Jennifer T. Choy

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Work phone: 608-263-6974

Education

Harvard University, Cambridge, MA
PhD, Applied Physics (Advisor: Marko Lončar) 2013
MS, Applied Physics 2008

Massachusetts Institute of Technology (MIT), Cambridge, MA
BSc, Nuclear Science and Engineering 2007
BSc, Physics 2007

Positions

University of Wisconsin-Madison
Associate Professor July 2025 –
Assistant Professor Jan 2019 – June 2025
Electrical and Computer Engineering (tenure home, 2023–)
Nuclear Engineering and Engineering Physics (tenure home, 2019-22)
Materials Science and Engineering
Physics
Grainger Institute of Engineering
Wisconsin Quantum Institute
Chicago Quantum Exchange

Draper Laboratory, Electro-optics and Instruments group 2013–2018
Principal Member of the Technical Staff (2016–2018), Senior Member of the Technical Staff (2013–2016)

- Technical director on DARPA Chip-scale Combinatorial Atomic Navigator (C-SCAN) program
- Program manager on DARPA Precise Robust Inertial Guidance for Munitions (PRIGM) programs

Harvard University, Laboratory for Nanoscale Optics 2008–2013
Graduate student and post-doctoral researcher under Prof. Marko Lončar

MIT, Nuclear Magnetic Resonance Laboratory 2004–2007
Undergraduate researcher under Prof. David G. Cory

Awards

Dugald C. Jackson Assistant Professorship, ECE, UW-Madison (2024)

Outstanding Graduate Student Mentoring Award, ECE, UW-Madison (2024)

Finalist for Outstanding Student Organization Advisor, COE, UW-Madison (2024)

NSF CAREER Award (2023)

Grainger Institute Faculty Scholar Award, UW-Madison (2018)

Outstanding Contribution Award, Draper Laboratory (2015, 2016, 2017, 2018)

Outstanding Task Leader Award Finalist, Draper Laboratory (2016)

Materials Research Society Graduate Student Silver Award (2012)

National Science Foundation Graduate Research Fellowship (2007–2012)

First place winner (as part of a team of five) of the American Nuclear Society Undergraduate Student Design Competition (2007)

Roy Axford Award, Department of Nuclear Science and Engineering, MIT (2007)

Barry M. Goldwater Scholarship (2006)

Irving Kaplan Award, Department of Nuclear Science and Engineering, MIT (2006)

Major professional activities

Founding General Chair of the Optica Quantum Sensing Conference (2024, 2025)

Panelist on the National Academies Assessment of the Army Research Laboratory, in the area of Photonics, Electronics, and Quantum Sciences (2024)

Founding Scientific Advisor for Dirac Labs, a start-up devoted to the development of mobile quantum technologies

Program Chair of Optica Optical Sensors Conference 2023

Subcommittee Chair on Quantum Sensing for Optica Optical Sensors Conference (2020, 2021, 2022, 2023), Nanophotonics, Plasmonics, and Metamaterials for IEEE Photonics Conference (2022, 2023)

Consultant to Duality (2021-2022), Quantum Valley Ideas Lab (2021), Defense Science Board (2018), Air Force Scientific Advisory Board (2015)

Panelist for the NATO Sensor Electronics and Technology Panel on "Mobile Quantum Sensors for Navigation, Timing, and Gravitation" (2017)

Awards received by advisees

Second place winner in the SDL Payload Challenge at Spaceport America Cup (UW-Madison AIAA team, 2024). Role: Team and payload advisor

Third place winner in the Wisconsin Governor's Business Plan Competition (2024, Dirac Labs). Role: Founding Scientific Advisor

Emergent Ventures Grant (2024, Dirac Labs). Role: Founding Scientific Advisor

Wisconsin Technology Council Elevator Pitch Olympics (2023, Dirac Labs). Role: Founding Scientific Advisor

ECE Chancellors Opportunity Fellowship (2022, Sabrina Wu). Role: Research advisor

Student Paper Finalist at OSA Optical Sensors and Sensing Congress (2021, Ricardo Vidrio). Role: Research advisor

Ford Foundation Fellowships Honorable Mention (2021, Sarah G. Francis). Role: Research advisor

Sophomore Research Fellowship - Honorable Mention (2020, Zhengzhi Chen). Role: Research advisor

Graduate Engineering Research Scholars (GERS) Advanced Opportunity Fellowship (Ricardo Vidrio; Sarah G. Francis; Joseph Kasti). Role: Research advisor

Publications

At UW-Madison:

