

An optical neural chip for implementing complex-value

Nature Communications

12, 457

DOI: [10.1038/s41467-020-20719-7](https://doi.org/10.1038/s41467-020-20719-7)

Citation Report

#	ARTICLE	IF	CITATIONS
1	Fully Complex-Valued Dendritic Neuron Model. IEEE Transactions on Neural Networks and Learning Systems, 2023, 34, 2105-2118.	7.2	35
2	On-chip rapid drug screening of leukemia cells by acoustic streaming. Lab on A Chip, 2021, 21, 4005-4015.	3.1	21
3	Phase-shift determination for a 4×4 intelligent photonic neural network with compatible learning. Applied Optics, 2021, 60, 2100.	0.9	2
4	Efficient On-Chip Training of Optical Neural Networks Using Genetic Algorithm. ACS Photonics, 2021, 8, 1662-1672.	3.2	61
5	Linear optical circuits characterization by means of thermal field correlation measurement. Laser Physics Letters, 2021, 18, 075201.	0.6	3
6	Photonic extreme learning machine by free-space optical propagation. Photonics Research, 2021, 9, 1446.	3.4	43
7	Reservoir computing based on a silicon microring and time multiplexing for binary and analog operations. Scientific Reports, 2021, 11, 15642.	1.6	31
9	A Silicon Photonic Coherent Neuron with 10GMAC/sec processing line-rate. , 2021, , .		14
10	Architecture agnostic algorithm for reconfigurable optical interferometer programming. Optics Express, 2021, 29, 38429.	1.7	8
11	Optical coherent dot-product chip for sophisticated deep learning regression. Light: Science and Applications, 2021, 10, 221.	7.7	56
12	Neuromorphic computing: Devices, hardware, and system application facilitated by two-dimensional materials. Applied Physics Reviews, 2021, 8, .	5.5	39
13	Neural Schrödinger Equation: Physical Law as Deep Neural Network. IEEE Transactions on Neural Networks and Learning Systems, 2022, 33, 2686-2700.	7.2	13
14	Compute with Light: Architectures, Technologies and Training Models for Neuromorphic Photonic Circuits. , 2021, , .		7
15	Silicon-integrated coherent neurons with 32GMAC/sec/axon compute line-rates using EAM-based input and weighting cells. , 2021, , .		20
16	Artificial Neuron Based on Tera Hertz Optical Asymmetric Demultiplexer Using Quantum Dot Semiconductor Optical Amplifier. , 2021, , 293-306.		4
17	Direct construction of an optical linear transform and its application on optical complex data generation. Optics Express, 2022, 30, 1793.	1.7	2
18	Low-threshold all-optical nonlinear activation function based on a Ge/Si hybrid structure in a microring resonator. Optical Materials Express, 2022, 12, 970.	1.6	30
19	Photonic matrix multiplication lights up photonic accelerator and beyond. Light: Science and Applications, 2022, 11, 30.	7.7	167

