Wulfram Gerstner

List of Publications by Citations

131 papers	13,635 citations	58 h-index	116 g-index
150 ext. papers	16,699 ext. citations	5.6 avg, IF	6.87 L-index

#	Paper	IF	Citations
131	Spiking Neuron Models: Single Neurons, Populations, Plasticity **2002**,		2037
130	A neuronal learning rule for sub-millisecond temporal coding. *Nature*, **1996**, 383, 76-81	50.4	806
129	Adaptive exponential integrate-and-fire model as an effective description of neuronal activity. *Journal of Neurophysiology*, **2005**, 94, 3637-42	3.2	664
128	Neuronal Dynamics: From Single Neurons to Networks and Models of Cognition **2014**,		495
127	Noninvasive brain-actuated control of a mobile robot by human EEG. *IEEE Transactions on Biomedical Engineering*, **2004**, 51, 1026-33	5	444
126	Hebbian learning and spiking neurons. *Physical Review E*, **1999**, 59, 4498-4514	2.4	392
125	Connectivity reflects coding: a model of voltage-based STDP with homeostasis. *Nature Neuroscience*, **2010**, 13, 344-52	25.5	387
124	Triplets of spikes in a model of spike timing-dependent plasticity. *Journal of Neuroscience*, **2006**, 26, 9673-82	6.82	383
123	Phenomenological models of synaptic plasticity based on spike timing. *Biological Cybernetics*, **2008**, 98, 459-78	2.8	346
122	Time structure of the activity in neural network models. *Physical Review E*, **1995**, 51, 738-758	2.4	303
121	Population dynamics of spiking neurons: fast transients, asynchronous states, and locking. *Neural Computation*, **2000**, 12, 43-89	2.9	299
120	Reduction of the Hodgkin-Huxley Equations to a Single-Variable Threshold Model. *Neural Computation*, **1997**, 9, 1015-1045	2.9	230
119	A history of spike-timing-dependent plasticity. *Frontiers in Synaptic Neuroscience*, **2011**, 3, 4	3.5	227
118	Mathematical formulations of Hebbian learning. *Biological Cybernetics*, **2002**, 87, 404-15	2.8	227
117	Spatial cognition and neuro-mimetic navigation: a model of hippocampal place cell activity. *Biological Cybernetics*, **2000**, 83, 287-99	2.8	199
116	What matters in neuronal locking?. *Neural Computation*, **1996**, 8, 1653-76	2.9	192
115	Firing patterns in the adaptive exponential integrate-and-fire model. *Biological Cybernetics*, **2008**, 99, 335-47	2.8	191

114	Generalized integrate-and-fire models of neuronal activity approximate spike trains of a detailed model to a high degree of accuracy. *Journal of Neurophysiology*, **2004**, 92, 959-76	3.2	189
113	Predicting spike timing of neocortical pyramidal neurons by simple threshold models. *Journal of Computational Neuroscience*, **2006**, 21, 35-49	1.4	181
112	Diverse synaptic plasticity mechanisms orchestrated to form and retrieve memories in spiking neural networks. *Nature Communications*, **2015**, 6, 6922	17.4	176
111	Optimal control of transient dynamics in balanced networks supports generation of complex movements. *Neuron*, **2014**, 82, 1394-406	13.9	176
110	Why spikes? Hebbian learning and retrieval of time-resolved excitation patterns. *Biological Cybernetics*, **1993**, 69, 503-515	2.8	171
109	Neuroscience. How good are neuron models?. *Science*, **2009**, 326, 379-80	33.3	168
108	Optimal spike-timing-dependent plasticity for precise action potential firing in supervised learning. *Neural Computation*, **2006**, 18, 1318-48	2.9	163
107	Dynamic I-V curves are reliable predictors of naturalistic pyramidal-neuron voltage traces. *Journal of Neurophysiology*, **2008**, 99, 656-66	3.2	151
106	Microcircuits of excitatory and inhibitory neurons in layer 2/3 of mouse barrel cortex. *Journal of Neurophysiology*, **2012**, 107, 3116-34	3.2	141
105	Neuromodulated Spike-Timing-Dependent Plasticity, and Theory of Three-Factor Learning Rules. *Frontiers in Neural Circuits*, **2015**, 9, 85	3.5	134
104	Associative memory in a network of spiking neurons. *Network: Computation in Neural Systems*, **1992**, 3, 139-164	0.7	130
103	Noise in integrate-and-fire neurons: from stochastic input to escape rates. *Neural Computation*, **2000**, 12, 367-84	2.9	123
102	Intrinsic stabilization of output rates by spike-based Hebbian learning. *Neural Computation*, **2001**, 13, 2709-41	2.9	122
101	Temporal whitening by power-law adaptation in neocortical neurons. *Nature Neuroscience*, **2013**, 16, 942-8	25.5	121
100	Theory and simulation in neuroscience. *Science*, **2012**, 338, 60-5	33.3	103
99	A benchmark test for a quantitative assessment of simple neuron models. *Journal of Neuroscience Methods*, **2008**, 169, 417-24	3	99
98	Synaptic plasticity in neural networks needs homeostasis with a fast rate detector. *PLoS Computational Biology*, **2013**, 9, e1003330	5	98
97	Coherence and incoherence in a globally coupled ensemble of pulse-emitting units. *Physical Review Letters*, **1993**, 71, 312-315	7.4	98