33. J Scott, HM Lim, U Singla, Q Meece, J. T. Choy, S Kolkowitz, TM Graham, M Saffman "Laser cooling and qubit measurements on a forbidden transition in neutral Cs atoms", arXiv:2507.01720 (2025)
32. M Kim, M Zahedian, W Wu, C Fang, Z Yu, RA Wambold, S Yin, DA Czaplewski, JT Choy, MA Kats, "Broadband light extraction from near-surface NV centers using crystalline-silicon antennas", Nano Letters, 25, 12, 4659–4666 (2025)
31. Y Tong, M Zahedian, A Zeng, R Vidrio, M Efremov, S Yin, H Mei, P Heaney, JT Choy,"Tuning the surface energy of fluorinated diamond-like carbon coatings via plasma immersion ion implantation plasma-enhanced chemical vapor deposition with 1,1,1,2-tetrafluoroethane", Diamond and Related Materials, 156, 112365 (2025)

30. R Vidrio, C Saucedo, V Lordi, S Kolkowitz, KG Ray, RJ Hamers, JT Choy, "Sub-nanometer-thick native sp2 carbon on oxidized diamond surfaces", arXiv:2409.06934, in revisions at Langmuir (2024)
29. DR Smith, M Beuting, DJ Den Hartog, B Geiger, ST Sanders, X Yang, JT Choy, "Entangled two-photon absorption for continuous generation of excited state populations in plasma", arXiv:2409.08391, in revisions at Review of Scientific Instruments (2024)
28. X Yang, P Mukherjee, M Kim, H Mei, C Fang, S Choi, Y Tong, S Perlowski, DA Czaplewski, AM Dibos, MA Kats, JT Choy, "Atomic magnetometry using a metasurface polarizing beamsplitter in silicon on sapphire", ACS Photonics, 11, 9, 3644–3651 (2024)
27. R Vidrio, D Vincent, B Bachman, C Saucedo, M Zahedian, Z Xu, J Lai, TA Grotjohn, S Kolkowitz, J-H Seo, RJ Hamers, KG Ray, Z Ma, JT Choy, "XPS analysis of molecular contamination and sp2 carbon on oxidation of (100) single-crystal diamond surfaces", Materials for Quantum Technology, 4, 025201 (2024)
26. M Zahedian, J Liu, R Vidrio, S Kolkowitz, JT Choy, "Modeling of Radiative Emission from Shallow Color Centers in Single Crystalline Diamond", Laser and Photonics Reviews, 2200529 (2023)
25. X Yang, M Benelajla, S Carpenter, JT Choy, "Analysis of atomic magnetometry using metasurface optics for balanced polarimetry," Optics Express, 31, 13436-13446 (2023)
24. PM Pellegrino, G Brambilla, F Volmer, JT Choy, "Optical sensors, 2022: introduction to the feature issue", Optics Express, 31(9), 14997-14999 (2023)
23. A Gardill, I Kemeny, Y. Li, M. Zahedian, M Zahedian, X Xu, V Lordi, A Gali, JR Maze, JT Choy, S Kolkowitz, "Super-resolution Airy disk microscopy of individual color centers in diamond", ACS Photonics 9(12), 3848-3854 (2022)
22. B Bachman, Z Jones, Zachary, G Jaffe, J Salman, R Wambold, Z Yu, J Choy, S Kolkowitz, M Eriksson, M Kats, R Hamers, "High-density covalent grafting of spin-active molecular moieties to diamond surfaces", Langmuir, 37(30), 9222–9231 (2021)
21. RA Wambold, Z Yu, Y Xiao, B Bachman, G Jaffe, S Kolkowitz, JT Choy, MA Eriksson, RJ Hamers, MA Kats, "Adjoint-optimized nanoscale light extractor for nitrogen-vacancy centers in diamond," Nanophotonics, 10(1), 393–401 (2020)
20. JT Choy, "Photonics for atomic sensors." Photonics Spectra (August 2020 issue)

Before UW-Madison:

19. I Huang, J Holzgrafe, R Jensen, J Choy, M Bawendi, and M Lončar, "10 nm Gap Bowtie Plasmonic Nanoresonators Fabricated by Modified Lift-off Process," Applied Physics Letters, 109, 133105 (2016)
18. RA Jensen, I Huang, O Chen, JT Choy, TS Bischof, M Lončar, MG Bawendi, "Optical Trapping and Two-Photon Excitation of Colloidal Quantum Dots using Bowtie Apertures," ACS Photonics, 3(3), 423–427 (2016)
17. S Meesala, YI Sohn, HA Atikian, S Kim, MJ Burek, JT Choy, M Lončar, "Enhanced strain coupling of nitrogen vacancy spins to nanoscale diamond cantilevers," Physical Review Applied, 5, 034010 (2016)
16. HA Atikian, A Eftekharian, AJ Salim, MJ Burek, JT Choy, AH Majedi, M Lončar, "Superconducting nanowire single photon detector on diamond," Applied Physics Letters, 104(12), 122602 (2014)