#	ARTICLE	IF	CITATIONS
20	Recycling forward and backward frequency-multiplexed modes in a waveguide coupled to phased time-perturbed microrings for low-footprint neuromorphic computing. <i>Optical Materials Express</i> , 2022, 12, 1198.	1.6	1
21	An All-MRR-Based Photonic Spiking Neural Network for Spike Sequence Learning. <i>Photonics</i> , 2022, 9, 120.	0.9	5
22	Space-efficient optical computing with an integrated chip diffractive neural network. <i>Nature Communications</i> , 2022, 13, 1044.	5.8	90
23	Are phase change materials ideal for programmable photonics?: opinion. <i>Optical Materials Express</i> , 2022, 12, 2368.	1.6	16
24	Scalable and Robust Photonic Integrated Unitary Converter Based on Multiplane Light Conversion. <i>Physical Review Applied</i> , 2022, 17, .	1.5	14
25	Superhybrid Mode-Enhanced Optical Torques on Mie-Resonant Particles. <i>Nano Letters</i> , 2022, 22, 1769-1777.	4.5	17
26	Generalized robust training scheme using genetic algorithm for optical neural networks with imprecise components. <i>Photonics Research</i> , 2022, 10, 1868.	3.4	14
27	Programmable photonic neural networks combining WDM with coherent linear optics. <i>Scientific Reports</i> , 2022, 12, 5605.	1.6	24
28	At the intersection of optics and deep learning: statistical inference, computing, and inverse design. <i>Advances in Optics and Photonics</i> , 2022, 14, 209.	12.1	23
29	Emergence of Biased Errors in Imperfect Optical Circuits. <i>Physical Review Applied</i> , 2021, 16, .	1.5	0
30	Touchable cell biophysics property recognition platforms enable multifunctional blood smart health care. <i>Microsystems and Nanoengineering</i> , 2021, 7, 103.	3.4	18
31	Scalable and compact photonic neural chip with low learning-capability-loss. <i>Nanophotonics</i> , 2022, 11, 329-344.	2.9	26
32	All-Optical Nonlinear Activation Function Based on Germanium Silicon Hybrid Asymmetric Coupler. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2023, 29, 1-6.	1.9	8
34	Coherent Photonic Crossbar Arrays for Large-Scale Matrix-Matrix Multiplication. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2023, 29, 1-11.	1.9	11
35	All-Optical Recurrent Neural Network With Reconfigurable Activation Function. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2023, 29, 1-14.	1.9	6
36	Neuromorphic Silicon Photonics and Hardware-Aware Deep Learning for High-Speed Inference. <i>Journal of Lightwave Technology</i> , 2022, 40, 3243-3254.	2.7	32
37	Electromagnetic wave-based extreme deep learning with nonlinear time-Floquet entanglement. <i>Nature Communications</i> , 2022, 13, 2651.	5.8	8
38	Reconfigurable Activation Functions in Integrated Optical Neural Networks. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2022, 28, 1-13.	1.9	9

#	ARTICLE	IF	CITATIONS
39	Photonic (computational) memories: tunable nanophotonics for data storage and computing. <i>Nanophotonics</i> , 2022, 11, 3823-3854.	2.9	37
40	Deep Phase-Transmittance RBF Neural Network for Beamforming With Multiple Users. <i>IEEE Wireless Communications Letters</i> , 2022, 11, 1498-1502.	3.2	4
41	WDM equipped universal linear optics for programmable neuromorphic photonic processors. <i>Neuromorphic Computing and Engineering</i> , 2022, 2, 024010.	2.8	18
42	Polarization multiplexed diffractive computing: all-optical implementation of a group of linear transformations through a polarization-encoded diffractive network. <i>Light: Science and Applications</i> , 2022, 11, .	7.7	42
43	Programmable chalcogenide-based all-optical deep neural networks. <i>Nanophotonics</i> , 2022, 11, 4073-4088.	2.9	29
44	Multicore Photonic Complex-Valued Neural Network with Transformation Layer. <i>Photonics</i> , 2022, 9, 384.	0.9	2
45	An Optical Computing Chip for Executing Complex-valued Neural Network and Its On-chip Training. , 2022, , .		1
46	Deep learning in light-matter interactions. <i>Nanophotonics</i> , 2022, 11, 3189-3214.	2.9	10
47	Silicon-Based Metastructure Optical Scattering Multiply-Accumulate Computation Chip. <i>Nanomaterials</i> , 2022, 12, 2136.	1.9	2
48	Hybrid training of optical neural networks. <i>Optica</i> , 2022, 9, 803.	4.8	16
49	All-optical graph representation learning using integrated diffractive photonic computing units. <i>Science Advances</i> , 2022, 8, .	4.7	35
50	Deep Learning-Based Hybrid Analog-Digital Signal Processing in mmWave Massive-MIMO Systems. <i>IEEE Access</i> , 2022, 10, 72348-72362.	2.6	3
51	A Method Executing Optical Real-Valued Matrix Multiplication. , 2022, , .		0
52	Optical Computing: Status and Perspectives. <i>Nanomaterials</i> , 2022, 12, 2171.	1.9	28
53	On-chip bacterial foraging training in silicon photonic circuits for projection-enabled nonlinear classification. <i>Nature Communications</i> , 2022, 13, .	5.8	15
54	Reconfigurable InP waveguide components using the Sb ₂ S ₃ phase change material. <i>Journal of Optics (United Kingdom)</i> , 2022, 24, 094001.	1.0	6
55	Using Deep Learning Networks to Identify Cyber Attacks on Intrusion Detection for In-Vehicle Networks. <i>Electronics (Switzerland)</i> , 2022, 11, 2180.	1.8	13
56	Self-calibrating programmable photonic integrated circuits. <i>Nature Photonics</i> , 2022, 16, 595-602.	15.6	59

