James P Crutchfield

List of Publications by Year
in descending order

120 papers	6,137 citations	117625 34 h-index	74163 75 g-index
122 all docs	122 docs citations	122 times ranked	2718 citing authors

#	Article	IF	Citations
1	Probabilistic Deterministic Finite Automata and Recurrent Networks, Revisited. Entropy, 2022, 24, 90.	2.2	0
2	Discovering causal structure with reproducing-kernel Hilbert space Îµ -machines. Chaos, 2022, 32, 023103.	2.5	4
3	Shortcuts to Thermodynamic Computing: The Cost of Fast and Faithful Information Processing. Journal of Statistical Physics, 2022, 187, 17.	1.2	11
4	Modes of information flow in collective cohesion. Science Advances, 2022, 8, eabj1720.	10.3	4
5	Quantum Information Dimension and Geometric Entropy. PRX Quantum, 2022, 3, .	9.2	4
6	Fraudulent white noise: Flat power spectra belie arbitrarily complex processes. Physical Review Research, 2021, 3, .	3.6	10
7	Refining Landauerâ€™s Stack: Balancing Error and Dissipation When Erasing Information. Journal of Statistical Physics, 2021, 183, 1.	1.2	7
8	Shannon Entropy Rate of Hidden Markov Processes. Journal of Statistical Physics, 2021, 183, 1.	1.2	10
9	Beyond density matrices: Geometric quantum states. Physical Review A, 2021, 103, .	2.5	7
10	Non-Markovian momentum computing: Thermodynamically efficient and computation universal. Physical Review Research, 2021, 3, .	3.6	3
11	Harnessing fluctuations in thermodynamic computing via time-reversal symmetries. Physical Review Research, 2021, 3, .	3.6	6
12	Divergent predictive states: The statistical complexity dimension of stationary, ergodic hidden Markov processes. Chaos, 2021, 31, 083114.	2.5	8
13	Ambiguity rate of hidden Markov processes. Physical Review E, 2021, 104, 064107.	2.1	3
14	Optimizing Quantum Models of Classical Channels: The Reverse Holevo Problem. Journal of Statistical Physics, 2020, 181, 1966-1985.	1.2	0
15	Variations on a demonic theme: Szilardâ€™s other engines. Chaos, 2020, 30, 093105.	2.5	0
16	Measurement-induced randomness and structure in controlled qubit processes. Physical Review E, 2020, 102, 040102.	2.1	6
17	Thermal Efficiency of Quantum Memory Compression. Physical Review Letters, 2020, 125, 020601.	7.8	9
18	Nonequilibrium thermodynamics of erasure with superconducting flux logic. Physical Review Research, 2020, 2, .	3.6	24

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19	Thermodynamically-efficient local computation and the inefficiency of quantum memory compression. Physical Review Research, 2020, 2, .	3.6	4
20	Functional thermodynamics of Maxwellian ratchets: Constructing and deconstructing patterns, randomizing and derandomizing behaviors. Physical Review Research, 2020, 2, .	3.6	11
21	Balancing error and dissipation in computing. Physical Review Research, 2020, 2, .	3.6	11
22	Prediction and Dissipation in Nonequilibrium Molecular Sensors: Conditionally Markovian Channels Driven by Memoryful Environments. Bulletin of Mathematical Biology, 2020, 82, 25.	1.9	2
23	Strong and Weak Optimizations in Classical and Quantum Models of Stochastic Processes. Journal of Statistical Physics, 2019, 176, 1317-1342.	1.2	15
24	Exotic states in a simple network of nanoelectromechanical oscillators. Science, 2019, 363, .	12.6	111
25	Unique Information and Secret Key Agreement. Entropy, 2019, 21, 12.	2.2	20
26	DisCo: Physics-Based Unsupervised Discovery of Coherent Structures in Spatiotemporal Systems. , 2019, , .		8
27	Koopman operator and its approximations for systems with symmetries. Chaos, 2019, 29, 093128.	2.5	20
28	Global Seismic Nowcasting With Shannon Information Entropy. Earth and Space Science, 2019, 6, 191-197.	2.6	51
29	Unique information via dependency constraints. Journal of Physics A: Mathematical and Theoretical, 2019, 52, 014002.	2.1	25
30	Extreme Quantum Memory Advantage for Rare-Event Sampling. Physical Review X, 2018, 8, .	8.9	14
31	Prediction and generation of binary Markov processes: Can a finite-state fox catch a Markov mouse?. Chaos, 2018, 28, 013109.	2.5	6
32	Spectral simplicity of apparent complexity. II. Exact complexities and complexity spectra. Chaos, 2018, 28, 033116.	2.5	9
33	Spectral simplicity of apparent complexity. I. The nondiagonalizable metadynamics of prediction. Chaos, 2018, 28, 033115.	2.5	11
34	Beyond the spectral theorem: Spectrally decomposing arbitrary functions of nondiagonalizable operators. AIP Advances, 2018, 8, 065305.	1.3	6
35	Local causal states and discrete coherent structures. Chaos, 2018, 28, 075312.	2.5	9
36	Thermodynamics of Modularity: Structural Costs Beyond the Landauer Bound. Physical Review X, 2018, 8, .	8.9	39

