume 597, Page 172001
Link: https://doi.org/10.1016/j.jmmm.2024.172001

- Built a large language model based algorithm to automatically extract materials properties.
- Created a magnetic materials database, which contains 2,035 entries with full chemical, structural and magnetic transition temperature information.
- My role was the data curation of the extracted material information.

ArXiv preprints:
"Inertia in skyrmions confined to one-dimensional geometries"
Authors: **Koichiro Takahashi**, Sergey S. Pershoguba, and Jiadong Zang
Citation: arXiv:2409.17461 (2024)
Link: https://doi.org/10.48550/arXiv.2409.17461
Supervisors: Sergey Pershoguba, Jiadong Zang

- Theoretical study of current-driven dynamics of skyrmion confined in 1D helical backgrounds
- Showed that the confined skyrmion generically acquires non-zero effective mass in dynamics
- Predicted that the massive skyrmion exhibits hysteresis in its current-driven dynamics

Unpublished:
"Symmetry and tight-binding modeling of altermagnet candidate MnTe"
Supervisor: Jiadong Zang; Collaborator: Jie-Xiang Yu

- Analytical calculation of electronic band structure of MnTe by tight-binding modeling
- Derived the group theory constraints onto the effective Hamiltonian around Γ and A points
- Derived the effective Hamiltonian from the tight-binding model of MnTe

Conferences and Presentations:

Poster presentations:
Northeast Quantum Forum (NEQT) 2024
Poster title: Tight-binding modeling of altermagnet candidate MnTe
Place: University of New Hampshire
Poster link: https://koichiro0110.github.io/Figures/Poster_MnTe.pdf

- Presented the preliminary results on the tight-binding MnTe project at NEQT 2024

・I was one of the local organizers, and I made the website for the conference
Conference website link: https://sites.usnh.edu/neqt/

UNH Undergraduate Research Conference (URC)
Poster title: Nonlinear dynamics of skyrmion in helical lanes
Place: University of New Hampshire
Poster link: https://koichiro0110.github.io/Figures/Poster_skyrmion.pdf
・Presented the preliminary results on the skyrmion project at the conference

2024 US Quantum Information Science Summer School (USQIS)
Place: Oak Ridge National Laboratory
Poster title: Nonlinear dynamics of skyrmion in helical lanes
・Presented the preliminary results on the skyrmion project at ORNL

2024 Summer STEM Symposium
Place: University of New Hampshire
Poster title: Nonlinear dynamics of skyrmion in helical lanes
・Presented the preliminary results on the skyrmion project at UNH

Research and Experiences:

Research Assistant in the Theoretical Condensed Matter Physics Group
Period: 05/2023-Present; Institution: University of New Hampshire
Supervisor: **Jiadong Zang**, Sergey Pershoguba

2024 US Quantum Information Science Summer School (USQIS)
Date: July 14-26, 2024; Institution: Oak Ridge National Laboratory (ORNL)
・Elective lectures and keynote presentations were given at advanced graduate levels
・Advanced topics related to quantum computing, quantum sensing, quantum simulations, topological quantum algorithm, topological superconductors, Kitaev spin liquid, DMRG, measurement-induced phase transition, etc.
・Interacted with competitive graduate students and postdocs by discussions and studies
・Website: https://www.qscience.org/us-quantum-information-science-summer-school/

Research Interests:

Condensed Matter Theory, Topological Phases of Matter, Strongly Correlated Electrons System, Magnetism, Superconductivity, Topological Quantum Computing, Quantum Information Theory, Machine Learning, Complexity

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Computational Skills: Python, Mathematica, (Julia)

Education:

Transfer Undergraduate Physics Student at **University of New Hampshire** (4th-year)
Period: 08/2023-Present; Class of 2025; GPA: 4.0/4.0

2-semester Study Exchange in Physics at University of New Hampshire
Period: 08/2022-05/2023; Place: Durham, New Hampshire, USA; GPA: 4.0/4.0

Undergraduate Student in Physics at Saitama University (Transferred to UNH)
Period: 04/2021-08/2022; Place: Sakura-Ku, Saitama, Japan; Class of 2025, Earned Credits: 73
GPA: 3.71/4.0 (Top of my cohort)

Scholarships:

UNH Summer Undergraduate Research Fellowships (SURF)
Period: 05/2024-08/2024; Received: $4,000; # of recipients: ~50
・Awarded by the Hamel Center for Undergraduate Research at UNH
・For 10 weeks of summer research on campus at UNH

UNH Physics Karsten Pohl Scholarship 2024-2025
Period: 05/2024; Received: $4,660; # of recipients: 1
・Awarded by the College of Engineering & Physical Sciences at UNH
・"For academic excellence and for advancing the University's goal of enhancing the educational experience through enrollment of a diverse student body"

UNH Transfer Excellence Scholarship
08/2023-Present; Received: $7,500; # of recipients: unknown
・Awarded to accepted full-time students who are enrolled in a bachelor's degree program and have 24 transferable college credits and a 3.50+ cumulative GPA

Gyomu Super Japan Dream Foundation Scholarship 2022
Period: 08/2022-05/2023 (9 months); Received: ¥1,200,000; # of recipients: ~500
・Eligible for undergraduate students at Japanese universities with Japanese nationality, applying for a study exchange program, meeting academic and language standards

Exemption of Tuition Fee at Saitama University
Period: 10/2022-08/2023;
・Applies for students who has outstanding academic performance at Saitama University

Japan Student Services Organization (JASSO) Scholarship
Period: 04/2021-08/2023
・Eligibility is based on factors, such as financial need and academic performance
・Funded by the Japanese government

Awards:

Dean's list in Highest Honors at University of New Hampshire
Received Semesters: 2022 Fall, 2023 Spring, 2023 Fall, 2024 Spring; # of recipients: unknown
・For students who earn a semester GPA of 3.85+/4.0

Outstanding Grade Award from the Physics Department of Saitama University
Received Years: 2021; # of recipients: 2

- Awarded annually to the students who has the highest GPA in their cohort

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Teaching Experience:

Teaching Assistant in Thermodynamics and Statistical Mechanics (Undergraduate)
Period: 08/2024-Present;

- Teach recitations, 50 mins per week, plus grading homework and quizzes
- Homework help office hours, 1hour+, twice a week
- UNH course website: https://courses.unh.edu/class/202410/11465

Independent Seminars:

UNH Graduate Theoretical Physics Seminar Spring 2024
Period: 01/2024-04/2024; Presentation title: "Dynamics of Magnetic Skyrmion"

Group Theory and Algebraic Geometry Seminar
Collaborator: Michael Lathwood, Physics PhD student at UNH
Period: 01/2024-03/2024

- Weekly Seminar of Introduction to Group Theory and Algebraic Geometry

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Extracurricular Activities:

UNH Men's Volleyball Club
Period: 08/2022-Present; Position: Outside Hitter/Libero

- Played in tournaments held at Boston College, UMass Lowell, UNH etc.
- Weekly practice, 3 hours×2 per week

Leadership Experience:

Office of the International Students and Scholars (OISS) Orientation Leader
Period; 08/2024; # of accepted people: ~4 undergraduates with ~6 PhD students

- Worked as one of the orientation leaders for new international students at UNH in 2024 Fall

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Personal Information: Citizenship: Japan; Language: Japanese (Native), English (Fluent)