96	Functional requirements for reward-modulated spike-timing-dependent plasticity. *Journal of Neuroscience*, **2010**, 30, 13326-37	6.6	93
95	Tag-trigger-consolidation: a model of early and late long-term-potentiation and depression. *PLoS Computational Biology*, **2008**, 4, e1000248	5	88
94	Is there a geometric module for spatial orientation? Insights from a rodent navigation model. *Psychological Review*, **2009**, 116, 540-66	6.3	87
93	Extracting oscillations. Neuronal coincidence detection with noisy periodic spike input. *Neural Computation*, **1998**, 10, 1987-2017	2.9	83
92	Associative memory in a network of spiking neurons		83
91	Learning navigational maps through potentiation and modulation of hippocampal place cells. *Journal of Computational Neuroscience*, **1997**, 4, 79-94	1.4	81
90	The temporal paradox of Hebbian learning and homeostatic plasticity. *Current Opinion in Neurobiology*, **2017**, 43, 166-176	7.6	80
89	A biologically motivated and analytically soluble model of collective oscillations in the cortex. I. Theory of weak locking. *Biological Cybernetics*, **1993**, 68, 363-74	2.8	80
88	Hebbian plasticity requires compensatory processes on multiple timescales. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **2017**, 372,	5.8	79
87	Reinforcement learning using a continuous time actor-critic framework with spiking neurons. *PLoS Computational Biology*, **2013**, 9, e1003024	5	79
86	Extraction of Network Topology From Multi-Electrode Recordings: Is there a Small-World Effect?. *Frontiers in Computational Neuroscience*, **2011**, 5, 4	3.5	78
85	Synaptic tagging and capture: a bridge from molecular to behaviour. *BMC Neuroscience*, **2011**, 12,	3.2	78
84	The quantitative single-neuron modeling competition. *Biological Cybernetics*, **2008**, 99, 417-26	2.8	77
83	Synaptic shot noise and conductance fluctuations affect the membrane voltage with equal significance. *Neural Computation*, **2005**, 17, 923-47	2.9	77
82	Eligibility Traces and Plasticity on Behavioral Time Scales: Experimental Support of NeoHebbian Three-Factor Learning Rules. *Frontiers in Neural Circuits*, **2018**, 12, 53	3.5	75
81	Generalized Bienenstock-Cooper-Munro rule for spiking neurons that maximizes information transmission. *Proceedings of the National Academy of Sciences of the United States of America*, **2005**, 102, 5239-44	11.5	74
80	Rapid phase locking in systems of pulse-coupled oscillators with delays. *Physical Review Letters*, **1996**, 76, 1755-1758	7.4	74
79	Towards a theory of cortical columns: From spiking neurons to interacting neural populations of finite size. *PLoS Computational Biology*, **2017**, 13, e1005507	5	73

