Shahriar Aghaeimeibodi

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Professional Experience

- **October 2022 - Present**
  Research Science Manager, Center for Quantum Computing, Amazon Web Services, San Francisco, CA:
  Manager of the design delivery team, a team of 7 researchers, overseeing all design projects from inception to delivery of layout artifacts to the fabrication team.
- **October 2021 - October 2022**
  Quantum Research Scientist, Center for Quantum Computing, Amazon Web Services, San Francisco, CA
  Design and simulation scientist, focused on research and development of superconducting qubits.
- **January 2020 - September 2021**
  Postdoctoral fellow at Edward L. Ginzton Laboratory, Stanford University, CA
  Supervisor: *Prof. Jelena Vuckovic*

Education

- **August 2014 - December 2019**
  PhD in Electrical and Computer Engineering, University of Maryland, College Park
  GPA: 4.0/4.0.
  Dissertation title: *Integrated Quantum Photonic Circuits with Quantum Dots*
  Defense date: December 2019
- **August 2014 - December 2018**
  MS in Electrical and Computer Engineering, University of Maryland, College Park
  GPA: 4.0/4.0.
- **September 2009 - June 2014**
  B.Sc. in Electrical Engineering, Sharif University of Technology, Tehran, Iran.
  B.Sc. in Physics, Sharif University of Technology, Tehran, Iran.

Research Interests

- Quantum Technologies, Quantum Computing, Quantum Optics, Photonic Integrated Circuits, Nanophotonics, Silicon Photonics, Quantum Information Processing, Quantum Materials

Skills

- **Managerial:** Writing team charters, team procudures, onbaording contents and retrospectives, Effective employee development through written and verbal communication, Experienced with scouting and hiring scientists for open-ended projects, Managing team of research scientists with diverse backgrounds, Developing and promoting employees.
- **Experimental:** Quantum computing, Superconducting qubits, Integrated optics, Photonics, Waveguides, Cavities, Active and passive photonic components, Laser physics and spectroscopy, Confocal microscopy, Design and alignment of optical systems from UV to Infrared, Measurement system automation using LabView and Matlab programming, Quantum optical measurements, Single-photon measurements, Design and operation of vacuum and cryogenic systems, Fiber optics, Electronics and data acquisition apparatus, Micro-machining.
- **Advanced nanofabrication:** optical and electron beam lithography, CVD and electron beam deposition, chemical and dry etching. Characterization: Atomic force microscopy, Scanning electron microscopy, Focused ion beam microscopy.

- **Computational and programming:** Quantum computing (Qiskit), Quantum Optics (Qutip, QuantumOptics.jl), Data analysis and simulations (Python, MATLAB, Julia), Experimental control and design in Labview, HTML
- **Microwave and Optical Circuit Design** Automated and scripted CAD layout in Julia and Python, Photonics component design (Lumerical FDTD, MODE), Photonics inverse design (SPINS), Electromagnetic Simulations (COMSOL, Palace, Sonnet), Scripted design rule checking and validation, Superconducting resonator and transmon design, Superconducting packaging and enclosure design.

Honors and Awards

- Bloch postdoctoral fellowship in Quantum Science and Engineering, Stanford University, 2020
- Distinguished Dissertation Award, ECE department, University of Maryland, 2019.
- Finalist for Dean's Doctoral Student Research Award, Clark School of Engineering, University of Maryland, 2019.
- Ann G. Wylie Dissertation Fellowship, University of Maryland, 2019.
- Incubic/Milton Chang Travel Grant, Optical Society of America, 2018.
- Outstanding Graduate Assistant Award, University of Maryland, 2018.
- Clark School of Engineering Distinguished Graduate Fellowship, University of Maryland, 2014.
- Ranked 10^{th} in the Iranian Mathematics and Physics University Entrance Exam among more than 400,000 participants, 2009.
- Silver Medal (Ranked 2^{nd}) in Iran's National Physics Olympiad, 2008.
- 4 Year Fellowship Award of Iran's National Elite Foundation, 2008 - 2012.
- Dean's Honorary Award from the President of Sharif University of Technology, Prof. Sohrabpour, 2009.

