

SHUO SUN

University of Colorado Boulder, 440 UCB, Boulder, CO 80309

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EDUCATION

Dec 2016 Ph.D. in Electrical Engineering, University of Maryland, College Park
Dec 2015 M.S. in Electrical Engineering, University of Maryland, College Park
June 2011 B.S. in Optics, Zhejiang University

APPOINTMENTS

Aug 2020 - Present Assistant Professor of Physics, University of Colorado Boulder
Aug 2020 - Present Associate Fellow of JILA
June 2019 - Aug 2020 Visiting Assistant Professor of Physics, University of Colorado Boulder
Dec 2019 - Aug 2020 Physical Science Research Scientist, Stanford University
Jan 2017 - Nov 2019 Postdoctoral Fellow, Stanford University
Aug 2011 - Dec 2016 Graduate Research Assistant, University of Maryland, College Park

HONORS AND AWARDS

1. Second Prize of the Rising Stars of Light, Light: Science & Applications, 2020
2. Honorable Mention, Carl E. Anderson Division of Laser Science Dissertation Award, American Physical Society, 2017
3. Distinguished PhD Dissertation Award, Department of Electrical and Computer Engineering, University of Maryland College Park, 2016
4. Maiman Outstanding Student Paper Award, Optical Society of America, 2015
5. Grand Prize of the China Instrument and Control Society Scholarship, 2011
6. Chu Kochen Award (the highest honor in Zhejiang University), 2011
7. National Scholarship of China (2008, 2009, 2010)

PROFESSIONAL SERVICE

- Assistant Editor, Journal of the Optical Society of America B, 2020 - Present
- Regular Reviewer of scientific publications for Nature, Nature Nanotechnology, Nature Physics, npj Quantum Information, Physical Review Letters, Physical Review X, Physical Review Applied, Physical Review A, Physical Review B, Nano Letters, ACS Photonics, Advanced Optical Materials, Scientific Reports, New Journal of Physics, Applied Physics Letters, Optical Express, Optics Letters, Journal of the Optical Society of America B, Quantum Science and Technology.
- CU Physics Department Committees: Junior Faculty Advisory Committee (2020 - Present), Arts & Science Undergraduate Advising Committee (2020 - Present), Graduate Committee (2020 - Present)
- CU Physics Comprehensive Exam and Dissertation Committee: Robert Delaney (COMPS III, 2020)

TEACHING

Fall 2020 PHYS1120 General Physics II (TA)

MENTORING AND ADVISING

1. Yuan Zhan (PhD student in Physics, 2019 - Present)
2. KinFung Ngan (PhD student in Physics, 2020 - Present)
3. Yichuan Su (Undergraduate student in Engineering Physics, 2020 - Present)

RESEARCH ACTIVITIES AND INTERESTS

- Broad Definition: Quantum Optics, Photonics, Quantum Information
- Specific Topics: cavity electrodynamics, spin-photon interface, deterministic single-photon level optical nonlinearity, semiconductor quantum dots, color centers, photonic crystals, quantum repeater, optical quantum computing.