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37	Optimized bacteria are environmental prediction engines. Physical Review E, 2018, 98, 012408.	2.1	12
38	Causal Asymmetry in a Quantum World. Physical Review X, 2018, 8, .	8.9	26
39	dit: a Python package for discrete information theory. Journal of Open Source Software, 2018, 3, 738.	4.6	33
40	Minimum memory for generating rare events. Physical Review E, 2017, 95, 032101.	2.1	5
41	Leveraging Environmental Correlations: The Thermodynamics of Requisite Variety. Journal of Statistical Physics, 2017, 167, 1555-1585.	1.2	24
42	Informational and Causal Architecture of Continuous-time Renewal Processes. Journal of Statistical Physics, 2017, 168, 109-127.	1.2	25
43	The ambiguity of simplicity in quantum and classical simulation. Physics Letters, Section A: General, Atomic and Solid State Physics, 2017, 381, 1223-1227.	2.1	18
44	Complex Dynamical Networks Constructed with Fully Controllable Nonlinear Nanomechanical Oscillators. Nano Letters, 2017, 17, 5977-5983.	9.1	18
45	Transient Dissipation and Structural Costs of Physical Information Transduction. Physical Review Letters, 2017, 118, 220602.	7.8	17
46	Structure and Randomness of Continuous-Time, Discrete-Event Processes. Journal of Statistical Physics, 2017, 169, 303-315.	1.2	22
47	Fluctuations When Driving Between Nonequilibrium Steady States. Journal of Statistical Physics, 2017, 168, 873-918.	1.2	12
48	Correlation-powered information engines and the thermodynamics of self-correction. Physical Review E, 2017, 95, 012152.	2.1	27
49	Extreme Quantum Advantage when Simulating Classical Systems with Long-Range Interaction. Scientific Reports, 2017, 7, 6735.	3.3	16
50	Nearly maximally predictive features and their dimensions. Physical Review E, 2017, 95, 051301.	2.1	18
51	Information trimming: Sufficient statistics, mutual information, and predictability from effective channel states. Physical Review E, 2017, 95, 060102.	2.1	2
52	Thermodynamics of random number generation. Physical Review E, 2017, 95, 062139.	2.1	10
53	Anatomy of a Spin: The Information-Theoretic Structure of Classical Spin Systems. Entropy, 2017, 19, 214.	2.2	8
54	Multivariate Dependence beyond Shannon Information. Entropy, 2017, 19, 531.	2.2	41

