Hyejin Kim

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aadeliee22

SUMMARY

Highly motivated undergraduate student trained in physics, mathematics, and computor science (machine learning, numerical computation) with 1+ year of research experience. Currently preparing publication.

Research interest: **Condensed matter physics theory (CMT)** , both theoretical and numerical

- Quantum Many-body system / Strongly correlated system / Non-equilibrium quantum dynamics
- Topological phase/order

EDUCATION

Mar. 2018 – pres. **Gwangju Institute of Science & Technology (GIST)** *Gwangju, S. Korea*

B.S. Physics major, Mathematics minor

- Graduation expected on *Aug. 2022*
- GPA: 4.2/4.5 (3.86/4.0), Major GPA: 4.47/4.5 (4.0/4.0)

Jul. – Aug. 2019 **Boston University** *Boston, MA, USA*

- Summer 2 session, GPA: 4.0/4.0

Jan. 2019 **Caltech-GIST collaboration course** *Gwangju, S. Korea*

Instructor: Prof. Rob Phillips (Physical Biology of the Cell)

Mar. 2016 – Feb. 2018 **Jeonbuk Science High school** *Jeonbuk, S. Korea*

- Science-oriented high school, Early graduation

PUBLICATIONS

In preperation **H. Kim**, D. Kim, D.-H. Kim, Interpretation of a minimal neural network to learn the metal-insulator transition in the dynamical mean-field theory

RESEARCH EXPERIENCE

Jul. 2020 – pres. **Computational Many-body Physics Group, GIST** *Gwangju, S. Korea*

Undergraduate Research Intern (Advisor: Prof. Dong-Hee Kim)

Dec. 2020 – pres.

- **Interpretation of a minimal neural network to learn the metal-insulator transition in the dynamical mean-field theory**
  - ··· Interpreted the network connectivity trained by the hybridization function from DMFT-NRG.
  - ··· Extracted effective measure that can be employed on a broader range, based on the few bath orbitals of DMFT-ED.
  - ··· Discussed the relationship between phase indicator and the quasiparticle weight.

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 Monte-Carlo, implementation of Self-learning Monte Carlo method with nontrivial model.

Dec. 2019 – Mar. 2020 **Quantum Field & Gravity Theory Group, GIST** *Gwangju, S.Korea*

Undergraduate Research Intern (Advisor: Prof. Keun-Young Kim)

- **Implementation of AdS/DL correspondence**
  - ··· deep neural network in AdS/CFT, predicted bulk metric of holographic model of strongly correlated models from magnetic response data.

AWARDS & HONORS

2020 – pres. **National Scholarship for Science & Engineering**, Korea Student Aid Foundation, full fund

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

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

Jul. 2019 **Scholarship for Summer session abroad**, GIST, full fund

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

TEACHING EXPERIENCE

Gwangju Institute of Science and Technology *Gwangju, S. Korea*

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. 2021 ○ Nuclear & particle physics: Report & Presentation on 'Renormalization group with SFT, QFT approach'

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 for implementing neural network classifier on CIFAR100.

SKILLS

Programming Languages
- ○ Working knowledge of: Python, C/C++, PyTorch, Linux server (Linux Shell Script), LaTeX, Excel
- ○ Familiar with: git, Mathematica, TensorFlow2
- ○ Library: TRIQS (NRG ljubljana solver), trng4 (random number generator), fftw

Languages
- ○ Korean (native), American English (advanced), German (basic)

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

◦ Physics club HOLICS

2019 – 2020 ··· 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 – pres. ◦ Piano & Badminton club activities

Extra activities

Nov. 2021 ◦ Played piano for cousin's wedding

Mar. 2019 ◦ GIST newspaper article: Review for course 'Physical Biology of the Cell'

REFERENCE

Dong-Hee Kim

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