15. K Bayat, J Choy, M Farrokh Baroughi, S Meesala, M Lončar, "Efficient, Uniform, and Large Area Microwave Magnetic Coupling to NV Centers in Diamond Using Double Split-Ring Resonators," Nano Letters, 14 (3), 1208–1213 (2014)
14. R Mahfouz, DL Floyd, W Peng, JT Choy, M Lončar, OM Bakr, "Size-controlled fluorescent nanodiamonds: a facile method of fabrication and color-center counting," Nanoscale, 5(23), 11776–11782 (2013)
13. JT Choy, I Bulu, B Hausmann, and M Lončar, "Spontaneous emission and collection efficiency enhancement of single emitters in diamond via plasmonic cavities and gratings," Applied Physics Letters, 103(16), 161101 (2013)
12. JDB Bradley, CC Evans, JT Choy, O Reshef, PB Deotare, F Parsy, KC Phillips, M Lončar, and E Mazur, "Submicrometer-wide amorphous and polycrystalline anatase TiO_2 waveguides for microphotonic devices," Optics Express, 20, 23821–23831 (2012)
11. BJM Hausmann, JT Choy, TM Babinec, BJ Shields, I Bulu, MD Lukin, and M Lončar, "Diamond nanophotonics and applications in quantum science and technology," Physica Status Solidi A, 209, 1619–1630 (2012)
10. BM Hausmann, B Shields, Q Quan, P Maletinsky, M McCutcheon, JT Choy, TM Babinec, A Kubanek, A Yacoby, MD Lukin, M Lončar, "Integrated diamond networks for quantum nanophotonics," Nano Letters, 12(3), 1578–1582 (2012)
9. JT Choy, JDB Bradley, PB Deotare, IB Burgess, CC Evans, E Mazur, and M Lončar, "Integrated TiO_2 resonators for visible photonics," Optics Letters, 37, 539-541 (2012)
8. JT Choy, BM Hausmann, TM Babinec, I Bulu, M Khan, P Maletinsky, A Yacoby, and M Lončar, "Enhanced single photon emission from a diamond-silver aperture," Nature Photonics, 5, 738–743 (2011)
7. Y Zhang, C Hamsen, JT Choy, Y Huang, JH Ryou, RD Dupuis, and M Lončar, "Photonic crystal disk lasers," Optics Letters, 36(14), 2704–2706 (2011)
6. TM Babinec, BM Hausmann, JT Choy, M Khan, PR Hemmer, and M Lončar, "Quantum photonics with diamond," IEEE Photonics Society Newsletter, 25, 13–18 (2011)
5. I Bulu, TM Babinec, B Hausmann, JT Choy, M Lončar, "Plasmonic resonators for enhanced diamond NV-center single photon sources," Optics Express, 19, 5268–5276 (2011)
4. BM Hausmann, TM Babinec, JT Choy, JS Hodges, S Hong, I Bulu, A Yacoby, M Lukin and M Lončar, "Single color centers implanted in diamond nanostructures," New Journal of Physics, 13, 045004 (2011)
3. TM Babinec, JT Choy, KJM Smith, M Khan, and M Lončar, "Design and focused ion beam fabrication of single crystal diamond nanobeam cavities," Journal of Vacuum Science and Technology B, 29, 010601 (2011)
2. LE Fernandes, JT Choy, DR Khanal, DG Cory, "Experimental realization of electromagnetically induced transparency in liquid-state NMR," Concepts in Magnetic Resonance A, 30A(5), 236–245 (2007)
1. J Choy, W Ling, A Jerschow, "Selective detection of ordered sodium signals via the central transition," Journal of Magnetic Resonance, 180, 105–109 (2006)

Committee reports

National Academies of Sciences, Engineering, and Medicine. 2024. 2024 Assessment of the DEVCOM Army Research Laboratory. Washington, DC: The National Academies Press.

"Fueling American Innovation & Growth: A National Network For Microelectronics Education and Workforce Development" American Semiconductor Academy & SEMI (2022)

Book chapter

JT Choy, BJM Hausmann, MJ Burek, T. Babinec, M Lončar, "Nanofabrication of photonic devices from single crystal diamond for quantum information processing (QIP)," invited book chapter in "Quantum Information Processing with Diamond", edited by S Prawer and I Aharonovich, Woodhead Publishing (2014)

Patents

S Deshpande, M Kats, J Choy, "Gravity surveys on unstaffed aerial vehicle", patent application filed on March 5, 2024

K Kotru, JM Brown, DL Butts, RE Stoner, JT Choy, DMS Johnson, N Pomeroy, SP Smith, N Wu, "Atom interferometry in dynamic environments", US Patent 10,331,087 (2019)

