☎ (+1) 520-339-7156
✉ bohanwu@hawaii.edu
in Bo-Han Wu
Google Scholar Bo-Han Wu
○ go705

University of Hawai'i at Mānoa,
Electrical and Computer Engineering,
2540 Dole Street, Honolulu, HI 96822

BO-HAN WU

Research Interests

Developing machine learning co-designed quantum systems to explore design spaces in quantum photonics and quantum information science. I am interested in leveraging machine learning to identify innovative solutions beyond human intuition, optimizing the performance and scalability of quantum technologies.

Professional Experience

2025 - current	**Assistant Professor**	*Electrical and Computer Engineering* (ECE), University of Hawai'i, Mānoa (UHM), Honolulu, HI
2023 - 2025	**Postdoctoral Researcher**	*Research Laboratory of Electronics* (RLE), Massachusetts Institute of Technology (MIT), Cambridge, MA Advisor: Prof. Dirk Englund
2022	**Visiting Student**	*Electrical Engineering and Computer Science* (EECS), University of Michigan, Ann Arbor, MI Advisor: Prof. Zheshen Zhang
2014 - 2016	**Research Assistant**	*Institute of Atomic and Molecular Sciences* (IAMS), Academia Sinica, Taipei, Taiwan Advisor: Dr. Ying-Cheng Chen

Education

2017 - 2022	**Ph.D.**, *Physics*,	The University of Arizona (UArizona), Tucson, AZ, USA Advisor: Prof. Zheshen Zhang and Prof. Quntao Zhuang (co-adivsed) Thesis: Continuous-variable photonic quantum information processing
2011 - 2014	**M.S.**, *Physics*,	National Tsing Hua University (NTHU), Hsinchu, Taiwan Advisor: Prof. Ite Yu Thesis: Studies of Transient Effects from Single-Λ to Double-Λ Systems under the All-Resonant Condition
2007 - 2011	**B.S.**, *Electrophysics*,	National Chiao Tung University (NCTU), Hsinchu, Taiwan

Grants Experience

2025	NSF 25-543, Pending, Prof. Bo-Han Wu (UHM) and Prof Hyeongrak Choi (SBU)
2024	AFRL (FA8750-25-2-0500), **Awarded**, Co-write with Dr. A. Kumar and Prof. D. Englund
2023	DARPA-INSPIRED (HR001123S0052), **Awarded**, Co-write with Prof. M. Yu (USC), Dr. Z. Chen (USC), Prof. D. Englund (MIT) and Prof. Q. Zhuang (USC)
2023	HRI-MIT collaboration statement of work, **Approved** by Honda Research Institute (HRI) USA

Invited Talks

2026, 3.	UHM (Department of Electrical and Computer Engineering), Professors and Pizza Seminar
2025, 12.	UHM (Department of Physics and Astronomy), Seminar
2025, 10.	UHM (Department of Mathematics), Applied Math Seminar
2024, 5.	Cornell University (Department of Applied and Engineering Physics), Special Talk @ Zoom
2023, 1.	NTHU (Department of Physics), Seminar, Hsinchu, Taiwan
2023, 1.	National Yang Ming Chiao Tung University (Department of Photonics), Seminar, Hsinchu, Taiwan
2023, 1.	Academia Sinica (Institute of Atomic and Molecular Sciences), Seminar, Taipei, Taiwan
2022, 12.	Hon-Hai Research Institute, Seminar, @ Zoom
2022, 11.	MIT EECS seminar of Optical and Quantum Electronics @ Zoom

Awards and Honors

2012	Shang-Keng Ma Scholarship: Outstanding Statistical Mechanics study (Top 5%)
2010	Movie Physics Competition: Creating videos that analyzed the physics in movies (Top 5%)
2007, 2008	Joint Calculus Examinations (I, II): Calculus competition (Top 2%)