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55	Predictive Rate-Distortion for Infinite-Order Markov Processes. Journal of Statistical Physics, 2016, 163, 1312-1338.	1.2	19
56	Patterns of patterns of synchronization: Noise induced attractor switching in rings of coupled nonlinear oscillators. Chaos, 2016, 26, 094816.	2.5	19
57	Occamâ€™s Quantum Strop: Synchronizing and Compressing Classical Cryptic Processes via a Quantum Channel. Scientific Reports, 2016, 6, 20495.	3.3	43
58	Minimized state complexity of quantum-encoded cryptic processes. Physical Review A, 2016, 93, .	2.5	25
59	Elusive present: Hidden past and future dependency and why we build models. Physical Review E, 2016, 93, 022143.	2.1	11
60	Maxwell Demon Dynamics: Deterministic Chaos, the Szilard Map, and the Intelligence of Thermodynamic Systems. Physical Review Letters, 2016, 116, 190601.	7.8	37
61	Information Flows? A Critique of Transfer Entropies. Physical Review Letters, 2016, 116, 238701.	7.8	104
62	Identifying functional thermodynamics in autonomous Maxwellian ratchets. New Journal of Physics, 2016, 18, 023049.	2.9	50
63	Statistical signatures of structural organization: The case of long memory in renewal processes. Physics Letters, Section A: General, Atomic and Solid State Physics, 2016, 380, 1517-1525.	2.1	12
64	Exact complexity: The spectral decomposition of intrinsic computation. Physics Letters, Section A: General, Atomic and Solid State Physics, 2016, 380, 998-1002.	2.1	23
65	Computational Mechanics of Inputâ€“Output Processes: Structured Transformations and the $$epsilon $$-Transducer. Journal of Statistical Physics, 2015, 161, 404-451.	1.2	44
66	Signatures of infinity: Nonergodicity and resource scaling in prediction, complexity, and learning. Physical Review E, 2015, 91, 050106.	2.1	10
67	Time resolution dependence of information measures for spiking neurons: scaling and universality. Frontiers in Computational Neuroscience, 2015, 9, 105.	2.1	26
68	Information Anatomy of Stochastic Equilibria. Entropy, 2014, 16, 4713-4748.	2.2	18
69	The dreams of theory. Wiley Interdisciplinary Reviews: Computational Statistics, 2014, 6, 75-79.	3.9	12
70	Intersection Information Based on Common Randomness. Entropy, 2014, 16, 1985-2000.	2.2	55
71	Infinite Excess Entropy Processes with Countable-State Generators. Entropy, 2014, 16, 1396-1413.	2.2	23
72	Bayesian structural inference for hidden processes. Physical Review E, 2014, 89, 042119.	2.1	30

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73	Many roads to synchrony: Natural time scales and their algorithms. Physical Review E, 2014, 89, 042135.	2.1	14
74	Chaos forgets and remembers: Measuring information creation, destruction, and storage. Physics Letters, Section A: General, Atomic and Solid State Physics, 2014, 378, 2124-2127.	2.1	13
75	Forgetting and Remembering in Chaotic Dynamical Systems. IEICE Proceeding Series, 2014, 2, 41-41.	0.0	0
76	Structural Drift: The Population Dynamics of Sequential Learning. PLoS Computational Biology, 2012, 8, e1002510.	3.2	4
77	Between order and chaos. Nature Physics, 2012, 8, 17-24.	16.7	278
78	Anatomy of a bit: Information in a time series observation. Chaos, 2011, 21, 037109.	2.5	94
79	How hidden are hidden processes? A primer on crypticity and entropy convergence. Chaos, 2011, 21, 037112.	2.5	20
80	Exact Synchronization for Finite-State Sources. Journal of Statistical Physics, 2011, 145, 1181-1201.	1.2	22
81	Asymptotic Synchronization for Finite-State Sources. Journal of Statistical Physics, 2011, 145, 1202-1223.	1.2	16
82	Introduction to Focus Issue on â€œRandomness, Structure, and Causality: Measures of Complexity from Theory to Applicationsâ€• Chaos, 2011, 21, 037101.	2.5	8
83	Information symmetries in irreversible processes. Chaos, 2011, 21, 037107.	2.5	18
84	Optimal causal inference: Estimating stored information and approximating causal architecture. Chaos, 2010, 20, 037111.	2.5	29
85	Introduction to Focus Issue: Intrinsic and Designed Computation: Information Processing in Dynamical Systemsâ€”Beyond the Digital Hegemony. Chaos, 2010, 20, 037101.	2.5	69
86	Synchronization and control in intrinsic and designed computation: An information-theoretic analysis of competing models of stochastic computation. Chaos, 2010, 20, 037105.	2.5	27
87	Prediction, Retrodiction, andÂthe Amount ofÂInformation Stored in the Present. Journal of Statistical Physics, 2009, 136, 1005-1034.	1.2	72
88	Timeâ€™s Barbed Arrow: Irreversibility, Crypticity, and Stored Information. Physical Review Letters, 2009, 103, 094101.	7.8	78
89	Information accessibility and cryptic processes. Journal of Physics A: Mathematical and Theoretical, 2009, 42, 362002.	2.1	16
90	Computation in finitary stochastic and quantum processes. Physica D: Nonlinear Phenomena, 2008, 237, 1173-1195.	2.8	19