78	Cognitive navigation based on nonuniform Gabor space sampling, unsupervised growing networks, and reinforcement learning. *IEEE Transactions on Neural Networks*, **2004**, 15, 639-52		66
77	Spike-based reinforcement learning in continuous state and action space: when policy gradient methods fail. *PLoS Computational Biology*, **2009**, 5, e1000586	5	62
76	Voltage and Spike Timing Interact in STDP - A Unified Model. *Frontiers in Synaptic Neuroscience*, **2010**, 2, 25	3.5	59
75	Parameter extraction and classification of three cortical neuron types reveals two distinct adaptation mechanisms. *Journal of Neurophysiology*, **2012**, 107, 1756-75	3.2	58
74	Inference of neuronal network spike dynamics and topology from calcium imaging data. *Frontiers in Neural Circuits*, **2013**, 7, 201	3.5	57
73	Stress, genotype and norepinephrine in the prediction of mouse behavior using reinforcement learning. *Nature Neuroscience*, **2009**, 12, 1180-6	25.5	57
72	Extracting non-linear integrate-and-fire models from experimental data using dynamic I-V curves. *Biological Cybernetics*, **2008**, 99, 361-70	2.8	56
71	Robust self-localisation and navigation based on hippocampal place cells. *Neural Networks*, **2005**, 18, 1125-40	9.1	55
70	Stable propagation of activity pulses in populations of spiking neurons. *Neural Computation*, **2002**, 14, 987-97	2.9	49
69	Automated High-Throughput Characterization of Single Neurons by Means of Simplified Spiking Models. *PLoS Computational Biology*, **2015**, 11, e1004275	5	47
68	Spontaneous excitations in the visual cortex: stripes, spirals, rings, and collective bursts. *Neural Computation*, **1995**, 7, 905-14	2.9	46
67	Predicting neuronal activity with simple models of the threshold type: Adaptive Exponential Integrate-and-Fire model with two compartments. *Neurocomputing*, **2007**, 70, 1668-1673	5.4	44
66	Coding and learning of behavioral sequences. *Trends in Neurosciences*, **2004**, 27, 11-4; discussion 14-5	13.3	41
65	Universality in neural networks: the importance of the 'mean firing rate'. *Biological Cybernetics*, **1992**, 67, 195-205	2.8	40
64	Predicting non-linear dynamics by stable local learning in a recurrent spiking neural network. *ELife*, **2017**, 6,	8.9	38
63	Stochastic variational learning in recurrent spiking networks. *Frontiers in Computational Neuroscience*, **2014**, 8, 38	3.5	37
62	Limits to high-speed simulations of spiking neural networks using general-purpose computers. *Frontiers in Neuroinformatics*, **2014**, 8, 76	3.9	37
61	Modeling spatial and temporal aspects of visual backward masking. *Psychological Review*, **2008**, 115, 83-100	6.3	36