Journal Publications

2026	1.	"Bidirectional Nonlinear Optical Tomography: Unbiased Characterization of Off- and On-Chip Coupling Efficiencies," **B.-H. Wu**, M. J. Mehrabad, D. Englund, arXiv: 2510.13110
2025	2.	"Wafer-Scale Squeezed-Light Chips," S. Liu, K. Zhou, Y. Zhang, A. Hariri, N. Reynolds, **B.-H. Wu**, Z. Zhang, arXiv: 2509.10445
2025	3.	"All-optical reconfiguration of single silicon-vacancy centers in diamond for non-volatile memories," Y. Xue, X. Ni, M. Titze, S. S. Su, **B.-H. Wu**, L. Zhang, C. Cui, S. Guha, M. Eichenfield, L. Fan, Nat. Commun. 16, 6275
2025	4.	"Micro-Ring Perceptron Sensor for High-Speed, Low-Power Radio-Frequency Signal," **B.-H. Wu**, S.-Y. Ma, S.-Y. Ma. S. K. Vadlamani, H. Choi, D. Englund, arXiv:2504.16119
2024	5.	"Formation of Quasi-Bound States in the Continuum in a Single Deformed Microcavity," S. Liu, **B.-H. Wu**, J. Huang, Z. Zhang, Photon. Res. 12, 2651
2024	6.	"Distinguishing under-and over-coupled resonances without prior knowledge," C. Cui, L. Zhang, **B.-H. Wu**, S. Liu, P.-K. Chen, L. Fan, Optica 11 (2), 176
2023	7.	"Entanglement-assisted multi-aperture pulse-compression radar for angle resolving detection," **B.-H. Wu**, S. Guha, Q. Zhuang, Quantum Sci. and Technol. 8 (3), 035016
2022	8.	"Continuous-variable quantum repeaters based on bosonic error-correction and teleportation: architecture and applications," **B.-H. Wu**, Z. Zhang, Q. Zhuang, Quantum Sci. and Technol. 7 (2), 025018
2020	9.	"Quantum computing with multidimensional continuous-variable cluster states in a scalable photonic platform," **B.-H. Wu**, R. N. Alexander, S. Liu, Z. Zhang, Phys. Rev. Research 2, 023138
2020	10.	"Broadband coherent optical memory based on electromagnetically induced transparency," Y.-C. Wei, **B.-H. Wu**, Y.-F. Hsiao, P.-J. Tsai, Y.-C. Chen, Phys. Rev. A 102 (6), 063720

2019	11. "Theoretical study of a memory-based optical converter with degenerate Zeeman states," P.-J. Tsai, Y.-C. Wei, **B.-H. Wu**, S.-X. Lin, Y.-C. Chen, Phys. Rev. A 100 (6), 063843
2017	12. "Enhanced spectral profile in the study of Doppler-broadened Rydberg ensembles," **B.-H. Wu**, Y.-W. Chuang, Y.-H. Chen, J.-C. Yu, M.-S. Chang, I. A. Yu, Sci. Rep. 7 (1), 9726
2016	13. "High conversion efficiency in resonant four-wave mixing processes," C.-Y. Lee, **B.-H. Wu**, G. Wang, Y.-F. Chen, Y.-C. Chen, I. A. Yu, Opt. Express 24 (2), 1008

Conference Publications

2026	1. "Bidirectional Nonlinear Optical Tomography: Unbiased Characterization of Off- and On-Chip Coupling Efficiencies," **B.-H. Wu**, M. J. Mehrabad, D. Englund, SMT, Denver, CO, USA
2025	2. "Quantum Neuromorphic Sensor Network," **B.-H. Wu**, S.-Y. Ma, S.-Y. Ma. S. K. Vadlamani, H. Choi, D. Englund, SMT, Los Angeles, CA, USA
2023	3. "Generation of Squeezed Light in Silicon Nitride Photonic Integrated Chips," S. Liu, A. Hariri, **B.-H. Wu**, Y. Zhang, and Z. Zhang, *Conference on Lasers and Electro-Optics (CLEO)*, Charlotte, NC, USA
2020	4. "Continuous-variable quantum repeaters based on bosonic error-correction and teleportation: architecture and applications," **B.-H. Wu**, Z. Zhang and Q. Zhuang, *CLEO*, San Jose, CA, USA
2020	5. "Quantum-Computing Architecture based on Large-Scale Multi-Dimensional Continuous-Variable Cluster States in a Scalable Photonic Platform," **B.-H. Wu**, R. N. Alexander, S. Liu, Z. Zhang, *Conference on APS March meeting @ YouTube*.
2017	6. "Electromagnetically induced transparency based light storage in short pulse regime," **B.-H. Wu**, Y.-F. Hsiao, P.-J. Tsai, Y.-C. Chen, *Annual Meeting of the Physical Society of Taiwan*, Danshui, Taiwan
2014	7. "Studies of Conversion Efficiency and Energy Loss in Four-Wave Mixing Processes," **B.-H. Wu**, C.-Y. Lee, G. Wang, Y.-F. Chen, Y.-C. Chen, I. A. Yu, *Annual Meeting of the Physical Society of Taiwan*, Kaoshiung, Taiwan