Research Experience

- **Nanoscale and Quantum Photonics Laboratory, Stanford University**
  Advisor: Prof. Jelena Vuckovic
  Diamond and SiC color centers, (2020- 2021)
  We develop photonic and electronic devices to enhance the light matter interaction in color centers hosted in Diamond and SiC. These color centers can act as quantum sources or memories, useful for quantum information applications.
  Quantum fequency conversion, (2020- 2021)
  Using non-linear optical processes, we design devices that are capable of translating the wavelength of color centers from the visible range of the spectrum to the telecommunication band where the photon transmission loss is minimal.
- **Quantum Photonics Laboratory, UMD**
  Advisor: Prof. Edo Waks
  Hybrid Integration of Quantum Emitters to integrated photonics, (2016 - 2019)
  We developed a pick-and-place technique based on SEM and focused ion milling that can transfer nanostructures from a host chip to a target chip. With a hybrid system of solid-state quantum dots and integrated photonics (e.g., silicon or lithium niobate), we can take advantage of bright single photons from the dots and efficient light manipulation in integrated photonics.
  Optoelectronics of Quantum 2D Materials, (2015 - 2018)
  We study optical and electronic characteristics of emerging solid-state materials, specifically 2D materials. Our goal is to integrate this new technology with well known CMOS compatible silicon-based devices to create a new platform for integrated optical interconnects, such as sources, detectors, and modulators.
  Integrated photonics for ion-based Quantum Information Applications, (2016 - 2018)
  We design and fabricate on-chip optical elements such as beam splitters, to be used in quantum information systems, which use ion traps as their quantum sources and memories, and on-chip optics as their processing tools. This work was in collaboration with Prof. Chris Monroe.

Journal Publications

1. T. Cai et al., "Coupling emission from single localized defects in two-dimensional semiconductor to surface plasmon polaritons," Nano Letters, vol. 17, no. 11, pp. 6564–6568, 2017.
2. J.-H. Kim, S. Aghaeimeibodi, C. J. Richardson, R. P. Leavitt, D. Englund, and E. Waks, "Hybrid integration of solid-state quantum emitters on a silicon photonic chip," Nano letters, vol. 17, no. 12, pp. 7394–7400, 2017.
3. S. Aghaeimeibodi, J.-H. Kim, and E. Waks, "Near-infrared Emission from Defect States in Few-layer Phosphorene," arXiv preprint arXiv:1706.10189, 2017.
4. S. Dutta, T. Cai, M. A. Buyukkaya, S. Barik, S. Aghaeimeibodi, and E. Waks, "Coupling quantum emitters in WSe2 monolayers to a metal-insulator-metal waveguide," Applied Physics Letters, vol. 113, no. 19, 2018.
5. S. Aghaeimeibodi et al., "Integration of quantum dots with lithium niobate photonics," Applied Physics Letters, vol. 113, no. 22, 2018.
6. J.-H. Kim, S. Aghaeimeibodi, C. J. Richardson, R. P. Leavitt, and E. Waks, "Super-radiant emission from quantum dots in a nanophotonic waveguide," Nano Letters, vol. 18, no. 8, pp. 4734–4740, 2018.
7. T. Cai, J.-H. Kim, Z. Yang, S. Dutta, S. Aghaeimeibodi, and E. Waks, "Radiative enhancement of single quantum emitters in WSe2 monolayers using site-controlled metallic nanopillars," ACS Photonics, vol. 5, no. 9, pp. 3466–3471, 2018.
8. Z. Yang, S. Aghaeimeibodi, and E. Waks, "Chiral light-matter interactions using spin-valley states in transition metal dichalcogenides," Optics express, vol. 27, no. 15, pp. 21367–21379, 2019.
9. S. Aghaeimeibodi, J.-H. Kim, C.-M. Lee, M. A. Buyukkaya, C. Richardson, and E. Waks, "Silicon photonic add-drop filter for quantum emitters," Optics Express, vol. 27, no. 12, pp. 16882–16889, 2019.
10. S. Aghaeimeibodi, C.-M. Lee, M. A. Buyukkaya, C. J. Richardson, and E. Waks, "Large stark tuning of InAs/InP quantum dots," Applied Physics Letters, vol. 114, no. 7, 2019.
11. C.-M. Lee, M. A. Buyukkaya, S. Aghaeimeibodi, A. Karasahin, C. J. Richardson, and E. Waks, "A fiber-integrated nanobeam single photon source emitting at telecom wavelengths," Applied Physics Letters, vol. 114, no. 17, 2019.
12. J.-H. Kim, S. Aghaeimeibodi, J. Carolan, D. Englund, and E. Waks, "Hybrid integration methods for on-chip quantum photonics," Optica, vol. 7, no. 4, pp. 291–308, 2020.
13. A. E. Rugar et al., "Narrow-linewidth tin-vacancy centers in a diamond waveguide," ACS Photonics, vol. 7, no. 9, pp. 2356–2361, 2020.
14. C.-M. Lee, M. A. Buyukkaya, S. Harper, S. Aghaeimeibodi, C. J. Richardson, and E. Waks, "Bright telecom-wavelength single photons based on a tapered nanobeam," Nano letters, vol. 21, no. 1, pp. 323–329, 2020.
15. A. E. Rugar et al., "Quantum photonic interface for tin-vacancy centers in diamond," Physical Review X, vol. 11, no. 3, p. 031021, 2021.
16. S. Aghaeimeibodi, D. Riedel, A. E. Rugar, C. Dory, and J. Vučković, "Electrical tuning of tin-vacancy centers in diamond," Physical Review Applied, vol. 15, no. 6, p. 064010, 2021.
17. K. Y. Yang et al., "Multi-dimensional data transmission using inverse-designed silicon photonics and microcombs," Nature Communications, vol. 13, no. 1, p. 7862, 2022.
18. E. I. Rosenthal et al., "Microwave spin control of a tin-vacancy qubit in diamond," Physical Review X, vol. 13, no. 3, p. 031022, 2023.
19. D. Riedel et al., "Efficient photonic integration of diamond color centers and thin-film lithium niobate," ACS Photonics, 2023.
20. E. I. Rosenthal et al., "Single-Shot Readout and Weak Measurement of a Tin-Vacancy Qubit in Diamond," arXiv preprint arXiv:2403.13110, 2024.