A Gill, SJ Byrnes, J Choy, CY Wang, MA Sinclair, A Kelsey, D Johnson, "Cold atom interferometry", US Patent 10,157,692 (2018)

Invited seminars

Since starting at UW-Madison:

11. "Optical and chemical control of quantum interfaces". Seminar at University of California Berkeley, September 2024
10. "Tackling interface challenges for near-surface color centers in diamond" Illinois Quantum Information Science and Technology Center Seminar at University of Illinois Urbana-Champaign, September 2024
9. "Engineering of atomic and solid-state quantum emitters for sensing". Quantum Research Institute Seminar at University of Michigan, April 2024
8. "Photonic engineering of atomic and solid-state quantum emitters for sensing". Physics Colloquium at Mississippi State University, March 2023
7. "Engineering atomic and solid-state quantum sensors for magnetometry and inertial sensing". Thouless Institute for Quantum Matter Seminar at University of Washington Seattle, February 2023
6. "Nanophotonic engineering of quantum sensors". Webinar hosted by Laser Focus World, October 2021
5. "Quantum sensing in atomic and solid-state systems". Hamamatsu Quantum Technologies Webinar, September 2021
4. "Photonic engineering of atomic sensors". Illinois Quantum Information Science and Technology Center Seminar at University of Illinois Urbana-Champaign, May 2021
3. "Quantum sensing in atomic and solid-state systems". Material Science and Engineering Seminar, University of Wisconsin-Madison, Madison, WI, February 2020

Before UW-Madison:

2. "Engineering light-matter interactions with atom-like systems." R.G. Herb Condensed Matter Seminar, University of Wisconsin-Madison, Madison, WI, September 2016

1. "Single photon sources based on diamond-silver apertures." Center for Nanoscale Systems Seminar, Harvard University, Cambridge, MA, December 2011

Invited presentations at conferences and workshops

Since starting at UW-Madison:

17. MRS Spring Meeting, April 2025
16. "Silicon nanophotonics for atomic and solid-state quantum sensors". International Network for Micro-fabricated Atomic Quantum Sensors workshop, October 2024
15. "Tackling interface challenges for shallow color centers in diamond". 245th Electrochemical Society (ECS) meeting, May 2024
14. "Photonic engineering of atomic and solid-state quantum sensors". IEEE Photonics Society Summer Topicals, July 2023
13. "Photonic engineering of atomic and solid-state quantum emitters for sensing". Photonics North, June 2023
12. "Fabrication of quantum metamaterials in diamond using focused ion beam implantation". CLEO, May 2023
11. "Engineering near-surface color centers in diamond for quantum sensing". SPIE Photonics West, January 2023
10. "Nanophotonic components for quantum sensors". SPIE Photonics West (On Demand), January 2022
9. "Photonic engineering of atomic sensors". IEEE Research and Applications of Photonics in Defense (RAPID), August 2021
8. "Applications of metasurface optics in atom-based sensors". META 2020, Session on Opto-mechanical metasurfaces and metamaterials, July 2021 (talk canceled for COVID-related reasons)
7. "Electromagnetic field imaging using quantum sensors." *Imaging and Visualization Workshop*, Grainger Institute of Engineering, University of Wisconsin-Madison, October 2020
6. "Photonic engineering of atomic sensors". Photonics for Quantum 2 Workshop at Rochester Institute of Technology, June 2020

Before UW-Madison:

5. "Cold atom inertial sensors." Briefing presented to the Defense Science Board at Draper Laboratory, May 2018
4. "A cold atom accelerometer-gyroscope." First Meeting of the NATO Sensors and Electronics Technology Panel on "Mobile Quantum Sensors for Navigation, Timing, and Gravitation", April 2017
3. "Cold atom inertial sensors." Briefing presented to the Utility of Quantum System Study Panel of the Air Force Scientific Advisory Board at Draper Laboratory, March 2015
2. "Single photon sources based on nanostructured diamond." Quantum Innovators Workshop, Institute for Quantum Computing at University of Waterloo, September 2012

1. "Diamond nanophotonics and quantum optics." International Materials Research Congress (IMRC), August 2011

