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	Inferring statistical complexity. Physical Review Letters, 1989, 63, 105-108.	7.8	727
2	The calculi of emergence: computation, dynamics and induction. Physica D: Nonlinear Phenomena, 1994, 75, 11-54.	2.8	603
3	Computational Mechanics: Pattern and Prediction, Structure and Simplicity. Journal of Statistical Physics, 2001, 104, 817-879.	1.2	305
4	Quantum automata and quantum grammars. Theoretical Computer Science, 2000, 237, 275-306.	0.9	285
5	Between order and chaos. Nature Physics, 2012, 8, 17-24.	16.7	278
6	Regularities unseen, randomness observed: Levels of entropy convergence. Chaos, 2003, 13, 25-54.	2.5	273
7	Are Attractors Relevant to Turbulence?. Physical Review Letters, 1988, 60, 2715-2718.	7.8	234
8	Computational mechanics of cellular automata: An example. Physica D: Nonlinear Phenomena, 1997, 103, 169-189.	2.8	134
9	The organization of intrinsic computation: Complexity-entropy diagrams and the diversity of natural information processing. Chaos, 2008, 18, 043106.	2.5	120
10	Exotic states in a simple network of nanoelectromechanical oscillators. Science, 2019, 363, .	12.6	111
11	Information Flows? A Critique of Transfer Entropies. Physical Review Letters, 2016, 116, 238701.	7.8	104
12	Thermodynamic depth of causal states: Objective complexity via minimal representations. Physical Review E, 1999, 59, 275-283.	2.1	98
13	Statistical Dynamics of the Royal Road Genetic Algorithm. Theoretical Computer Science, 1999, 229, 41-102.	0.9	98
14	The attractor?basin portrait of a cellular automaton. Journal of Statistical Physics, 1992, 66, 1415-1462.	1.2	96
15	Anatomy of a bit: Information in a time series observation. Chaos, 2011, 21, 037109.	2.5	94
16	Finite populations induce metastability in evolutionary search. Physics Letters, Section A: General, Atomic and Solid State Physics, 1997, 229, 144-150.	2.1	85
17	Turbulent pattern bases for cellular automata. Physica D: Nonlinear Phenomena, 1993, 69, 279-301.	2.8	83
18	Statistical complexity of simple one-dimensional spin systems. Physical Review E, 1997, 55, R1239-R1242.	2.1	81

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19	Phenomenology of Spatio-Temporal Chaos. Series on Directions in Condensed Matter Physics, 1987, , 272-353.	0.1	79
20	Timeâ€™s Barbed Arrow: Irreversibility, Crypticity, and Stored Information. Physical Review Letters, 2009, 103, 094101.	7.8	78
21	Prediction, Retrodiction, andÂthe Amount ofÂInformation Stored in the Present. Journal of Statistical Physics, 2009, 136, 1005-1034.	1.2	72
22	Structural information in two-dimensional patterns: Entropy convergence and excess entropy. Physical Review E, 2003, 67, 051104.	2.1	71
23	Introduction to Focus Issue: Intrinsic and Designed Computation: Information Processing in Dynamical Systemsâ€"Beyond the Digital Hegemony. Chaos, 2010, 20, 037101.	2.5	69
24	Stability and diversity in collective adaptation. Physica D: Nonlinear Phenomena, 2005, 210, 21-57.	2.8	59
25	Intersection Information Based on Common Randomness. Entropy, 2014, 16, 1985-2000.	2.2	55
26	Global Seismic Nowcasting With Shannon Information Entropy. Earth and Space Science, 2019, 6, 191-197.	2.6	51
27	Identifying functional thermodynamics in autonomous Maxwellian ratchets. New Journal of Physics, 2016, 18, 023049.	2.9	50
28	Computational Mechanics of Inputâ€"Output Processes: Structured Transformations and the $$epsilon $$-Transducer. Journal of Statistical Physics, 2015, 161, 404-451.	1.2	44
29	Occamâ€™s Quantum Strop: Synchronizing and Compressing Classical Cryptic Processes via a Quantum Channel. Scientific Reports, 2016, 6, 20495.	3.3	43