#	ARTICLE	IF	CITATIONS
57	Photonic Emulator for Inverse Design. ACS Photonics, 2023, 10, 2173-2181.	3.2	9
58	Si Microring Resonator Crossbar Array for On-Chip Inference and Training of the Optical Neural Network. ACS Photonics, 2022, 9, 2614-2622.	3.2	31
59	Optical Neural Network with Reduced Phase Shifters Using Multi-Plane Light Conversion. , 2022, , .		1
60	Optical-Electrical Nonlinear Feedback Assisted Photonic Circuits for Temporal Pattern Recognition. , 2022, , .		0
61	Meta-optic accelerators for object classifiers. Science Advances, 2022, 8, .	4.7	17
62	Seven-channel all-optical reconfigurable canonical logic units multicasting at 40 Gb/s based on a nonlinearity-enhanced silicon waveguide. Optics Express, 2022, 30, 32650.	1.7	6
63	Complex-Valued Neural Networks: A Comprehensive Survey. IEEE/CAA Journal of Automatica Sinica, 2022, 9, 1406-1426.	8.5	38
64	Boolean logic gates implemented by a single photonic neuron based on a semiconductor Fano laser. , 2022, 1, 1859.		3
65	Multilayer Radial Basis Function Neural Network for Symbol Timing Recovery. Neural Processing Letters, 0, , .	2.0	0
66	Two-layer integrated photonic architectures with multiport photodetectors for high-fidelity and energy-efficient matrix multiplications. Optics Express, 2022, 30, 33940.	1.7	7
67	Optical manipulation with metamaterial structures. Applied Physics Reviews, 2022, 9, .	5.5	57
68	Adversarial Attacks on an Optical Neural Network. IEEE Journal of Selected Topics in Quantum Electronics, 2023, 29, 1-6.	1.9	2
69	On-chip Training Silicon Photonic Circuits to Perform Digital and Analog Computing. , 2022, , .		0
70	Error-Tolerant Integrated Optical Neural Network Processor based on Multi-Plane Light Conversion. , 2022, , .		2
71	Photonic Reconfigurable Accelerators for Efficient Inference of CNNs With Mixed-Sized Tensors. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2022, 41, 4337-4348.	1.9	2
72	Characterizing Coherent Integrated Photonic Neural Networks Under Imperfections. Journal of Lightwave Technology, 2023, 41, 1464-1479.	2.7	6
73	Memory Consolidation: Neural Data Analysis and Mathematical Modeling. , 2022, , 1-37.		0
74	Neuromorphic Computing Based on Wavelength-Division Multiplexing. IEEE Journal of Selected Topics in Quantum Electronics, 2023, 29, 1-12.	1.9	17

