

## CURRICULUM VITAE

### YUJUN CHOI

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#### 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	<ul style="list-style-type: none"><li>▪ Noise spectroscopy with space-curve formalism</li><li>▪ Single-shot entangling gates between distant semiconductor spin qubits coupled to a superconducting resonator</li><li>▪ Theoretical study on silicon T centers for photonic graph state generation</li><li>▪ Mitigation of charge noise with ballast charges</li></ul>	Virginia Tech/ Dr. Sophia E. Economou, Dr. Edwin Barnes	Sep. 2023 – Present

Graduate Research Assistant	<ul style="list-style-type: none"> <li>▪ Geometric analysis on cross power spectral densities of semiconductor spin qubits</li> <li>▪ The role of charge noise sources in pulse-induced resonance frequency shift of semiconductor spin qubits</li> <li>▪ The effect of driving field on charge noise sources in semiconductor quantum dot devices</li> <li>▪ Noise characterization of semiconductor quantum dot devices by using anisotropy in relaxation and dephasing times of spin qubits</li> </ul>	University of Wisconsin-Madison/ Dr. Robert J. Joynt	Sep. 2018 – Aug. 2023
Graduate Research Assistant	<ul style="list-style-type: none"> <li>▪ Experimental realization of a noisy CNOT gate with linear-optic elements and data analysis of the gate for a preset noise parameter</li> <li>▪ Preparation and tomography of ququart states using polarization and time-bin modes of a single photon</li> <li>▪ Generation of non-zero quantum discord in a two-qubit state using the second-order interference of a laser</li> <li>▪ Proof-of-principle experiment of Plug-and-Play measurement-device-independent quantum key distribution</li> </ul>	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

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- **Yujun Choi**<sup>\*</sup>, Hruday Mallubhotla<sup>\*</sup>, Mark Friesen, Susan Coppersmith, and Robert Joynt, “Bayesian and geometric analyses of power spectral densities of spin qubits in Si/SiGe quantum dot devices,” In preparation.
- 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**<sup>†</sup>, 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).

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<sup>\*</sup>Contributed equally

<sup>†</sup>Corresponding author

## PATENTS

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

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### 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).
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## PROFESSIONAL SERVICE

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### 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)
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- 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 (2024-2025)
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**OUTREACH ACTIVITIES**

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**Summer School Tutor**

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

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<b>Kwanjeong Overseas Scholarship (\$100,000)</b>	2018 – 2022
<i>Kwanjeong Educational Foundation</i>	
<b>The National Scholarship for Science and Engineering (\$40,000)</b>	2010 – 2013
<i>Korea Student Aid Foundation</i>	

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