30	Multivariate Dependence beyond Shannon Information. Entropy, 2017, 19, 531.	2.2	41
31	Thermodynamics of Modularity: Structural Costs Beyond the Landauer Bound. Physical Review X, 2018, 8, .	8.9	39
32	Inferring Markov chains: Bayesian estimation, model comparison, entropy rate, and out-of-class modeling. Physical Review E, 2007, 76, 011106.	2.1	37
33	Maxwell Demon Dynamics: Deterministic Chaos, the Szilard Map, and the Intelligence of Thermodynamic Systems. Physical Review Letters, 2016, 116, 190601.	7.8	37
34	dit: a Python package for discrete information theory. Journal of Open Source Software, 2018, 3, 738.	4.6	33
35	Bayesian structural inference for hidden processes. Physical Review E, 2014, 89, 042119.	2.1	30
36	Optimal causal inference: Estimating stored information and approximating causal architecture. Chaos, 2010, 20, 037111.	2.5	29

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37	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
38	Correlation-powered information engines and the thermodynamics of self-correction. Physical Review E, 2017, 95, 012152.	2.1	27
39	Time resolution dependence of information measures for spiking neurons: scaling and universality. Frontiers in Computational Neuroscience, 2015, 9, 105.	2.1	26
40	Causal Asymmetry in a Quantum World. Physical Review X, 2018, 8, .	8.9	26
41	Minimized state complexity of quantum-encoded cryptic processes. Physical Review A, 2016, 93, .	2.5	25
42	Informational and Causal Architecture of Continuous-time Renewal Processes. Journal of Statistical Physics, 2017, 168, 109-127.	1.2	25
43	Unique information via dependency constraints. Journal of Physics A: Mathematical and Theoretical, 2019, 52, 014002.	2.1	25
44	Leveraging Environmental Correlations: The Thermodynamics of Requisite Variety. Journal of Statistical Physics, 2017, 167, 1555-1585.	1.2	24
45	Nonequilibrium thermodynamics of erasure with superconducting flux logic. Physical Review Research, 2020, 2, .	3.6	24
46	Infinite Excess Entropy Processes with Countable-State Generators. Entropy, 2014, 16, 1396-1413.	2.2	23
47	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
48	Exact Synchronization for Finite-State Sources. Journal of Statistical Physics, 2011, 145, 1181-1201.	1.2	22
49	Structure and Randomness of Continuous-Time, Discrete-Event Processes. Journal of Statistical Physics, 2017, 169, 303-315.	1.2	22
50	Objects that make objects: the population dynamics of structural complexity. Journal of the Royal Society Interface, 2006, 3, 345-349.	3.4	21
51	How hidden are hidden processes? A primer on crypticity and entropy convergence. Chaos, 2011, 21, 037112.	2.5	20
52	Unique Information and Secret Key Agreement. Entropy, 2019, 21, 12.	2.2	20
53	Koopman operator and its approximations for systems with symmetries. Chaos, 2019, 29, 093128.	2.5	20
54	Dynamical embodiments of computation in cognitive processes. Behavioral and Brain Sciences, 1998, 21, 635-635.	0.7	19

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55	Computation in finitary stochastic and quantum processes. Physica D: Nonlinear Phenomena, 2008, 237, 1173-1195.	2.8	19
56	Predictive Rate-Distortion for Infinite-Order Markov Processes. Journal of Statistical Physics, 2016, 163, 1312-1338.	1.2	19
57	Patterns of patterns of synchronization: Noise induced attractor switching in rings of coupled nonlinear oscillators. Chaos, 2016, 26, 094816.	2.5	19
58	Information symmetries in irreversible processes. Chaos, 2011, 21, 037107.	2.5	18
59	Information Anatomy of Stochastic Equilibria. Entropy, 2014, 16, 4713-4748.	2.2	18