Conference presentations by UW-Madison group members

9. M Zahedian, R Vidrio, S Kolkowitz, JT Choy. "Observation of depth-dependent modification in local density of states in shallow color centers in diamond." Contributed talk. Conference on Lasers and Electro-Optics (CLEO), May 2024
8. W Wu, M Zahedian, Q Zhou, MC Cambria, J Dolde, M Titze, E Bielejec, S Kolkowitz, Z Yu, and JT Choy. "Modeling and characterization of cooperative effects in ensembles of inhomogeneous solid-state emitters." Contributed talk (accepted). Conference on Lasers and Electro-Optics (CLEO), May 2024
7. X Yang, S Choi, M Kim, C Fang, H Mei, S Carpenter, M Benelajla, S Perlowski, D Czaplewski, A Dibos, M Kats, J Choy. "Progress towards a metasurface-integrated atomic magnetometer." Poster. Frontiers in Optics + Laser Science, October 2023
6. R Vidrio, C Saucedo, B Bachman, RJ Hamers, JT Choy, "Analyzing the layered heterogeneity of (100) single-crystalline diamond using Angle-Resolved XPS." Contributed talk. International Conference on Diamond and Carbon Materials 2023
5. R Vidrio, D Vincent, B Bachman, C Saucedo, M Zahedian, Z Xu, T Grotjohn, S Kolkowitz, J Lai, J-H Seo, RJ Hamers, KR George, Z Ma, JT Choy, "Preparation and analysis of oxidation on (100) single-crystal diamond surface." Contributed talk. MRS Fall Meeting, November 2022
4. M Zahedian, J Liu, R Vidrio, S Kolkowitz, JT Choy, "Depth dependence of the radiative lifetimes of shallow color centers in single crystalline diamond." Poster. MRS Fall Meeting, November 2022
3. X Yang, S Francis, M Benelajla, JT Choy, "Chip-scale optics for atomic magnetometry." Contributed talk. OSA Novel Optical Materials and Applications (NOMA), July 2021
2. R Vidrio, M Zahedian, H Zhang, B Schneider, X Zu, A Couet, JT Choy, "Characterization of luminescence and electron transport in corroded zirconium alloys." Contributed talk. OSA Optical Sensors and Sensing Congress, July 2021. **Student Paper Finalist.**
1. X Yang, JF Doyle, JT Choy, "Development of a photonic-integrated atomic magnetometer." Contributed talk. APS DAMOP, June 2020

Other conference presentations

8. "Depth-dependent radiative lifetimes in shallow nitrogen-vacancy centers in diamond." Optica Quantum Sensing and Metrology Conference, July 2024
7. "Quantum sensing discussion." Special Event at Optica Optical Sensors and Sensing Congress, July 2022
6. "A hybrid atom interferometer accelerometer-gyroscope." IEEE/ION Position Location and Navigation Symposium, April 2018
5. "A hybrid atom-interferometer-based inertial measurement unit." Joint Navigation Conference, June 2017
4. "Plasmonic gratings for improving single photon collection for color centers in diamond." MRS Fall Meeting, November 2012
3. "Diamond-silver apertures with plasmonic gratings." CLEO, May 2012
2. "Enhanced single photon emission by diamond-plasmon nanostructures." CLEO, May 2011

1. "Optical characterization of diamond nanoparticles and their applications." MRS Fall Meeting, November 2010

Grants

Since starting at UW-Madison:
Prof. Choy has been PI or co-PI on externally funded grants from DOE, NSF, and ONR totaling approximately $11.6 million and has served as lead PI for external awards totaling more than $7.3 million.

21. Program: Equipment: MRI: Track 1 Acquisition of a Transportable Laser System Tunable over 210-4300 nm with Two Independent Outputs
Sponsor: National Science Foundation
Institution: University of Wisconsin-Madison
Years: 2024–2027
Amount: $949,898 (total)
Role: Co-PI

20. Program: Consortium for Enabling Technologies and Innovation 2.0
Sponsor: Department of Energy National Nuclear Security Administration
Institutions: Georgia Tech (lead), University of Wisconsin-Madison
Years: 2025–2030
Amount: $500,000 (estimated Choy portion)
Role: Co-PI

19. Program: CAREER: Solid-state quantum navigation and timekeeping
Sponsor: National Science Foundation
Institution: University of Wisconsin-Madison
Years: 2024–2029
Amount: $550,000
Role: **Single PI**

18. Program: QuSeC-TAQS: Compact and Robust Quantum Atomic Sensors for Timekeeping and Inertial Sensing
Sponsor: National Science Foundation
Institutions: University of Wisconsin-Madison (lead), UC Santa Barbara
Years: 2023–2027
Amount: $2,000,000 (total)
Role: **Lead PI**

17. Program: All-optical quantum techniques for fusion research
Sponsor: Department of Energy, Fusion Energy Sciences
Institution: University of Wisconsin-Madison
Years: 2023–2026
Amount: $1,500,000 (total)
Role: **Lead PI**

16. Program: Role of nanoscale heterogeneities on charged species transport in oxide
Sponsor: Department of Energy, Office of Science
Institution: University of Wisconsin-Madison
Years: 2023–2026
Amount: $956,217 (total)
Role: Co-PI

15. Program: Wisconsin Center for Semiconductor Thermal Photonics
Sponsor: Wisconsin Alumni Research Foundation Research Forward Award
Institution: University of Wisconsin-Madison
Years: 2023–2025
Amount: $250,000 (total)
Role: Co-PI