PEER-REVIEWED JOURNAL PUBLICATION

1. Y. Zhan and **S. Sun**, Deterministic Generation of Loss-Tolerant Photonic Cluster States with a Single Quantum Emitter, *Physical Review Letters* **125**, 223601 (2020).
2. D. M. Lukin, A. D. White, M. A. Guidry, R. Trivedi, N. Morioka, C. Babin, J. U. Hassan, N. T. Son, T. Ohshima, P. K. Vasireddy, M. H. Nasr, **S. Sun**, J. W. MacLean, C. Dory, E. A. Nanni, J. Wrachtrup, F. Kaiser, J. Vučković, Spectrally reconfigurable quantum emitters enabled by optimized fast modulation, *npj Quantum Information* **6**, 80 (2020).
3. A. E. Rugar, C. Dory, S. Aghaeimeibodi, H. Lu, **S. Sun**, S. D. Mishra, Z.-X. Shen, N. A. Melosh, J. Vučković, Narrow-Linewidth Tin-Vacancy Centers in a Diamond Waveguide, *ACS Photonics* **7**, 23562361 (2020).
4. D. M. Lukin, C. Dory, M. A. Guidry, K. Y. Yang, S. D. Mishra, R. Trivedi, M. Radulaski, **S. Sun**, D. Vercruysee, G. H. Ahn and J. Vučković, 4H-silicon-carbide-on-insulator for integrated quantum and nonlinear photonics, *Nature Photonics* **14**, 330334 (2020).
5. A. E. Rugar, H. Lu, C. Dory, **S. Sun**, P. J. McQuade, Z.-X. Shen, N. Melosh, J. Vučković, Generation of Tin-Vacancy Centers in Diamond via Shallow Ion Implantation and Subsequent Diamond Overgrowth, *Nano Letters* **20**, 1614 - 1619 (2020).
6. Z. Luo, **S. Sun**, A. Karasahin, M. K. Yakes, S. G. Carter, A. S. Bracker, D. Gammon and Edo Waks, A spin-photon interface using charge-tunable quantum dots strongly coupled to a cavity, *Nano Letters* **19**, 7072-7077 (2019).
7. M. Radulaski, Y.-K. Tzeng, J. L. Zhang, K. G. Lagoudakis, H. Ishiwata, C. Dory, K. A. Fischer, Y. A. Kelaita, **S. Sun**, P. C. Maurer, K. Alassaad, G. Ferro, Z.-X. Shen, N. Melosh, S. Chu and J. Vučković, Nanodiamond Integration with Photonic Devices, *Laser and Photonics Review* **2019**, 1800316.
8. C. Dory, D. Vercruysee, K. Y. Yang, N. V. Sapra, A. E. Rugar, **S. Sun**, D. M. Lukin, A. Y. Piggott, J. L. Zhang, M. Radulaski, K. G. Lagoudakis, L. Su and J. Vučković, Inverse-designed diamond photonics, *Nature Communications* **10**, 3309 (2019).
9. A. E. Rugar, C. Dory, **S. Sun**, and J. Vučković, Characterization of optical and spin properties of single Tin-vacancy centers in diamond nanopillars, *Physical Review B* **99**, 205417 (2019).
10. **S. Sun**, H. Kim, Z. Luo, G. S. Solomon and E. Waks, A single-photon switch and transistor enabled by a solid-state quantum memory, *Science* **361**, 57-60 (2018).

11. **S. Sun***, J. L. Zhang*, K. A. Fischer*, M. J. Burek, C. Dory, K. G. Lagoudakis, Y.-K. Tzeng, M. Radulaski, Y. Kelaita, A. Safavi-Naeini, Z.-X. Shen, N. A. Melosh, S. Chu, M. Lončar and J. Vučković, Cavity-enhanced Raman emission from a single color center in a solid, *Physical Review Letters* **121**, 083601 (2018). (*contributed equally)
12. K. Fischer*, **S. Sun***, D. Lukin, Y. Kelaita, R. Trivedi and J. Vučković, Coherent drive in the Jaynes-Cummings model, *Physical Review A* **98**, 021802(R) (2018). (*contributed equally)
13. **S. Sun**, H. Kim, G. S. Solomon and E. Waks, Cavity-enhanced optical readout of a single solid-state spin, *Physical Review Applied* **9**, 054013 (2018).
14. J. L. Zhang*, **S. Sun***, M. J. Burek*, C. Dory, Y.-K. Tzeng, K. A. Fischer, Y. Kelaita, K. G. Lagoudakis, M. Radulaski, Z.-X. Shen, N. A. Melosh, S. Chu, M. Loncar and J. Vučković, Strongly cavity-enhanced spontaneous emission from silicon-vacancy centers in diamond, *Nano Letters* **18** (2), 1360-1365 (2018). (*contributed equally)
15. L. Hanschke, K. A. Fischer, S. Appel, D. Lukin, J. Wierzbowski, **S. Sun**, R. Trivedi, J. Vučković, J. J. Finley and K. Müller, Quantum dot single-photon sources with ultra-low multi-photon probability, *njp Quantum Information* **4**, 43 (2018).
16. J. L. Zhang, K. G. Lagoudakis, Y.-K. Tzeng, C. Dory, M. Radulaski, Y. Kelaita, K. A. Fischer, **S. Sun**, Z.-X. Shen, N. A. Melosh, S. Chu, and J. Vučković, Complete coherent control of silicon vacancies in diamond nanopillars containing single defect centers, *Optica* **4**, 1317-1321 (2017).
17. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, A quantum phase switch between a single solid-state spin and a photon, *Nature Nanotechnology* **11**, 539-544 (2016).
18. **S. Sun** and E. Waks, Single-shot optical readout of a quantum bit using cavity quantum electrodynamics, *Physical Review A* **94**, 012307 (2016).
19. **S. Sun** and E. Waks, Deterministic generation of entanglement between a quantum-dot spin and a photon, *Physical Review A* **90**, 042322 (2014).
20. **S. Sun**, H. Kim, G. S. Solomon and E. Waks, Strain tuning of a quantum dot strongly coupled to a photonic crystal cavity, *Applied Physics Letters* **103**, 151102 (2013).