60	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
61	Complex Dynamical Networks Constructed with Fully Controllable Nonlinear Nanomechanical Oscillators. Nano Letters, 2017, 17, 5977-5983.	9.1	18
62	Nearly maximally predictive features and their dimensions. Physical Review E, 2017, 95, 051301.	2.1	18
63	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
64	Transient Dissipation and Structural Costs of Physical Information Transduction. Physical Review Letters, 2017, 118, 220602.	7.8	17
65	Attractor vicinity decay for a cellular automaton. Chaos, 1993, 3, 215-224.	2.5	16
66	Information accessibility and cryptic processes. Journal of Physics A: Mathematical and Theoretical, 2009, 42, 362002.	2.1	16
67	Asymptotic Synchronization for Finite-State Sources. Journal of Statistical Physics, 2011, 145, 1202-1223.	1.2	16
68	Extreme Quantum Advantage when Simulating Classical Systems with Long-Range Interaction. Scientific Reports, 2017, 7, 6735.	3.3	16
69	Strong and Weak Optimizations in Classical and Quantum Models of Stochastic Processes. Journal of Statistical Physics, 2019, 176, 1317-1342.	1.2	15
70	Many roads to synchrony: Natural time scales and their algorithms. Physical Review E, 2014, 89, 042135.	2.1	14
71	Extreme Quantum Memory Advantage for Rare-Event Sampling. Physical Review X, 2018, 8, .	8.9	14
72	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

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73	Unreconstructible at any radius. Physics Letters, Section A: General, Atomic and Solid State Physics, 1992, 171, 52-60.	2.1	12
74	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
75	The dreams of theory. Wiley Interdisciplinary Reviews: Computational Statistics, 2014, 6, 75-79.	3.9	12
76	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
77	Fluctuations When Driving Between Nonequilibrium Steady States. Journal of Statistical Physics, 2017, 168, 873-918.	1.2	12
78	Optimized bacteria are environmental prediction engines. Physical Review E, 2018, 98, 012408.	2.1	12
79	Elusive present: Hidden past and future dependency and why we build models. Physical Review E, 2016, 93, 022143.	2.1	11
80	Spectral simplicity of apparent complexity. I. The nondiagonalizable metadynamics of prediction. Chaos, 2018, 28, 033115.	2.5	11
81	Reconstructing Language Hierarchies. NATO ASI Series Series B: Physics, 1991, , 45-60.	0.2	11
82	Functional thermodynamics of Maxwellian ratchets: Constructing and deconstructing patterns, randomizing and derandomizing behaviors. Physical Review Research, 2020, 2, .	3.6	11
83	Balancing error and dissipation in computing. Physical Review Research, 2020, 2, .	3.6	11
84	Shortcuts to Thermodynamic Computing: The Cost of Fast and Faithful Information Processing. Journal of Statistical Physics, 2022, 187, 17.	1.2	11
85	Signatures of infinity: Nonergodicity and resource scaling in prediction, complexity, and learning. Physical Review E, 2015, 91, 050106.	2.1	10
86	Thermodynamics of random number generation. Physical Review E, 2017, 95, 062139.	2.1	10
87	Fraudulent white noise: Flat power spectra belie arbitrarily complex processes. Physical Review Research, 2021, 3, .	3.6	10
88	Shannon Entropy Rate of Hidden Markov Processes. Journal of Statistical Physics, 2021, 183, 1.	1.2	10
89	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
90	Spectral simplicity of apparent complexity. II. Exact complexities and complexity spectra. Chaos, 2018, 28, 033116.	2.5	9

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91	Local causal states and discrete coherent structures. Chaos, 2018, 28, 075312.	2.5	9