21. H. Levine et al., "Demonstrating a Long-Coherence Dual-Rail Erasure Qubit Using Tunable Transmons," Phys. Rev. X, vol. 14, no. 1, p. 011051, Mar. 2024, doi: 10.1103/PhysRevX.14.011051.
22. H. Putterman et al., "Hardware-efficient quantum error correction using concatenated bosonic qubits," arXiv preprint arXiv:2409.13025, 2024.
23. H. Putterman et al., "Preserving phase coherence and linearity in cat qubits with exponential bit-flip suppression," arXiv preprint arXiv:2409.17556, 2024.

Invited Talks

- IEEE International Electron Devices Meeting (IEDM), San Francisco, CA, 2021, *Quantum Photonics with SnV Centers in Diamond*
- IEEE Photonics Conference, San Antonio,TX, 2019, *Integrated quantum photonic circuits with quantum dots*
- SPIE Defense and Commercial Sensing, Orlando, FL, 2018, *Hybrid Integration of Quantum Dots to Silicon Photonics*

Conference Presentations

1. Aghaeimeibodi, et al. "A nanophotonic interface for tin-vacancy spin qubits in diamond.", Quantum Nanophotonic Materials, Devices, and Systems, SPIE, San Diego, CA (2021)
2. Aghaeimeibodi, et al. "Integration of Quantum Emitters with Lithium Niobate Photonics." Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, paper FM1M.3 (2019)
3. Aghaeimeibodi, et al. "Large Stark Tuning of InAs/InP Quantum Dots." APS Meeting Abstracts, March 7, Boston, MA, V24.00010 (2019)
4. Aghaeimeibodi, et al. "A Silicon Photonic On-Chip Filter for Quantum Emitters." Frontiers in Optics. Optical Society of America, (2018).
5. Aghaeimeibodi, et al. "Hybrid Integration of Solid-state Quantum Dots on a Silicon-on-Insulator Photonic Chip," APS Meeting Abstracts, March 9, Los Angeles, CA, Y28.00001 (2018)
6. Aghaeimeibodi, et al. "Near infrared emission from defect states of atomically thin phosphorene," Conference on Lasers and Electro-Optics (CLEO), May 14, San Jose, CA, paper SW4K.4 (2017)
7. Aghaeimeibodi et al. "Near Infrared Emission from Defects in Few-Layer Phosphorene," APS Meeting Abstracts, March 16, New Orleans, LA, V30.00009 (2017)

Research Media Coverage

- *Quantum Emitter Integration May Enable Quantum Circuits, Dec 2017*
  Nature Photonics Research Highlights , Photonics Media, Semiconductor Today, Phys.org, EurekAlert!, ECN.

Teaching and Mentoring Experience

- Mentoring an ECE undergraduate researcher at the Quantum Photonics Laboratory, UMD, Spring 2017 to Spring 2018
  Project title: *Polarization insensitive integrated optics for Ion QuBits*
- **Teaching Assistant** for ENEE486, Optoelectronics Lab, Prof. Dagenais, ECE Department, University of Maryland, Fall 2014