

RESEARCH INTEREST

Condensed matter theory;
– Strongly correlated systems, Topological phase/insulator
Implementation of Machine learning; Neural networks
Computational Many-body physics

EDUCATION

- Mar. 2018 – present* **Gwangju Institute of Science & Technology (GIST college)**
B.S. Physics major, Mathematics minor
◦ GPA: 4.21/4.5 (3.86/4.0), Major GPA: 4.47/4.5 (4.0/4.0)
- Jul. – Aug. 2019* **Boston University**, Boston, MA
Summer session
◦ GPA: 4.0/4.0 (Statistics & Probability, Micro-economic Analysis)
- Jan. 2019* **Caltech-GIST collaboration course**
Instructor: prof. Rob Phillips (Physical Biology of the Cell)

PUBLICATIONS

- Working* ◦ **H. Kim**, D. Kim, D.-H. Kim, Machine learning assisted prediction of metal-insulator transition with few bath orbitals in the dynamical mean-field theory (2021)

RESEARCH EXPERIENCE

- Jul. 2020 – present* **Computational Many-body Physics Group, GIST**
Undergraduate Research Intern
(Advisor: prof. Dong-Hee Kim)
- Dec. 2020 – present* ◦ **Machine-learning prediction of Mott transition on DMFT**
... Working on publication
... Analyzed the kernel-density estimation of the neural network trained by the hybridization function.
... Extracted effective order parameter that relates both the real & Matsubara frequency domain data, and the bath orbitals of DMFT-ED.
... DMFT-NRG & DMFT-ED calculation on Hubbard model.

Jul. – Aug. 2020

- **Machine-learning accelerated Monte-Carlo algorithm for 2D spin model**
- ... SURF project: Wrote a research report.
- ... Analyzed the classical Ising model with Markov chain Monte-Carlo, implementation of Self-learning Monte Carlo method with nontrivial model.

Dec. 2019 – Mar. 2020

Quantum Field & Gravity Theory Group, GIST
Undergraduate Research Intern
(Advisor: prof. Keun-Young Kim)

- Implemented deep neural network in AdS/CFT, to predict bulk metric of holographic model of strongly correlated models.

AWARDS & HONORS

2020 – present **National Graduate Science & Technology Scholarship**
Korea Student Aid Foundation(KOSAF), full fund

2018 – 2019 **Korea Government Scholarship, GIST**

2018 – 2020 **Academic Scholarship to excellence, GIST**

Jun. – Aug. 2019 **Scholarship for Summer session abroad**
GIST, full fund

Jan. 2017 **Encouragement Award**
Korean Young Physicists' Tournament (KYPT)

TEACHING EXPERIENCE

Spring 2020 / Spring 2021 **Teaching assistant**

- General Physics & Rec. I
- ... Lectured recitation class. Scoring homeworks, midterm & final exams.

Fall 2021 **Teaching assistant**

- General Physics & Rec. I
- ... Lectured recitation class in English. Scoring homeworks.

RELEVANT COURSE PROJECT

Physics

Nov. 2020 ... Thermal & statistical physics: Presentation on 'Quantum Ising model'

Apr. 2020 ... Quantum physics I: Report on 'Exact solution of finite harmonic oscillator'

Jan. 2019 ... Physical Biology of the Cell: Project on bacterial growth rate from microscopy data, gene expression and the effect of repressor

Mathematics

Jun. 2020 ... Abstract Algebra: Report for geometric constructions

Others

Jun. 2021

- ... Machine Learning & Deep Learning: Project report for implementing neural network classifier for CIFAR100 dataset.

SKILLS

Programming languages

- Working knowledge of: Python, C/C++, LaTeX, PyTorch, Linux Shell Script(Linux server)
- Familiar with: git, Mathematica
- Library: TRIQS (DMFT-NRG ljubljana solver), trng4 (random number generator), fftw

Languages

Korean (native), American English (fluent)

EXTRA CURRICULAR ACTIVITIES

Attended programs

Jul. 2021

- KISTI N-Ways to GPU Programming Bootcamp

Aug. 2020

- SLAC summer institute: Exploring the Weakly Coupled Universe

Club activities

2019–2020

- Physics club HOLICS
- ... President of the club

2019

- ... Physics & Math seminar, half hour presentation: mathematical analysis of Coanda effect.

2018–2020

- ... Physics study group: Classical dynamics, Quantum mechanics

2019

- Cooking club volunteer for school events

2018–present

- Piano & Badminton club activities

Extra activities

Mar. 2019

- GIST newspaper article: Review for course 'Physical Biology of the Cell'