92	Thermal Efficiency of Quantum Memory Compression. Physical Review Letters, 2020, 125, 020601.	7.8	9
93	Introduction to Focus Issue on "Randomness, Structure, and Causality: Measures of Complexity from Theory to Applications". Chaos, 2011, 21, 037101.	2.5	8
94	Anatomy of a Spin: The Information-Theoretic Structure of Classical Spin Systems. Entropy, 2017, 19, 214.	2.2	8
95	DisCo: Physics-Based Unsupervised Discovery of Coherent Structures in Spatiotemporal Systems. , 2019, , .		8
96	Divergent predictive states: The statistical complexity dimension of stationary, ergodic hidden Markov processes. Chaos, 2021, 31, 083114.	2.5	8
97	Refining Landauer's Stack: Balancing Error and Dissipation When Erasing Information. Journal of Statistical Physics, 2021, 183, 1.	1.2	7
98	Beyond density matrices: Geometric quantum states. Physical Review A, 2021, 103, .	2.5	7
99	Prediction and generation of binary Markov processes: Can a finite-state fox catch a Markov mouse?. Chaos, 2018, 28, 013109.	2.5	6
100	Beyond the spectral theorem: Spectrally decomposing arbitrary functions of nondiagonalizable operators. AIP Advances, 2018, 8, 065305.	1.3	6
101	Measurement-induced randomness and structure in controlled qubit processes. Physical Review E, 2020, 102, 040102.	2.1	6
102	Harnessing fluctuations in thermodynamic computing via time-reversal symmetries. Physical Review Research, 2021, 3, .	3.6	6
103	Automated pattern detection—An algorithm for constructing optimally synchronizing multi-regular language filters. Theoretical Computer Science, 2006, 359, 306-328.	0.9	5
104	Minimum memory for generating rare events. Physical Review E, 2017, 95, 032101.	2.1	5
105	Structural Drift: The Population Dynamics of Sequential Learning. PLoS Computational Biology, 2012, 8, e1002510.	3.2	4
106	Thermodynamically-efficient local computation and the inefficiency of quantum memory compression. Physical Review Research, 2020, 2, .	3.6	4
107	Discovering causal structure with reproducing-kernel Hilbert space μ-machines. Chaos, 2022, 32, 023103.	2.5	4
108	Modes of information flow in collective cohesion. Science Advances, 2022, 8, eabj1720.	10.3	4

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109	Quantum Information Dimension and Geometric Entropy. PRX Quantum, 2022, 3, .	9.2	4
110	Optimal instruments and models for noisy chaos. Chaos, 2007, 17, 043127.	2.5	3
111	Non-Markovian momentum computing: Thermodynamically efficient and computation universal. Physical Review Research, 2021, 3, .	3.6	3
112	Ambiguity rate of hidden Markov processes. Physical Review E, 2021, 104, 064107.	2.1	3
113	Primordial Evolution in the Finitary Process Soup. , 2008, , 297-311.		2
114	Information trimming: Sufficient statistics, mutual information, and predictability from effective channel states. Physical Review E, 2017, 95, 060102.	2.1	2
115	DISCOVERING COHERENT STRUCTURES IN NONLINEAR SPATIAL SYSTEMS. , 1993, , 3-28.		2
116	Prediction and Dissipation in Nonequilibrium Molecular Sensors: Conditionally Markovian Channels Driven by Memoryful Environments. Bulletin of Mathematical Biology, 2020, 82, 25.	1.9	2
117	Optimizing Quantum Models of Classical Channels: The Reverse Holevo Problem. Journal of Statistical Physics, 2020, 181, 1966-1985.	1.2	0
118	Variations on a demonic theme: Szilardâ€™s other engines. Chaos, 2020, 30, 093105.	2.5	0
119	Forgetting and Remembering in Chaotic Dynamical Systems. IEICE Proceeding Series, 2014, 2, 41-41.	0.0	0
120	Probabilistic Deterministic Finite Automata and Recurrent Networks, Revisited. Entropy, 2022, 24, 90.	2.2	0