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91	The organization of intrinsic computation: Complexity-entropy diagrams and the diversity of natural information processing. Chaos, 2008, 18, 043106.	2.5	120
92	Primordial Evolution in the Finitary Process Soup. , 2008, , 297-311.		2
93	Optimal instruments and models for noisy chaos. Chaos, 2007, 17, 043127.	2.5	3
94	Inferring Markov chains: Bayesian estimation, model comparison, entropy rate, and out-of-class modeling. Physical Review E, 2007, 76, 011106.	2.1	37
95	Objects that make objects: the population dynamics of structural complexity. Journal of the Royal Society Interface, 2006, 3, 345-349.	3.4	21
96	Automated pattern detectionâ€"An algorithm for constructing optimally synchronizing multi-regular language filters. Theoretical Computer Science, 2006, 359, 306-328.	0.9	5
97	Stability and diversity in collective adaptation. Physica D: Nonlinear Phenomena, 2005, 210, 21-57.	2.8	59
98	SYNCHRONIZING TO PERIODICITY: THE TRANSIENT INFORMATION AND SYNCHRONIZATION TIME OF PERIODIC SEQUENCES. International Journal of Modeling, Simulation, and Scientific Computing, 2004, 07, 329-355.	1.4	9
99	Structural information in two-dimensional patterns: Entropy convergence and excess entropy. Physical Review E, 2003, 67, 051104.	2.1	71
100	Regularities unseen, randomness observed: Levels of entropy convergence. Chaos, 2003, 13, 25-54.	2.5	273
101	INFORMATION BOTTLENECKS, CAUSAL STATES, AND STATISTICAL RELEVANCE BASES: HOW TO REPRESENT RELEVANT INFORMATION IN MEMORYLESS TRANSDUCTION. International Journal of Modeling, Simulation, and Scientific Computing, 2002, 05, 91-95.	1.4	17
102	Computational Mechanics: Pattern and Prediction, Structure and Simplicity. Journal of Statistical Physics, 2001, 104, 817-879.	1.2	305
103	SYNCHRONIZING TO THE ENVIRONMENT: INFORMATION-THEORETIC CONSTRAINTS ON AGENT LEARNING. International Journal of Modeling, Simulation, and Scientific Computing, 2001, 04, 251-264.	1.4	12
104	Quantum automata and quantum grammars. Theoretical Computer Science, 2000, 237, 275-306.	0.9	285
105	Thermodynamic depth of causal states: Objective complexity via minimal representations. Physical Review E, 1999, 59, 275-283.	2.1	98
106	Statistical Dynamics of the Royal Road Genetic Algorithm. Theoretical Computer Science, 1999, 229, 41-102.	0.9	98
107	Dynamical embodiments of computation in cognitive processes. Behavioral and Brain Sciences, 1998, 21, 635-635.	0.7	19
108	Statistical complexity of simple one-dimensional spin systems. Physical Review E, 1997, 55, R1239-R1242.	2.1	81

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109	Finite populations induce metastability in evolutionary search. Physics Letters, Section A: General, Atomic and Solid State Physics, 1997, 229, 144-150.	2.1	85
110	Computational mechanics of cellular automata: An example. Physica D: Nonlinear Phenomena, 1997, 103, 169-189.	2.8	134
111	The calculi of emergence: computation, dynamics and induction. Physica D: Nonlinear Phenomena, 1994, 75, 11-54.	2.8	603
112	Turbulent pattern bases for cellular automata. Physica D: Nonlinear Phenomena, 1993, 69, 279-301.	2.8	83
113	Attractor vicinity decay for a cellular automaton. Chaos, 1993, 3, 215-224.	2.5	16
114	DISCOVERING COHERENT STRUCTURES IN NONLINEAR SPATIAL SYSTEMS. , 1993, , 3-28.		2
115	The attractor?basin portrait of a cellular automaton. Journal of Statistical Physics, 1992, 66, 1415-1462.	1.2	96
116	Unreconstructible at any radius. Physics Letters, Section A: General, Atomic and Solid State Physics, 1992, 171, 52-60.	2.1	12
117	Reconstructing Language Hierarchies. NATO ASI Series Series B: Physics, 1991, , 45-60.	0.2	11
118	Inferring statistical complexity. Physical Review Letters, 1989, 63, 105-108.	7.8	727
119	Are Attractors Relevant to Turbulence?. Physical Review Letters, 1988, 60, 2715-2718.	7.8	234
120	Phenomenology of Spatio-Temporal Chaos. Series on Directions in Condensed Matter Physics, 1987, , 272-353.	0.1	79