60	Optimality model of unsupervised spike-timing-dependent plasticity: synaptic memory and weight distribution. *Neural Computation*, **2007**, 19, 639-71	2.9	35
59	A computational model of parallel navigation systems in rodents. *Neuroinformatics*, **2005**, 3, 223-41	3.2	34
58	Biologically plausible deep learning - But how far can we go with shallow networks?. *Neural Networks*, **2019**, 118, 90-101	9.1	33
57	Noise and the PSTH response to current transients: I. General theory and application to the integrate-and-fire neuron. *Journal of Computational Neuroscience*, **2001**, 11, 135-51	1.4	33
56	Coding and decoding with adapting neurons: a population approach to the peri-stimulus time histogram. *PLoS Computational Biology*, **2012**, 8, e1002711	5	32
55	Nonlinear Hebbian Learning as a Unifying Principle in Receptive Field Formation. *PLoS Computational Biology*, **2016**, 12, e1005070	5	32
54	Improved similarity measures for small sets of spike trains. *Neural Computation*, **2011**, 23, 3016-69	2.9	31
53	Balancing New against Old Information: The Role of Puzzlement Surprise in Learning. *Neural Computation*, **2018**, 30, 34-83	2.9	29
52	Stability of working memory in continuous attractor networks under the control of short-term plasticity. *PLoS Computational Biology*, **2019**, 15, e1006928	5	27
51	Synaptic consolidation: from synapses to behavioral modeling. *Journal of Neuroscience*, **2015**, 35, 1319-34	6.6	26
50	How the threshold of a neuron determines its capacity for coincidence detection. *BioSystems*, **1998**, 48, 105-12	1.9	26
49	Short-term synaptic plasticity orchestrates the response of pyramidal cells and interneurons to population bursts. *Journal of Computational Neuroscience*, **2005**, 18, 323-31	1.4	25
48	Enhanced Sensitivity to Rapid Input Fluctuations by Nonlinear Threshold Dynamics in Neocortical Pyramidal Neurons. *PLoS Computational Biology*, **2016**, 12, e1004761	5	25
47	Reward-based learning under hardware constraints-using a RISC processor embedded in a neuromorphic substrate. *Frontiers in Neuroscience*, **2013**, 7, 160	5.1	24
46	Coding properties of spiking neurons: reverse and cross-correlations. *Neural Networks*, **2001**, 14, 599-610	9.1	24
45	STDP in Adaptive Neurons Gives Close-To-Optimal Information Transmission. *Frontiers in Computational Neuroscience*, **2010**, 4, 143	3.5	22
44	Perceptual learning, roving and the unsupervised bias. *Vision Research*, **2012**, 61, 95-9	2.1	21
43	Spike-timing prediction in cortical neurons with active dendrites. *Frontiers in Computational Neuroscience*, **2014**, 8, 90	3.5	21

42	Fluctuations and information filtering in coupled populations of spiking neurons with adaptation. *Physical Review E*, **2014**, 90, 062704	2.4	21
41	Gamma oscillations in a nonlinear regime: a minimal model approach using heterogeneous integrate-and-fire networks. *Neural Computation*, **2008**, 20, 2973-3002	2.9	21
40	From spiking neurons to rate models: a cascade model as an approximation to spiking neuron models with refractoriness. *Physical Review E*, **2006**, 73, 051908	2.4	18
39	Spatial orientation in navigating agents: Modeling head-direction cells. *Neurocomputing*, **2001**, 38-40, 1059-1065	5.4	18
38	Changing the responses of cortical neurons from sub- to suprathreshold using single spikes in vivo. *ELife*, **2013**, 2, e00012	8.9	18
37	Does computational neuroscience need new synaptic learning paradigms?. *Current Opinion in Behavioral Sciences*, **2016**, 11, 61-66	4	15
36	Cortical Dynamics in Presence of Assemblies of Densely Connected Weight-Hub Neurons. *Frontiers in Computational Neuroscience*, **2017**, 11, 52	3.5	15
35	How single neuron properties shape chaotic dynamics and signal transmission in random neural networks. *PLoS Computational Biology*, **2019**, 15, e1007122	5	14
34	Spike-triggered averages for passive and resonant neurons receiving filtered excitatory and inhibitory synaptic drive. *Physical Review E*, **2008**, 78, 011914	2.4	14
33	Dependence of the spike-triggered average voltage on membrane response properties. *Neurocomputing*, **2006**, 69, 1062-1065	5.4	14
32	Noise and the PSTH response to current transients: II. Integrate-and-fire model with slow recovery and application to motoneuron data. *Journal of Computational Neuroscience*, **2002**, 12, 83-95	1.4	14
31	Paradoxical evidence integration in rapid decision processes. *PLoS Computational Biology*, **2012**, 8, e1002382	5	12
30	Multicontact Co-operativity in Spike-Timing-Dependent Structural Plasticity Stabilizes Networks. *Cerebral Cortex*, **2018**, 28, 1396-1415	5.1	11
29	Predicting spike times of a detailed conductance-based neuron model driven by stochastic spike arrival. *Journal of Physiology (Paris)*, **2004**, 98, 442-51		11
28	Optimal Hebbian Learning: A Probabilistic Point of View. *Lecture Notes in Computer Science*, **2003**, 92-98	0.9	10
27	Connection-type-specific biases make uniform random network models consistent with cortical recordings. *Journal of Neurophysiology*, **2014**, 112, 1801-14	3.2	9
26	Emergence of spatiotemporal receptive fields and its application to motion detection. *Biological Cybernetics*, **1994**, 72, 81-92	2.8	9
25	Mesoscopic population equations for spiking neural networks with synaptic short-term plasticity. *Journal of Mathematical Neuroscience*, **2020**, 10, 5	2.4	8