Journal Reviewer

Communication Physics, Phys. Rev. Research, Quantum Electronics, Appl. Phys. Lett., Entropy, Optical and Quantum Electronics, IEEE JSAC, Phys. Rev. A., Appl. Opt.,

Teaching Experience

2026	ECE470/PHYS460 (Physical Optics): UHM, Electrical and Computer Engineering and Physics and Astronomy - Lecturer
2025	ECE491D/693D (Introduction to Quantum Information Science): UHM, Electrical and Computer Engineering - Lecturer
2023	6.2410 (Quantum Engineering System): MIT, Electrical Engineering and Computer Science - Guest Lecturer
2019	MSE350 (Numerical Methods): UArizona, Materials Science and Engineering - Guest Lecturer
2018	PHYS241 (Introduction to Electricity and Magnetism): UArizona, Physics - Teaching Assistant
2017-2018	PHYS141 (Introductory Mechanics): UArizona, Physics - Teaching Assistant
2017	PHYS181 (Introductory Laboratory I): UArizona, Physics - Teaching Assistant

2012	Mathematical and Scientific Thinking Lecture (general education): NTHU, Physics - Teaching Assistant
2012	Daily Physics (general education): NTHU, Physics - Teaching Assistant
2011	Introduction to Electrodynamics (I), (II): NTHU, Physics - Teaching Assistant

Previous Highlighted Research Projects

2023   **Quantum Neuromorphic Sensor network** (MIT): I proposed a quantum sensor-network structure, where each sensor nodes perform physics-based convolution on the RF signal to extract it feature information

2023   **Large-scale spin entanglement generation** (MIT): I developed digital twins using quantum Monte Carlo algorithm to generate high-fidelity nuclear electron-spin entanglement (>99%), simulating the nuclear spin entanglement generation with the proposed protocol (i.e. Barrett-Kok scheme and Humsphrey scheme)

2023   **High-rate quantum key distribution with single-photon** (MIT): I designed and simulated the quantum-key distribution (QKD) rate and the entanglement fidelity of the proposed atomic absorption-based quantum communication protocol

2021   **Quantum radar** (UArizona): I developed a radar scheme in the use of a transform-limited quantum microwave pulse field and demonstrated the appreciable quantum advantage (> 15 dB) by setting a finite pulse duration (0.1 second)

2020   **Quantum integrated photonic chip** (UArizona): I experimentally designed, fabricated and characterized the microstructure (e.g. ELS-7000, Versaline DSE III, MLA150, FC2500), and setting up free-space optical measurement system (Pound-Driver-Hall technique and homodyne measurement). In this experiment project, I achieved 0.83 dB level squeezing on silicon photonic platform (SiN). Moreover, I developed the theory in simulating the quantum dynamics in photonic chips to match the theory with experiments.

2016   **EIT based light storage** (IAMS): I studied the broadband optical memory based on the EIT protocol and provided a theoretical analysis of the requirements needed to achieve efficient and broadband EIT memory.

2014   **Rydberg EIT spectra under low atomic density** (NTHU): I investigated Rydberg-EIT spectra in room-temperature ^{87}Rb atoms, developing a theoretical model to describe how the contrast of EIT transparency changes with probe field intensity. Initially, the transparency contrast increases, peaks, and then gradually decreases. At optimal intensity, the contrast is 2-4 times higher than at the lowest intensity.

2012   **Efficient conversion in four-wave mixing process** (NTHU): I proposed an efficiency scheme of the resonant four-wave mixing (FWM) for the frequency up or down conversion. In this new scheme, two control fields are spatially varied such that a probe field at the input can be converted to a signal field at the output. The efficiency of probe-to-signal energy conversion can be 90% at medium's optical depth of about 100.