#	ARTICLE	IF	CITATIONS
75	Iterative photonic processor for fast complex-valued matrix inversion. <i>Photonics Research</i> , 2022, 10, 2488.	3.4	2
76	Noise-resilient and high-speed deep learning with coherent silicon photonics. <i>Nature Communications</i> , 2022, 13, .	5.8	29
77	Enabling scalable optical computing in synthetic frequency dimension using integrated cavity acousto-optics. <i>Nature Communications</i> , 2022, 13, .	5.8	9
78	Silicon Photonic Phase Shifters and Their Applications: A Review. <i>Micromachines</i> , 2022, 13, 1509.	1.4	9
79	Massively scalable wavelength diverse integrated photonic linear neuron. <i>Neuromorphic Computing and Engineering</i> , 2022, 2, 034012.	2.8	3
80	Resource-efficient high-dimensional subspace teleportation with a quantum autoencoder. <i>Science Advances</i> , 2022, 8, .	4.7	9
81	Photonic tensor core for machine learning: a review. , 2022, , .		1
82	Memory Consolidation: Neural Data Analysis and Mathematical Modeling. , 2022, , 973-1009.		0
83	Nonlinear germanium-silicon photodiode for activation and monitoring in photonic neuromorphic networks. <i>Nature Communications</i> , 2022, 13, .	5.8	20
84	Mechanical neural networks: Architected materials that learn behaviors. <i>Science Robotics</i> , 2022, 7, .	9.9	24
85	Large-scale photonic natural language processing. <i>Photonics Research</i> , 2022, 10, 2846.	3.4	9
86	Reconfigurable Low-Threshold All-Optical Nonlinear Activation Functions Based on an Add-Drop Silicon Microring Resonator. <i>IEEE Photonics Journal</i> , 2022, 14, 1-7.	1.0	3
87	Universal Linear Optics for Ultra-Fast Neuromorphic Silicon Photonics Towards fJ/MAC and TMAC/sec/mm ² Engines. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2022, , 1-15.	1.9	9
88	Experimental demonstration of coherent photonic neural computing based on a Fabry-Pérot laser with a saturable absorber. <i>Photonics Research</i> , 2023, 11, 65.	3.4	6
89	Characterizing optical phase-change materials with spectroscopic ellipsometry and polarimetry. <i>Thin Solid Films</i> , 2022, 763, 139580.	0.8	3
90	Optoelectronic integrated circuits for analog optical computing: Development and challenge. <i>Frontiers in Physics</i> , 0, 10, .	1.0	3
91	High-Speed Waveguide-Integrated Avalanche Photodiodes for Near-Infrared Wavelengths on SiN-on-SOI Photonic Platform. <i>Journal of Lightwave Technology</i> , 2023, 41, 1811-1819.	2.7	2
92	AirNN: Over-the-Air Computation for Neural Networks via Reconfigurable Intelligent Surfaces. <i>IEEE/ACM Transactions on Networking</i> , 2023, 31, 2470-2482.	2.6	3

#	ARTICLE	IF	CITATIONS
93	â€˜Dial upâ€™ Photonic Integrated Circuit Filter. Journal of Lightwave Technology, 2023, 41, 1775-1783.	2.7	2
94	Universal Linear Optics Revisited: New Perspectives for Neuromorphic Computing With Silicon Photonics. IEEE Journal of Selected Topics in Quantum Electronics, 2023, 29, 1-16.	1.9	5
95	On-Demand Reconfigurable Incoherent Optical Matrix Operator for Real-Time Video Image Display. Journal of Lightwave Technology, 2023, 41, 1637-1648.	2.7	6
96	Quantum Photonic Chip for Binary Classification of Financial Data. , 2022, , .		1
97	Investigation of expressive power of a neural network architecture suited for optical neural networks. , 2022, , .		0
98	Molecular Property Prediction with Photonic Chipâ€Based Machine Learning. Laser and Photonics Reviews, 2023, 17, .	4.4	5
99	Computation at the speed of light: metamaterials for all-optical calculations and neural networks. Advanced Photonics, 2022, 4, .	6.2	24
100	On the effect of the thermal cross-talk in a photonic feed-forward neural network based on silicon microresonators. Frontiers in Physics, 0, 10, .	1.0	7
101	Multi-wavelength dual-polarization optical unitary processor using integrated multi-plane light converter. Japanese Journal of Applied Physics, 0, , .	0.8	2
102	Revealing the Formation Mechanism and Optimizing the Synthesis Conditions of Layered Double Hydroxides for the Oxygen Evolution Reaction. Angewandte Chemie - International Edition, 2023, 62, .	7.2	7
103	Analog nanophotonic computing going practical: silicon photonic deep learning engines for tiled optical matrix multiplication with dynamic precision. Nanophotonics, 2023, 12, 963-973.	2.9	13
104	Massively parallel universal linear transformations using a wavelength-multiplexed diffractive optical network. Advanced Photonics, 2023, 5, .	6.2	17
105	Photonic machine learning with on-chip diffractive optics. Nature Communications, 2023, 14, .	5.8	41
106	Photonic multiplexing techniques for neuromorphic computing. Nanophotonics, 2023, 12, 795-817.	2.9	27
107	Prospects and applications of on-chip lasers. ELight, 2023, 3, .	11.9	56
108	Optical Neural Network With Complementary Decomposition to Overcome the Phase Insensitive Constrains. IEEE Journal of Selected Topics in Quantum Electronics, 2023, 29, 1-8.	1.9	2
109	Microcomb-based integrated photonic processing unit. Nature Communications, 2023, 14, .	5.8	49
110	MXeneâ€Nanoflakesâ€Enabled Allâ€Optical Nonlinear Activation Function for Onâ€Chip Photonic Deep Neural Networks. Advanced Materials, 2023, 35, .	11.1	5

