Jaeyong Hwang

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B.S. candidate
Dept. of Physics (Advanced Major)
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Education

Korea Advanced Institute of Science and Techonology (KAIST) Daejeon, South Korea

B.S. candidate in Physics, cumulative GPA 3.91/4.3, Major GPA 4.05/4.3 Feb. 2017 ~ present

- Participated in three semesters of undergraduate research under the guidance of Prof. Jaewook Ahn resulting in undergraduate research project Grand Prix, and two conference presentations.

Seoul Science High School Seoul, South Korea

High School Diploma, major in Physics Feb. 2014 ~ Feb. 2017

- Exceptionally specialized high school for the gifted in science and math.

Research Experience

Center for Supersolid and Quantum Matter Research (CSQR), KAIST Jan. 2022 ~ present

PI: Prof. Eunseong Kim

- Working on building superconductor based 3D cavity to construct circuit QED system.
- More effective quantum nondemolition(QND) measurement construction.

Quantum Computing Lab (QCL), KAIST Sep. 2020 ~ Dec. 2021

PI: Prof. Jaewook Ahn

- Studied on quantum computing Maximum Independent Set problem, or Max-Cut problem using 3D arranged Rydberg atom array.
- Worked on three projects:
  - Experimental Realization of Quantum Approximate Optimization Algorithm (QAOA)
  - Quantum Tree Wire implementation on Rydberg atom systems for maximum independent set of an arbitrary non-planar graph
  - Designing an arbitrary unitary quantum gate using Rydberg blockade and avoided crossing technique
- Undergraduate Research Project(URP) Grand Prix, 1 Best Oral Presentation Award, and 2 Conference Presentations

Electronic structure Research Laboratory (ER Lab), KAIST Mar. 2018 ~ Jun. 2018

PI: Prof. Yeongkwan Kim

- Learned and assisted YBCO synthesis and characterization through extremely cold temperature.

Research Interests

My research interests include:

- Constructing qubit system via superconductor cavity or Rydberg atom array cavity.
- Implemetation of quantum algorithm
- Quantum Machine Learning

Honors and

2022 Global Leadership Awards (creative) awarded for showing an exceptional performance

Awards (Selected)

among whole undergraduate/graduate students in creativity area, Feb. 2022.

Leadership Mileage Diamond level awarded for being in top 5% students with active participation in leadership programs, Jan. 2022.

Best Oral Presentation award, Korean Physical Society awarded for the presentation "Rydberg quantum tree wires for vertex-splitting in Quantum computing high-degree graphs" at 2021 KPS Fall Meeting, Oct. 2021.

Grand Prix, KAIST Undergraduate Research Project(URP) awarded for taking first place on Winter/Spring URP with presenting a project titled "New Rydberg Atom Structure for Quantum Computing in any non-planar-graph: Quantum Tree Wire", Aug. 2021

Scholarship by Department of Physics, KAIST , Spring and Fall semesters of 2021

Dean's list, KAIST two times selected for showing outstanding performance(GPA 4.3/4.3), Spring 2021 / Fall 2021

Science Scholarship by the President of Republic of Korea awarded for representing university students who majored in science or engineering in Republic of Korea, 2017 ~ present

National Scholarship, KAIST awarded with full support for university admission, tuition, and student support fees, Feb. 2017 ~ present

Best Presentation award by the President of UNIST awarded for showing excellent work in Science High School R&E Conference, Jan. 2016.

Publications

Minhyuk Kim, Kangheun Kim, **Jaeyong Hwang**, Eun-Gook Moon, and Jaewook Ahn, "Rydberg Quantum Wires for Maximum Independent Set Problems", arXiv:2109.03517. (Pending, Nature Physics)

Hongseok Oh, Youngbin Tchoe, Heehun Kim, Jiyoung Yun, Mingi Park, Seongjun Kim, Young-soo Lim, Hanjoon Kim, Woosung Jang, **Jaeyong Hwang**, Yeda Song, Juntae Koh, and Gyu-chul Yi, "Large-scale, single-oriented ZnO nanostructure on h-BN films for flexible inorganic UV sensors", J. Appl. Phys. **130**, 223105 (2021).

Conference Presentations

Jaeyong Hwang, Minhyuk Kim, Kangheun Kim, Eun-Gook Moon, and Jaewook Ahn. (Oct., 20-21). Rydberg quantum tree wires for vertex-splitting in Quantum computing high-degree graphs, oral presentation in 2021 KPS Fall Meeting.

Jaeyong Hwang, Minhyuk Kim, Kangheun Kim, and Jaewook Ahn. (Jun., 2021). New Rydberg Atom Structure for Quantum Computing in any non-planar graph: Quantum Tree Wire, poster session presented at Atomic and Molecular Physics Devision Workshop(AMP2021), Korean Physical Society, Yeosu, Republic of Korea.

Kangheun Kim, Minhyuk Kim, **Jaeyong Hwang**, and Jaewook Ahn. (Apr. 2021). Quantum computing of maximal independent set problem for non-planar graphs, oral presentation in 2021 KPS Spring Meeting.

Patent

Minhyuk Kim, Kangheun Kim, **Jaeyong Hwang**, and Jaewook Ahn. (2022). "Method for solving Maximum Independent Set problem using Quantum Computing",
Pending (Case #:PCT/KR2022/000814)).

Skills / Qualifications

Languages: **Korean**(native), **English**(fluent)

Computer: **MATLAB**, Qiskit, Python, C/C++, Illustrator

Completed Qubit by Qubit's 2020-2021 Introduction to Quantum Computing Course sponsored by IBM Quantum. (October 2020 ~ May 2021).

Completed Quantum Information Science Summer School held by Quantum Information Research Support Center. (26 July 2021 ~ 5 August 2021).

Mandatory Military Service: served as Korean Augmentation To the United States Army(KATUSA) for 1.5 years. (December 2018 ~ July 2020).

Participated in GEM Trailblazer Summer Program as an exchange student to Nanyang Technological University(NTU), Singapore. (2-27 July 2018).