14. Program: I-Corps: Satellite-Borne Quantum Gravity Gradiometer for Observing Mass Density Variations and Transport Phenomena
Sponsor: National Aeronautics and Space Administration
Institution: University of Wisconsin-Madison
Years: 2023–2024
Amount: $10,000 (total)
Role: Co-PI

13. Program: Study and control of macroscopic quantum coherence in cold atoms
Sponsor: Wisconsin Alumni Research Foundation Fall Competition Award
Institution: University of Wisconsin-Madison
Years: 2023–2024
Amount: $46,825
Role: Single PI

12. Program: Q-NEXT Next Generation Quantum Science and Engineering
Sponsor: Department of Energy
Institutions: University of Wisconsin-Madison, Argonne National Laboratory (lead)
Years: 2021–2022
Amount: $50,000 (Choy portion)
Role: Senior Personnel

11. Program: Modeling, probing, and controlling quantum coherence in materials
Sponsor: Department of Energy, Basic Energy Sciences
Institutions: University of Wisconsin-Madison (lead), Lawrence Livermore National Laboratory
Years: 2022–2025
Amount: $2,827,889 (total)
Role: Co-PI (2022–2023); **Lead PI** (2023–2025)

10. Program: Quantum plasmonics for thermal atoms
Sponsor: Wisconsin Alumni Research Foundation Fall Competition Award
Institution: University of Wisconsin-Madison
Years: 2021–2022
Amount: $45,439
Role: single PI

9. Program: QLCI-CI: Hybrid Quantum Architectures and Networks
Sponsor: National Science Foundation
Institutions: University of Illinois Urbana Champaign (lead), University of Wisconsin-Madison
Years: 2020–2025
Amount: $8,560,000 (total)
Role: Senior Personnel; faculty lead in Quantum Outreach, Education, and Workforce Development

8. Program: Wisconsin Materials Research Science and Engineering Center seed project
Sponsor: National Science Foundation
Institution: University of Wisconsin-Madison
Years: 2020–2022
Amount: $148,570 (Choy and Couet portion)
Role: co-PI with Adrien Couet

7. Program: Photonic engineering for quantum sensors
Sponsor: Wisconsin Alumni Research Foundation Fall Competition Award
Institution: University of Wisconsin-Madison
Years: 2020–2021

Amount: $41,878
Role: single PI

6. Program: Nanophotonic approaches to atomic sensors
   Sponsor: Office of Naval Research
   Institution: University of Wisconsin-Madison
   Years: 2020–2024
   Amount: $449,764
   Role: **Single PI**
5. Program: Quantum probes of the materials origins of decoherence
   Sponsor: Department of Energy, Basic Energy Sciences
   Institutions: University of Wisconsin-Madison (lead), Lawrence Livermore National Laboratory
   Years: 2019–2022
   Amount: $2,400,000 (total)
   Role: Co-PI

Before UW-Madison:

4. Program: Miniaturized Inertial Measurement Unit (mini-IMU)
   Sponsor: Office of Naval Research
   Institution: Draper
   Years: 2018–2019
   Role: Technical Director
3. Program: Precise Robust Inertial Guidance for Munitions Navigation-Grade Inertial Measurement Unit (PRIGM:NGIMU)
   Sponsor: DARPA
   Institution: Draper (as subcontractor to Honeywell)
   Years: 2016–2017
   Role: Program Manager (2017)
2. Program: Precise Robust Inertial Guidance for Munitions: Advanced Inertial Micro Sensors (PRIGM:AIMS)
   Sponsor: DARPA
   Institution: Draper
   Years: 2016–2017
   Role: Program Manager (2017)
1. Program: Chip-Scale Combinatorial Atomic Navigator (C-SCAN)
   Sponsor: DARPA
   Institution: Draper
   Years: 2013–2017
   Role: Task Lead (2013–2015); Technical Director (2015–2017)

Teaching (UW only)

University of Wisconsin-Madison

ECE 601: Introduction to Quantum Sensing (ECE 835 starting F2025) F2023, F2024
Course introducing fundamental concepts and applications of quantum sensing technologies to undergraduates. **Developed from scratch by Choy**.

ECE 835: Light Interactions with Quantum Materials S2024, S2025
Graduate course on light-matter interactions with quantum systems and their applications in quantum computing, communications, and sensing. **Developed from scratch by Choy**.

EMA 550: Astrodynamics S2021, S2022, S2023

Advanced undergraduate course on orbital mechanics

EMA 601/NE 602: Quantum Engineering with Atoms and Photons F2020, F2021
Special topics course on the quantum and optical physics describing the quantum properties of atoms and how atoms interact with electromagnetic radiation, as well as the application of quantum science to sensing, communication, and communication. **Developed from scratch by Choy**.

