CURRICULUM VITAE

YUJUN CHOI

830 Claytor Square, Blacksburg, VA 24060
Email: yujunchoi@vt.edu
Phone Number: 608-338-2247
Google Scholar: https://scholar.google.com/citations?user=O06k3YwAAAAJ&hl=en

RESEARCH INTERESTS

- Quantum Information Science: Quantum Computing and Quantum Networks
- Semiconductor Spin Qubit Devices, Spin-Photon Interface in Silicon
- Open Quantum Systems, Decoherence, Noise Suppression and Mitigation

EDUCATION

University of Wisconsin-Madison 2023
Ph.D. in Physics Madison, WI, USA
Advisor: Dr. Robert J. Joynt
Thesis: Characterization of Noise Sources in Semiconductor Qubit Devices

Yonsei University 2017
M.S. in Physics Seoul, Korea
Advisor: Dr. Kyunghwan Oh
Thesis: Quantum Information Processing using Classical and Quantum Interference

Yonsei University 2014
B.S. in Physics Seoul, Korea

RESEARCH EXPERIENCE

Position	Responsibility	Organization/ Supervisor	Year
Postdoctoral Associate	▪ Noise spectroscopy with space-curve formalism ▪ Single-shot entangling gates between distant semiconductor spin qubits coupled to a superconducting resonator ▪ Theoretical study on silicon T centers for photonic graph state generation ▪ Mitigation of charge noise with ballast charges	Virginia Tech/ Dr. Sophia E. Economou, Dr. Edwin Barnes	Sep. 2023 – Present

Graduate Research Assistant	▪ Geometric analysis on cross power spectral densities of semiconductor spin qubits ▪ The role of charge noise sources in pulse-induced resonance frequency shift of semiconductor spin qubits ▪ The effect of driving field on charge noise sources in semiconductor quantum dot devices ▪ Noise characterization of semiconductor quantum dot devices by using anisotropy in relaxation and dephasing times of spin qubits	University of Wisconsin-Madison/ Dr. Robert J. Joynt	Sep. 2018 – Aug. 2023
Graduate Research Assistant	▪ Experimental realization of a noisy CNOT gate with linear-optic elements and data analysis of the gate for a preset noise parameter ▪ Preparation and tomography of ququart states using polarization and time-bin modes of a single photon ▪ Generation of non-zero quantum discord in a two-qubit state using the second-order interference of a laser ▪ Proof-of-principle experiment of Plug-and-Play measurement-device-independent quantum key distribution	Center for Quantum Information, Korea Institute of Science and Technology/ Dr. Yong-Su Kim	Mar. 2014 – Aug. 2017

TEACHING EXPERIENCE

Position	**Responsibility**	**Organization/ Supervisor**	**Year**
Research Advisor	▪ Advised undergraduate research project	Department of Physics, Virginia Tech	Jan. 2024 – Present
Graduate Teaching Assistant	▪ Led discussion and lab sessions for introductory electromagnetism course (Physics 104)	University of Wisconsin-Madison/ Dr. Jim Reardon	Jul. 2019 – Aug. 2019

PUBLICATIONS

- Arshag Danageozian, **Yujun Choi**, and Sophia E. Economou, "Tailoring single-chip photonics to the time-delayed feedback paradigm of photonic graph state generation," In preparation.
- Arshag Danageozian, **Yujun Choi**, Alp Sipahigil, and Sophia E. Economou, "Protocol for photonic graph state generation from T centers in silicon," In preparation.
- **Yujun Choi**[*], Hruday Mallubhotla[*], Mark Friesen, Susan Coppersmith, and Robert Joynt, "Bayesian and geometric analyses of power spectral densities of spin qubits in Si/SiGe quantum dot devices," Submitted to a journal, arXiv:2509.23473.
- **Yujun Choi**[†], John M. Nichol, and Edwin Barnes, "Ballast charges for semiconductor spin qubits," Phys. Rev. Lett. **134**, 237002 (2025).
- **Yujun Choi**, Susan Coppersmith, and Robert Joynt, "Using stochastic resonance of two-level systems to increase qubit coherence times," Phys. Rev. A **110**, 052408 (2024).
- **Yujun Choi** and Robert Joynt, "Interacting random-field dipole defect model for heating in semiconductor-based qubit devices," Phys. Rev. Res. **6**, 013168 (2024).
- **Yujun Choi**, Tanmay Singal, Young-Wook Cho, Sang-Wook Han, Kyunghwan Oh, Sung Moon, Yong-Su Kim, and Joonwoo Bae, "Single-copy certification of two-qubit gates without entanglement," Phys. Rev. Appl. **18**, 044046 (2022).
- **Yujun Choi** and Robert Joynt, "Anisotropy with respect to the applied magnetic field in relaxation and dephasing times of spin qubits," npj Quantum Inf. **8**, 70 (2022).
- Jinwon Yoo, **Yujun Choi**, Young-Wook Cho, Sang-Wook Han, Sang-Yun Lee, Sung Moon, Kyunghwan Oh, and Yong-Su Kim, "Experimental preparation and characterization of four-dimensional quantum states using polarization and time-bin modes of a single photon," Opt. Comm. **419**, 30 (2018).
- **Yujun Choi**, Kang-Hee Hong, Hyang-Tag Lim, Jiwon Yune, Osung Kwon, Sang-Wook Han, Kyunghwan Oh, Yoon-Ho Kim, Yong-Su Kim, and Sung Moon, "Generation of a non-zero discord bipartite state with classical second-order interference," Opt. Express **25**, 2540-2551 (2017).
- **Yujun Choi**, Osung Kwon, Minki Woo, Kyunghwan Oh, Sang-Wook Han, Yong-Su Kim, and Sung Moon, "Plug-and-play measurement-device-independent quantum key distribution," Phys. Rev. A **93**, 032319 (2016).