BOOK CHAPTERS

1. **S. Sun** and K. Mueller, Single-photon nonlinear optics with a semiconductor quantum dot, *Semiconductors and Semimetals* **105**, 387-416 (Elsevier 2020).
2. **S. Sun** and E. Waks, Interfacing single quantum dot spins with photons using a nanophotonic cavity, *Quantum dots for quantum information processing*, 359-378 (Springer 2017).

CONFERENCE PROCEEDINGS

1. Y. Zhan and **S. Sun**, Deterministic generation of photonic tree and repeater graph states with a single quantum emitter, APS March Meeting (2021).
2. A. E. Rugar, S. Aghaeimeibodi, C. Dory, H. Lu, P. J. McQuade, S. D. Mishra, **S. Sun**, Z.-X. Shen, N. A. Melosh, J. Vuckovic, Narrow linewidth tin-vacancy centers in diamond waveguides, APS March Meeting (2021).
3. L. Hanschke, K. Fischer, J. Wierzbowski, S. Appel, D. Lukin, **S. Sun**, R. Trivedi, M. Kremser, T. Simmet, C. Dory, J. Vuckovic, J. Finley and K. Mueller, Generation of single-photon and two-photon pulses from a self-assembled quantum dot, 11th International Conference on Quantum Dots (2020).
4. A. E. Rugar, H. Lu, C. Dory, **S. Sun**, P. J. McQuade, Z.-X. Shen, N. A. Melosh, and J. Vuckovic, Generation of Tin-Vacancy Centers in Diamond via Shallow Ion Implantation and Subsequent Diamond Overgrowth, Conference on Lasers and Electro-Optics (2020).