NE 427: Nuclear Instrumentation Laboratory S2019, F2019, S2020, F2022
Undergraduate course consisting of both lecture and laboratory components.

Education and outreach

Since starting at UW-Madison:

Faculty advisor for UW-Madison's entry at Spaceport America Cup intercollegiate rocket competition (2023, 2024); our diamond NV quantum magnetometer payload won second place over more than 150 teams in the 2024 payload competition

Faculty lead in Quantum Outreach, Education, and Workforce Development for NSF QLCI-CI: Hybrid Quantum Architectures and Networks; oversaw initiatives that include Wonders of Quantum Physics (which has distributed over 900 quantum activity kits reaching more than 2700 students across the country).

Faculty and research mentor for Open Quantum Initiative (OQI) Fellowship program (2022, 2023, 2024)

Member of the American Semiconductor Academy (ASA) planning team, focusing on initiatives for semiconductor microelectronics education

Mentor for Lincoln High School Scientific Research Program in Yonkers, NY (2022)

Volunteer for Physics Fair at UW-Madison (2020, 2022, 2025)

Faculty guest at Women in Science & Engineering (WISE) dinner (2019, 2020)

Before UW-Madison:

Engineering Possibilities Showcase, Draper (2017)

NeXXt scholar program fellow, New York Academy of Sciences (2013–2014)

Volunteer, Cambridge 8th grade Science and Engineering Showcase, Harvard (2012)

Volunteer, "NanoDays", Museum of Science, Boston, MA (2012)

Tutor and Science Olympiad advisor for Cambridge School Volunteers, Cambridge Rindge and Latin School (2008–2010)

Outreach talks/ interviews

Keynote speaker, WiscNet Connections 2025. WiscNet is a network of Wisconsin public and private higher education, K12 school districts, libraries, municipalities, and hospitals focusing on challenges in education and research missions.

"Quantum outreach and education." NSF QLCI proposal workshop, New York University, January 2025

"Quantum engineering with color centers in diamond." TeachQuantum Bootcamp, UW-Madison, July 2024

"Quantum sensing and metrology." QuantUM Speaker Series, University of Michigan, April 2024

"Quantum sensing and metrology with atoms." Quantum Information Science and Engineering Graduate Seminar, University of Washington Seattle, February 2023

Interviewee for local NBC news segment on UVC lights for disinfection, November 2020

"Atoms reveal the hidden workings of the universe." Presentation at SoundWaves: Hidden Worlds of the Universe, University of Wisconsin-Madison, April 2019

"Diamonds and light." Boston Museum of Science Podcast, 2012

Other external service

Note that conference leadership roles are listed earlier under "Major professional activities"

Guest editor for Optics Express Optical Sensors issue (2022)

Committee member for the Deborah Jin Award for Outstanding Doctoral Thesis Research in Atomic, Molecular, or Optical Physics (2023); Optica Novel Optical Materials and Applications conference (2019-present); subcommittee on Quantum Optics of Atoms, Molecules, and Solids for CLEO (2022, 2023); subcommittee on Nanophotonics for IEEE Photonics Conference (2021)

Proposal reviewer for National Science Foundation (2019, 2021), UW2020 WARF Discovery Initiative, Swiss National Science Foundation (2022)

Referee for Nature, Nano Letters, Carbon, Scientific Reports, Optical Materials Express, Optics Express, Optics Letters

Institutional service

Undergraduate Curriculum Committee in Electrical and Computer Engineering (2024-2025)

Steering Committee for the Wisconsin Quantum Institute (since 2024) PhD Graduate Committee in Electrical and Computer Engineering (2023-2024)

Faculty advisor for Wisconsin Space Program, UW-Madison's chapter in American Institute of Aeronautics and Astronautics (AIAA) (since 2022)

Faculty mentor at Tau Beta Pi, UW-Madison chapter (since 2022)

Qualifying exam committee in Engineering Physics (2020-2023)

Faculty Senate (Oct 2020-2022)

Research advising at UW-Madison

Postdoctoral Researchers

Michael Zepp (since November 2024, co-advised with Benedikt Geiger)

Ricardo Vidrio (since September 2024)

Maryam Zahedian (December 2020-November 2024)

Meryem Benelajla (January 2021-January 2022)

Graduate Students

Ricardo Vidrio (NEEP PhD, graduated Aug 2024)

Xuting Yang (MSE PhD, graduated Dec 2024)

Sarah Francis (NEEP PhD, September 2019-December 2021)

Zachary Jankowski (ECE MS, graduated May 2024)

Sabrina Wu (ECE PhD, since June 2022)

Soyeon Choi (Physics PhD, June 2022-May 2023)

