Ahreum Lee

Department of Physics
University of Maryland College Park
College Park, MD 20742
+1-240-413-6152
alee1206@umd.edu

Research Interests	Quantum Information Processing; Atomic Physics; Quantum Optics; Collective Radiation; Superradiance; Quantum Many-Body Systems; Atom-Photon Interaction

Education

Ph.D. in Physics, University of Maryland College Park 2019 – Present
Advisor: Prof. Steven L. Rolston

B.S. in Physics, Pohang University of Science and Technology 2018
Thesis: Anistropic Transport Properties in Black Phosphorus
Advisor: Prof. Seung-Hoon Jhi

Research & Work Experience

Rolston Ultracold Matter Group Sep. 2019 - Present
University of Maryland College Park, USA
Advisor: Prof. Steven L. Rolston

- Developed theory of collective vacuum-induced quantum beats
- Built a magneto-optical trap with two optical nanofibers crossing across it
- Made customized experimental control program (communicating with direct digital synthesizers and PCI boards) and measurement tool (communicating with PicoHarp).

Quantum Optics & Quantum Information Sep. 2018 - Feb. 2019
Pohang University of Science and Technology, South Korea
Advisor: Prof. Yoon-Ho Kim

- Observed nonlocal two-photon interference of time-energy entangled photons generated in warm Rubidium vapor

Computational Nano Physics Laboratory Mar. 2017 - Jul. 2017
Pohang University of Science and Technology, South Korea
Advisor: Prof. Seung-Hoon Jhi

- Calculated electric properties of monolayer black phosphorus via density functional theory and Boltzmann tansport theory

Ultracold Quantum Matter & Light Jun. 2017 - Jul. 2017
Institute for Quantum Computing & University of Waterloo, Canada
Advisor: Prof. Kyung Soo Choi

- Built external-cavity diode laser controller boxes
- Built a direct digital synthesizer circuit

Quantum Optics & Quantum Information   Sep. 2016 - Feb. 2017
Pohang University of Science and Technology, South Korea
Advisor: Prof. Yoon-Ho Kim

- Built Michelson-Morley and Mach-Zehnder interferometers and measured laser coherence length

- Built a magneto-optical trap of Rubidium atoms

Laboratory for Ultracold Quantum Gases   Jun. 2016 - Aug. 2017
Hong Kong University of Science and Technology, Hong Kong
Advisor: Prof. Gyu-Boong Jo

- Designed a second harmonic generation(SHG) cavity

- Calculated single pass efficiency of the SHG cavity

OSSLab - Software Engineer   Jan. 2015 - Jul. 2015
Seoul, South Korea
Advisor: Byung-Hyun Ahn

- Developed *Webcess*, an application performance management(APM) service

- Developed back-end module: extended the module for Windows users; extended the type of collected data; implemented connection between the user and the server

- Developed front-end service: visualized data using d3.js; renewed the service page

Publications See also [my google scholar](#) page.

3. **A. Lee**, H. S. Han, F. K. Fatemi, and S. L. Rolston, K. Sinha, "Collective quantum beats from distant multilevel emitters" *Phys. Rev. A* **107**, 013701 (2023).

2. H. S. Han*, **A. Lee***, K. Sinha, F. K. Fatemi, and S. L. Rolston, "Observation of Vacuum-Induced Collective Quantum Beats" *Phys. Rev. Lett.* **127**, 073604 (2021). (*equal contribution)

1. G. Lee, Y. S. Ihn, **A. Lee**, U. Kim, and Y. Kim, "Nonlocal two-photon interference of energy-time entangled photon pairs generated in Doppler-broadened ladder-type ^{87}Rb atoms" *Phys. Rev. A* **100**, 053817 (2019).

Awards
UKC Outstanding Leadership Award	2022
UKC fellow	2022
KSEA-KUSCO Graduate Scholarship	2022
Ralph Myers & Friends of Physics Award, 2nd Place	2020
Dean's Fellowhip	2019, 2020
Excellence Award for Bachelor's Thesis	2017
National Excellence Scholarship	2016-2017

Conference
APS DAMOP   2022
"Non-Markovian Collective Quantum Beats"

APS DAMOP   2021
"Vacuum-induced collective dynamics in three-level V-type atomic systems"

KSEA Virginia Washington Metro Regional Conference   2020
"Collective modes of 1d atomic clouds"

| **Community** | US Korea Conference | 2022 |
| **Activities** | *Student/Social Chair* | |

National Math and Science Competition, KSEA Washington DC Metro Chapter 2022
Vice Chair