5. D. Lukin, M. Guidry, **S. Sun**, C. Dory, and J. Vuckovic, Control of the Silicon Vacancy in Silicon Carbide via Electric and Magnetic Fields, APS March Meeting (2020).
6. A. E. Rugar, H. Lu, C. Dory, **S. Sun**, P. J. McQuade, Z.-X. Shen, N. A. Melosh, and J. Vuckovic, Site-controlled generation of tin-vacancy centers in diamond via shallow ion implantation and subsequent diamond growth, APS March Meeting (2020).
7. A. E. Rugar, C. Dory, **S. Sun**, and J. Vuckovic, Optical Characterization of Single Tin-Vacancy Centers in Diamond Nanopillars, Conference on Lasers and Electro-Optics (2019).
8. C. Dory, D. Vercruyssen, K. Y. Yang, N. V. Sapra, A. E. Rugar, **S. Sun**, D. M. Lukin, A. Y. Piggott, J. L. Zhang, M. Radulaski, K. G. Lagoudakis, L. Su and J. Vuckovic, Diamond Photonic Circuits, Conference on Lasers and Electro-Optics (2019).
9. D. Lukin, C. Dory, M. Radulaski, **S. Sun**, S. D. Mishra, M. Guidry, D. Vercruyssen, and J. Vuckovic, 4H-SiC-on-Insulator Platform for Quantum Photonics, Conference on Lasers and Electro-Optics (2019).
10. **S. Sun**, J. L. Zhang, K. A. Fischer, M. J. Burek, C. Dory, K. G. Lagoudakis, Y.-K. Tzeng, M. Radulaski, Y. Kelaita, A. Safavi-Naeini, Z.-X. Shen, N. A. Melosh, S. Chu, M. Loncar and J. Vuckovic, Frequency tunable single-photon emission from a single atomic defect in a solid, Conference on Lasers and Electro-Optics (2019).
11. C. Dory, D. Vercruyssen, K. Y. Yang, N. V. Sapra, A. E. Rugar, **S. Sun**, D. M. Lukin, A. Y. Piggott, J. L. Zhang, M. Radulaski, K. G. Lagoudakis, and J. Vuckovic, Optimized Photonic Quantum Hardware in Diamond, APS March Meeting (2019).
12. D. M. Lukin, C. Dory, M. Radulaski, **S. Sun**, D. Vercruyssen, and J. Vuckovic, 4H-SiC-on-insulator platform for quantum photonics with color centers, APS March Meeting (2019).
13. A. E. Rugar, **S. Sun**, C. Dory, and J. Vuckovic, Study of single tin-vacancy centers in diamond, APS March Meeting (2019).
14. D. M. Lukin, C. Dory, M. Radulaski, **S. Sun**, D. Vercruyssen, and J. Vuckovic, 4H-SiC-on-insulator platform for quantum photonics, Workshop on SiC quantum devices (2018).
15. L. Hanschke, K. Fischer, J. W., S. Appel, D. Lukin, **S. Sun**, R. Trivedi, M. Kremser, T. Simmet, C. Dory, J. Vuckovic, J. Finley and K. Mueller, Generation of single-photon and two-photon pulses from a self-assembled quantum dot, International Conference on Integrated Quantum Photonics (2018).
16. L. Hanschke, K. Fischer, J. W., S. Appel, D. Lukin, **S. Sun**, R. Trivedi, M. Kremser, T. Simmet, C. Dory, J. Vuckovic, J. Finley and K. Mueller, Generation of single-photon and two-photon pulses from a quantum two-level system, 34th International Conference on the Physics of Semiconductors (2018).
17. L. Hanschke, K. A. Fischer, S. Appel, D. Lukin, J. Wierzbowski, **S. Sun**, R. Trivedi, J. Vuckovic, J. J. Finley, and K. Mueller, Quantum dot single photon sources with ultra-low multi-photon probability, SPIE Optics and Photonics (2018).
18. E. Waks, **S. Sun**, J. Kim, C. Richardson, R. Leavitt and G. S. Solomon, Scalable quantum photonics using quantum dots, IEEE Photonics Society Summer Topical Meeting Series (2018).
19. M. Radulaski, Y.-K. Tzeng, J. L. Zhang, H. Ishiwata, K. G. Lagoudakis, C. Dory, K. A. Fischer, Y. A. Kelaita, **S. Sun**, P. C. Maurer, K. Alassaad, G. Ferro, Z.-X. Shen, N. A. Melosh, S. Chu, and J. Vuckovic, Diamond Color Center Integration with a Silicon Carbide Photonics Platform, Conference on Lasers and Electro-Optics (2018).
20. J. L. Zhang, **S. Sun**, M. Burek, C. Dory, Y.-K. Tzeng, K. A. Fischer, Y. Kelaita, K. G. Lagoudakis, M. Radulaski, Z.-X. Shen, N. A. Melosh, S. Chu, M. Loncar, and J. Vuckovic, Strongly Cavity-Enhanced Spontaneous Emission from Silicon-Vacancy Centers in Diamond, Conference on Lasers and Electro-Optics (2018).