#	ARTICLE	IF	CITATIONS
111	Revealing the Formation Mechanism and Optimizing the Synthesis Conditions of Layered Double Hydroxides for the Oxygen Evolution Reaction. <i>Angewandte Chemie</i> , 0, , .	1.6	0
112	A Coherent Photonic Crossbar for Scalable Universal Linear Optics. <i>Journal of Lightwave Technology</i> , 2023, 41, 2425-2442.	2.7	6
113	MMSE Signal Detection for MIMO Systems based on Ordinary Differential Equation. , 2022, , .		1
114	Nanowire-based integrated photonics for quantum information and quantum sensing. <i>Nanophotonics</i> , 2023, 12, 339-358.	2.9	16
115	Towards a high-density photonic tensor core enabled by intensity-modulated microrings and photonic wire bonding. <i>Scientific Reports</i> , 2023, 13, .	1.6	7
116	Coherent optical neuron control based on reinforcement learning. <i>Optics Letters</i> , 2023, 48, 1084.	1.7	2
117	Active Erbium-doped Silicon Nanoantenna. <i>Laser and Photonics Reviews</i> , 2023, 17, .	4.4	1
118	Aluminum Nitride Thin Film Based Reconfigurable Integrated Photonic Devices. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2023, , 1-18.	1.9	3
119	Integrated Microwave Photonics Coherent Processor for Massive-MIMO Systems in Wireless Communications. <i>IEEE Journal of Selected Topics in Quantum Electronics</i> , 2023, 29, 1-12.	1.9	1
120	Heavy tails and pruning in programmable photonic circuits for universal unitaries. <i>Nature Communications</i> , 2023, 14, .	5.8	6
121	Sophisticated deep learning with on-chip optical diffractive tensor processing. <i>Photonics Research</i> , 2023, 11, 1125.	3.4	4
122	Using binary-stiffness beams within mechanical neural-network metamaterials to learn. <i>Smart Materials and Structures</i> , 2023, 32, 035015.	1.8	1
123	Co-designed metaoptoelectronic deep learning. <i>Optics Express</i> , 2023, 31, 6453.	1.7	0
124	Optically Readable Electrochromic-Based Microfiber Synaptic Device for Photonic Neuromorphic Systems. <i>ACS Applied Materials & Interfaces</i> , 2023, 15, 9705-9713.	4.0	1
125	Evolving scattering networks for engineering disorder. <i>Nature Computational Science</i> , 2023, 3, 128-138.	3.8	10
126	Black-box simulation method: train the optical model from output. , 2023, , .		0
127	Training on the optical system: local search method. , 2023, , .		0
128	Design and testing of silicon photonic 4F system for convolutional neural networks. , 2023, , .		0