[*]Contributed equally
[†]Corresponding author

PATENTS

- Yong-Su Kim, Sang-Wook Han, Sung-Wook Moon, **Yujun Choi**, "Method and apparatus for quantum cryptographic communication," US Patent 9,722,785 (2017).

CONFERENCE PRESENTATIONS

Oral Session

- **Yujun Choi**, John Nichol, and Edwin Barnes, "Ballast charges for semiconductor spin qubits," APS Global Physics Summit (2025).
- **Yujun Choi** and Robert Joynt, "Interacting random-field dipole defect model for heating in semiconductor-based qubit devices," APS March Meeting 2024 (2024).
- **Yujun Choi**, Susan Coppersmith, and Robert Joynt, "Driving charge noise sources in semiconductor qubit devices with oscillating electric field," APS March Meeting 2023 (2023).
- **Yujun Choi** and Robert Joynt, "Characterizing noise sources of spin qubit devices with the anisotropy in relaxation and dephasing times," APS March Meeting 2022 (2022).
- **Yujun Choi**, Osung Kwon, Sang-Wook Han, Yong-Su Kim, and Sung Moon, "Toward practical measurement-device-independent quantum key distribution," The Optical Society of Korea Winter Annual Meeting (2015).

Poster Session

- **Yujun Choi**, John M. Nichol, and Edwin Barnes, "Qubit cruising on a rough charge sea," VTQ Symposium (2024).
- **Yujun Choi**, John M. Nichol, and Edwin Barnes, "Ballast charges for semiconductor spin qubits," LPS Quantum Computing Program Review (2024).
- **Yujun Choi** and Robert Joynt, "Noise characterization of spin qubits using anisotropy in decoherence times," The Optical Society of Korea 5th Quantum Information Conference (2022).
- **Yujun Choi** and Robert Joynt, "Characterization of noise sources using anisotropy in T_1 and T_2 of spin qubits," Silicon Quantum Electronics Workshop 2021 (2021).
- **Yujun Choi**, Osung Kwon, Minki Woo, Kyunghwan Oh, Sang-Wook Han, Yong-Su Kim, and Sung Moon, "Measurement-device-independent quantum key distribution with plug-and-play architecture," The 10th Asia-Pacific Laser Symposium (2016).
- **Yujun Choi**, Jiwon Yune, Kang-Hee Hong, Hyang-Tag Lim, Osung Kwon, Sang-Wook Han, Sung Moon, Yong-Su Kim, and Yoon-Ho Kim, "Strange quantum discord in two-photon interference," The 14th Advanced Lasers and Their Applications (2015).

PROFESSIONAL SERVICE

Grant Proposal Writing

- Co-authored a proposal for the 2026 CCI SWVA Cybersecurity Research Call with Dr. Sophia E. Economou, Virginia Tech (submitted in May 2025).

Journal Referee

- Nature (1 time)
- Nature Physics (1 time)

- Physical Review Letters (1 time)

Session Chair

- Session F46: Focus Session: Shuttling and Readout in Spin Qubit Arrays, APS March Meeting 2024

Seminar Committee

- VTQ Seminar Planning Committee (Sep. 2024 – Aug. 2025)

APS Career Mentoring Fellow

- Selected by the American Physical Society to provide career mentoring and outreach (Sep. 2025 – Aug. 2026)

OUTREACH ACTIVITIES

Summer School Tutor

- Quantum Information Science and Engineering High-School level Summer School (Virginia Tech, July 2025)

SCHOLARSHIPS

Kwanjeong Overseas Scholarship 2018 – 2022

Kwanjeong Educational Foundation

- Full scholarship support for Ph.D. studies abroad ($100,000)

The National Scholarship for Science and Engineering 2010 – 2013

Korea Student Aid Foundation

- Merit-based undergraduate scholarship in physics ($40,000)