21. M. Radulaski, Y.-K. Tzeng, J. L. Zhang, K. G. Lagoudakis, H. Ishiwata, C. Dory, K. A. Fischer, Y. A. Kelaita, **S. Sun**, P. C. Maurer, K. Alassaad, G. Ferro, Z.-X. Shen, N. Melosh, S. Chu and J. Vuckovic, Hybrid Diamond-Silicon Carbide Color Center Photonics, APS March Meeting (2018).
22. **S. Sun**, G. S. Solomon and E. Waks, Strong photon-photon interactions mediated by a single quantum dot spin, Conference on Lasers and Electro-Optics (2017).
23. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, Quantum information processing with quantum dot spin based cavity QED system, 9th International Conference on Quantum Dots (2015).
24. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, A quantum phase switch between a solid-state spin and a photon, APS March Meeting (2015).
25. **S. Sun** and E. Waks, A quantum gate between a single electron and a photon, International Conference On Optics of Excitons in Confined Systems (2015).
26. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, A solid-state spin-photon transistor, 8th International Conference on Nanophotonics (2015).
27. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, A solid-state spin-photon transistor, Conference on Lasers and Electro-Optics (2015).
28. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, Control of the cavity reflectivity using a single quantum dot spin, APS March Meeting (2015).
29. E. Waks, H. Kim, R. Bose, T. Cai, **S. Sun**, and G. S. Solomon, Controlling a photon with a solid-state quantum bit, SPIE NanoScience and Engineering (2014).
30. **S. Sun**, H. Kim, G. S. Solomon, and E. Waks, Strain tuning of a quantum dot strongly coupled to a photonic crystal cavity, Conference on Lasers and Electro-Optics (2014).

INVITED TALKS AT CONFERENCES AND WORKSHOPS

1. iCANX Talks, Online, 10/2020, “Quantum nanophotonics: engineering atom-photon interactions on-a-chip”
2. IEEE Photonics Conference, Online, 09/2020, “Nanophotonics for Quantum Information”
3. The 49th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, 01/2019, “Engineering diamond for quantum optics and quantum simulation”
4. Quantum Innovators in Science and Engineering Workshop, Waterloo, Canada, 10/2018, “Quantum nanophotonics: engineering atom-photon interactions on a chip”
5. Advanced Light Source 2018 user meeting, Berkeley, CA, 10/2018, “Quantum nanophotonics: engineering atom-photon interactions on a chip”
6. INQNET The Future of Quantum Technologies Symposium, Palo Alto, CA, 08/2018, “Quantum nanophotonics: engineering atom-photon interactions on a chip”
7. Frontier in Optics, Washington DC, 2017/09, “A nanophotonic spin-photon quantum transistor”
8. Bay Area Cold Atom Meeting, Berkeley, CA, 07/2017, “Strong atom-photon interactions on a semiconductor chip”
9. OSA Incubator on Integrated Semiconductor Quantum Photonic Devices, Washington DC, 06/2017, “Ultrafast single photon transistor based on a single solid-state spin”
10. IEEE Baltimore Colloquium on Quantum Computing, College Park, MD, 2016/10, “Quantum information processing with quantum dot spins coupled to nanophotonic cavities”
11. Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, 06/2016, “Nanophotonic quantum interface for a single solid-state spin”
12. SPIE Photonic West, San Francisco, CA, 02/2015, “Control of the cavity reflectivity using a single quantum dot spin”

INVITED COLLOQUIA AND SEMINARS

1. Ulsan National Institute of Science and Technology (UNIST), Korea, Physics Department Seminar, 01/2021
2. University of Colorado Boulder, Physics Graduate Research Opportunity Seminar, 09/2020
3. San Francisco State University, Physics & Astronomy Colloquium, 04/2019
4. University of Colorado Boulder, ECE Department Seminar, 03/2019
5. Cornell University, ECE Department Seminar, 03/2019
6. University of Illinois, Urbana-Champaign, ECE Department Seminar, 03/2019
7. University of New Mexico, CHTM Seminar, 03/2019
8. University of Utah, ECE Department Seminar, 03/2019
9. University of Pennsylvania, ESE Seminar, 03/2019
10. University of Maryland, College Park, QTC Seminar, 02/2019
11. University of Pittsburgh, ECE Department Seminar, 02/2019
12. University of California, Santa Barbara, Physics Department Colloquium, 02/2019
13. University of Calgary, Canada, Physics Department Seminar, 02/2019
14. University of Colorado Boulder, Special Physics Colloquium, 02/2019
15. Rochester University, Department of Physics and Astronomy Colloquium, 01/2019
16. Penn State University, Condensed Matter Physics Colloquium, 01/2019
17. UC Berkeley, AMOQI Seminar, 11/2018