#	ARTICLE	IF	CITATIONS
129	Nanophotonic and Optical Platforms for Deep Learning. Springer Series in Optical Sciences, 2023, , 157-172.	0.5	0
130	Proposal of fully augmented complex-valued neural networks. Nonlinear Theory and Its Applications IEICE, 2023, 14, 175-192.	0.4	0
131	å...%å¡ ç¥žç»ç½'ç»œåšå...¶åº”ç””. Laser and Optoelectronics Progress, 2023, 60, 0600001.	0.2	3
132	Photonic-assisted Modulation Format Identification Using Convolutional Neural Networks. , 2022, , .		0
133	Cyber Attack Detection for Self-Driving Vehicle Networks Using Deep Autoencoder Algorithms. Sensors, 2023, 23, 4086.	2.1	8
134	Nonlinear absorption of 2D materials and their application in optical neural networks. Journal of the Optical Society of America B: Optical Physics, 0, , .	0.9	0
137	WDM-compatible integrated photonic computing core for implementing a neural network. , 2023, , .		0
140	Semiconductor Multilayer Nanometrology with Machine Learning. Nanomanufacturing and Metrology, 2023, 6, .	1.5	4
145	Incoherent Fiber-based Optical Neuromorphic Computing Circuit. , 2023, , .		0
154	Building Blocks for a Complex-Valued Transformer Architecture. , 2023, , .		0
157	WDM-compatible integrated photonic computing core for implementing a neural network. , 2023, , .		0
160	An Optical XNOR-Bitcount Based Accelerator for Efficient Inference of Binary Neural Networks. , 2023, , .		1
164	Entropy of Mode Mixers for Optical Unitary Converter based on Multi-Plane Light Conversion. , 2022, , .		0
166	SCONNA: A Stochastic Computing Based Optical Accelerator for Ultra-Fast, Energy-Efficient Inference of Integer-Quantized CNNs. , 2023, , .		2
173	Calibration-free reconfigurable silicon optical signal processor. , 2023, , .		0
186	On-chip Training Silicon Photonic Circuits for Novel Classification Computing. , 2023, , .		0
187	High-Extinction Reconfigurable Mach-Zehnder Interferometer Based on Silicon Photonic MEMS. , 2023, , .		0
202	Experimental Demonstration of a Photonic Extreme Learning Machine with an Array of Microresonators. , 2023, , .		0

#	ARTICLE	IF	CITATIONS
203	Heterogeneous III-V-on-Silicon photonic Non-Linear Activation Function for Scalable Photonic Neural Networks. , 2023, , .		1
214	An implementation of complex-valued matrix-vector multiplication based on MZI array for photonic neural networks. , 2023, , .		0
215	Complex-valued Optical Neural Networks Enabled by Multimode Interferometers and Phase Shifters. , 2023, , .		0
216	On the Computational Complexities of Complex-Valued Neural Networks. , 2023, , .		0
221	FIONA: Photonic-Electronic CoSimulation Framework and Transferable Prototyping for Photonic Accelerator. , 2023, , .		0
222	Photonics-Assisted Complex-Valued Discrete Fourier Transform Processor Based on Temporal Computing. , 2023, , .		0
225	Economical optical matrix to vector multiplier. , 2024, , .		0
229	Large-scale neuromorphic systems enabled by integrated photonics. , 2024, , 191-220.		0
230	Photonic matrix computing accelerators. , 2024, , 257-293.		0
234	An Integrated All-Optical Multimodal Learning Engine Built by Reconfigurable Phase-Change Meta-Atoms. Lecture Notes in Computer Science, 2024, , 442-451.	1.0	0
246	Entropy of Mode Mixers for Optical Unitary Converter Based on Multi-Plane Light Conversion. , 2022, , .		0
250	Exploring nonlinear activation function within microring resonators for all-photonic neuromorphic computing. , 2024, , .		0
251	Diffraction Optical Neural Networks. , 2024, , 73-94.		0