24	Rapid suppression and sustained activation of distinct cortical regions for a delayed sensory-triggered motor response. *Neuron*, **2021**, 109, 2183-2201.e9	13.9	8
23	Excitable neuronal assemblies with adaptation as a building block of brain circuits for velocity-controlled signal propagation. *PLoS Computational Biology*, **2018**, 14, e1006216	5	7
22	From hebb rules to spike-timing-dependent plasticity: a personal account. *Frontiers in Synaptic Neuroscience*, **2010**, 2, 151	3.5	7
21	The Performance (and Limits) of Simple Neuron Models: Generalizations of the Leaky Integrate-and-Fire Model **2012**, 163-192		6
20	A Model of Synaptic Reconsolidation. *Frontiers in Neuroscience*, **2016**, 10, 206	5.1	6
19	One-shot learning and behavioral eligibility traces in sequential decision making. *ELife*, **2019**, 8,	8.9	5
18	Competition between cue response and place response: a model of rat navigation behaviour. *Connection Science*, **2005**, 17, 167-183	2.8	4
17	Noise-enhanced computation in a model of a cortical column. *NeuroReport*, **2005**, 16, 1237-40	1.7	4
16	Vertical signal flow and oscillations in a three-layer model of the cortex. *Journal of Computational Neuroscience*, **1996**, 3, 125-36	1.4	4
15	The silent period of evidence integration in fast decision making. *PLoS ONE*, **2013**, 8, e46525	3.7	3
14	Stability of working memory in continuous attractor networks under the control of short-term plasticity		3
13	Author response: Predicting non-linear dynamics by stable local learning in a recurrent spiking neural network **2017**,		3
12	Optimal Stimulation Protocol in a Bistable Synaptic Consolidation Model. *Frontiers in Computational Neuroscience*, **2019**, 13, 78	3.5	3
11	Learning in Volatile Environments With the Bayes Factor Surprise. *Neural Computation*, **2021**, 33, 269-340	2.9	3
10	On the choice of metric in gradient-based theories of brain function. *PLoS Computational Biology*, **2020**, 16, e1007640	5	2
9	Novelty is not surprise: Human exploratory and adaptive behavior in sequential decision-making. *PLoS Computational Biology*, **2021**, 17, e1009070	5	2
8	Multi-Timescale Memory Dynamics Extend Task Repertoire in a Reinforcement Learning Network With Attention-Gated Memory. *Frontiers in Computational Neuroscience*, **2018**, 12, 50	3.5	2
7	Exponentially Long Orbits in Hopfield Neural Networks. *Neural Computation*, **2017**, 29, 458-484	2.9	1

6	Dendritic Voltage Recordings Explain Paradoxical Synaptic Plasticity: A Modeling Study. *Frontiers in Synaptic Neuroscience*, **2020**, 12, 585539	3.5	1
5	A functional model of adult dentate gyrus neurogenesis. *ELife*, **2021**, 10,	8.9	1
4	Brain signals of a Surprise-Actor-Critic model: Evidence for multiple learning modules in human decision making. *NeuroImage*, **2021**, 246, 118780	7.9	0
3	When shared concept cells support associations: Theory of overlapping memory engrams.. *PLoS Computational Biology*, **2021**, 17, e1009691	5	0
2	Adaptive sensory processing for efficient place coding. *Neurocomputing*, **2006**, 69, 1211-1214	5.4	
1	A biologically motivated and analytically soluble model of collective oscillations in the cortex. *Biological Cybernetics*, **1994**, 71, 349-358	2.8	