Andrew Tong (ECE PhD, since September 2023)

Pritha Mukherjee (ECE MS, since September 2023)

Steven Carpenter (ECE PhD, since September 2024, co-advised with Deniz Yavuz)

Prayas Sharma (ECE PhD, since September 2024)

Joseph Kasti (ECE PhD, since September 2024)

Kunal Sinha (Physics - Quantum Computing MS, since September 2024)

Mayand Dangi (ECE PhD, since March 2025)

Undergraduates and post-bacc researchers

Zhengzhi Chen (ECE, 2019-2020)

John Doyle (ECE, 2019-2020)

Mazna Aljneibi (NEEP, 2019-2020)

Bryan Xu (AMEP, 2020-2022) (transitioned to Math PhD)

Andrew Tong (Physics, 2020-2023) (transitioned to ECE PhD)

Jietian Liu (AMEP, 2020-2022) (transitioned to ECE PhD at U Mich)

Steven Carpenter (AMEP, 2021-2024) (transitioned to ECE PhD)

Sarah Perlowski (Physics, 2021-2023)

Kate Arutyunova (Physics and EE at MIT, OQI Fellow, Summer 2022)

Veshnu Vemuri (ECE, 2022-2024)

Seamus Lavine (EMA, 2022-2023)

Erin Diran-Ojo (ECE at U Mich, OQI Fellow, Summer 2023)

William Cobb (ECE, since Summer 2024)

Walter Van Dyke (EP, since Fall 2023)

Yitianran Wang (Physics at Southern University of Science and Technology in China, visiting student at UW-Madison in Spring and Summer 2024)

Calvin Mestelle (ECE, since December 2024)

Ian Crawshaw (AMEP, since January 2025)

PhD Defense Committees

Zhenyang Xia (Electrical and Computer Engineering, 2019), Daniel Thrasher (Physics, 2020), Baris Ozguler (Physics, 2020), Alireza Shahsafi (Electrical and Computer Engineering, 2021); Gabriel Jaffe (Physics, 2021); Jad Salman (Elecctrical and Computer Engineering, 2021); Nathan Strachen (Electrical and Computer Engineering, 2021); Raymond Wambold (Electrical and Computer Engineering, 2021); Gregory Holdman (Physics, 2022); Jae Ha Ryu (Electrical and Computer Engineering, 2022); Benjamin Bachman (Chemistry, 2022), Chuanhong Vincent Liu (Physics, 2023), Colin Whistler (Physics, 2023), Susan Sorensen (Physics, 2023), Aedan Gardill (Physics, 2023), Leah Tom (Physics, 2023), Juan Bohorquez (Physics, 2023), Michael Bulatowicz (Physics, 2023), Boyuan Liu (Electrical and Computer Engineering, 2023), Hongyan Mei (Electrical and Computer Engineering, 2024), Wayne Goodman (Electrical and Computer Engineering, 2024), Yinqi Chen (Physics, 2024), Daniel Vincent (Electrical and Computer Engineering, 2024), Ricardo Vidrio (Nuclear Engineering and Engineering Physics, 2024), Demeng Feng (Electrical and Computer Engineering, 2024), Xuting Yang (Materials Science and Engineering, 2024), Margaret Fortman (Physics, 2025), Abigail Shearrow (Physics, 2025)

Preliminary Exam Committees

Alireza Shahsafi (Electrical and Computer Engineering, 2019); Jad Salman (Electrical

and Computer Engineering, 2019); Nathan Strachen (Electrical and Computer Engineering, 2019); Xiaoyu Jiang (Physics, 2020); Harry Fang (Materials Science and Engineering, 2021); Aedan Gardill (Physics, 2021); Xuting Yang (Materials Science and Engineering, 2021); Hongyan Mei (Electrical and Computer Engineering, 2022); Ricardo Vidrio (Nuclear Engineering and Engineering Physics, 2022); Matt Cambria (Physics, 2022); Demeng Feng (Electrical and Computer Engineering, 2022); Cuauhtemoc Rodriguez Sanchez (Nuclear Engineering and Engineering Physics, 2022), Armand Keyhani (Nuclear Engineering and Engineering Physics, 2023), Qingyi Zhou (Electrical and Computer Engineering, 2023), Sanket Deshpande (Electrical and Computer Engineering, 2023), Henrique Oliveira Miller (Electrical and Computer Engineering, 2024), Jacob Scott (Physics, 2024), Aidana Beisenova (Biomedical Engineering, 2024), Brandon Cortez (Electrical and Computer Engineering, 2024), Minjeong Kim (Electrical and Computer Engineering, 2024), Chengyu Fang (Electrical and Computer Engineering, 2024), Qinchen Lin (Electrical and Computer Engineering, 2025)