

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods,  
Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)

## INDEX

## A

*A-D-E* classification, 579, 754  
 Abe, 157  
 Abnormal dimension, 176  
 Adjoint representation, 625  
 Airy's equation, 653  
 Alvarez, 780  
 Amplitude ratios, 314  
 Amputation, 239  
 Anderson, 646  
 Andrews, Baxter, Forrester, 588  
 Annealed average, 802  
 Anomalies, 268  
 Anomalous dimension, 241, 274  
 Anomaly, 516  
 Anticommuting variables, 48  
 Area law, 345  
 Articulated diagrams, 250  
 Ashkin-Teller model, 554, 594  
 Asymptotic freedom, 329, 437,  
 727  
 Atiyah-Singer index theorem,  
 793  
 Avron, Seiler, 729  
 Axial gauge, 333

## B

Background gauge, 340  
 Baker, Nickel, Green, Meiron, 317  
 Baker-Campbell-Hausdorff  
 formula, 334

Bare parameters, 237  
 Baxter, 558  
 Baxter, Andrews, Forrester, 579  
 Becchi-Rouet-Stora (BRS), 647,  
 657, 717  
 Belavin, Polyakov,  
 Zamolodchikov, 501, 578  
 Beltrami equation, 784  
 Bender, Wu, 447  
 Berezin, 48  
 Berezinskii, 200  
 Berlin-Kac, 140  
 Bernal, 739  
 Berry's phase, 734  
 Bethe approximation, 121  
 Bethe lattice, 419  
 Block spin method, 168  
 Bogoliubov, Parasiuk,  
 Hepp, Zimmermann  
 renormalization scheme,  
 264  
 Born amplitude, 282  
 Bosonization, 97, 722  
 Brownian motion, 1, 649, 778,  
 801  
 Brézin, Le Guillou, Zinn-Justin,  
 311

## C

Caianiello, 95

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods, Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)*Index*

- Callan–Symanzik equation, 233, 273, 285, 309
- Canonical degree, 237
- Canonical dimension, 23, 241
- Cardy, 546, 601
- Cartan matrix, 622
- Cartan subalgebra, 619
- Cartan–Killing, 579, 619
- Casimir effect, 519, 564
- Casimir invariants, 583, 625, 635
- Casimir operator, 332
- Cauchy determinant, 84
- Cayley tree, 419
- Central charge, 515
- Character expansion, 374
- Cheeger, Müller, Schrader, 768
- Cheng–Wu, 88
- Chevalley, Serre, 622
- Christ, Friedberg, Lee, 738
- Classical Coulomb gas, 193
- Classical Heisenberg model, 26, 107
- Clausius–Mossotti formula, 109
- Clifford algebra, 52, 63
- Co-roots, 623
- Coleman, 197
- Configuration number, 439
- Confinement, 345
- Conformal anomaly, 773
- Conformal invariance, 502
- Conformal weights, 511
- Connected correlation functions, 239
- Contragredient form, 527
- Coordination number, 1
- Corrections to scaling laws, 301
- Correlation length, 40
- Coulomb gas, 203, 691
- Coulombic partition function, 593
- Coxeter numbers, 585, 624, 626
- Coxeter–Dynkin diagrams, 622
- Creutz, 473
- Critical amplitudes, 189
- Critical exponent, 6
- Critical exponents, 125, 280
- Critical point, 40, 274
- Critical slowing down, 460, 471
- Cross ratio, 518
- Crossover exponent, 720
- Cumulant expansion, 77, 239, 412
- Curie transition, 58
- D**
- Darboux–Christoffel kernel, 699
- David, 805
- Decimation, 176
- Deconfining transition, 354
- Dedekind’s function, 528, 549, 611
- Descendant, 526
- Di Francesco, Saleur, Zuber, 577
- Diagram, 405
- Diffusion equation, 3
- Dimensional analysis, 236
- Dimensional regularization, 250
- Dimensional transmutation, 716
- Dirac equation, 93
- Dirac field, 721
- Dirac matrices, 394
- Dirichlet–Voronoi construction, 739
- Discrete Laplacian, 3
- Dominant weight, 635
- Dotsenko, 561, 563
- Dotsenko, Dotsenko, 716, 720, 728
- Dual complex, 348
- Dual Coxeter number, 624
- Dual group, 347
- Duality transformation, 180, 204
- Duality, 59, 345
- Dynamical dimension, 242
- Dyson, 310, 647, 665, 690

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods,  
Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)*Index*

## E

Effective potential, 156, 240, 249  
 Eguchi, Ooguri, 578  
 Elitzur's theorem, 341  
 Elliptic functions, 609  
 Energy-momentum tensor, 507  
 Enveloping algebra, 583  
 $\epsilon$ -expansion, 235, 290, 311  
 Equation of state, 166  
 Equations of motion, 145  
 Euclidean fields, 21  
 Euler characteristic, 740, 765, 793  
 Euler's formula, 705  
 Euler's pentagonal identity, 549,  
 610  
 Euler's relation, 409

## F

Faddeev-Popov determinant, 785  
 Faddeev-Popov ghost fields, 337,  
 436  
 Feigin-Fuchs, 533  
 Ferdinand, Fisher, 574  
 Fermi levels, 714  
 Feynman integrals, 246  
 Feynman rules, 154, 244, 337  
 Finite size effects, 478  
 Fisher circles, 139  
 Fisher, 233, 235, 290, 480  
 Fisher-Gaunt, 157  
 Fock-Bargmann space, 50, 676  
 Fokker-Planck equation, 487, 649  
 Free fields, 22  
 Freudenthal formula, 626  
 Friedan, 780, 798  
 Friedan, Qiu, Shenker, 543, 592,  
 618, 638  
 Frustrated partition function, 72,  
 86  
 Frustration, 352, 588  
 Fujikawa, 776

## G

Gaudin, 699  
 Gauge fields, 329  
 Gauge fixing, 435  
 Gauge invariance, 329  
 Gauss series, 561  
 Gauss sum, 612  
 Gauss-Bonnet formula, 766  
 Gaussian discrete model, 205  
 Gaussian integrals, 22  
 Gaussian model, 33, 550, 592  
 Gell-Mann-Low formula, 522  
 Generating functionals, 236  
 Genus, 705  
 Gepner, Qiu, 582  
 Gepner, Witten, 581  
 Glueball mass spectrum, 390  
 Goddard, Kent, Olive, 636, 642  
 Goldstone modes, 107, 118, 120,  
 127  
 Goldstone's theorem, 298, 300,  
 435, 495  
 Grading, 524  
 Graph, 405  
 Grassmannian integrals, 48  
 Green function, 8  
 Green functions, 238  
 Gross-Neveu model, 490, 720  
 Group characters, 331  
 Group theoretical factors, 259

## H

Haar measure, 427  
 Hadron spectrum, 494  
 Haffnian, 95  
 Hall conductance, 729  
 Halperin, 647  
 Hard hexagon model, 558  
 Hardy-Ramanujan formula, 548  
 Harris criterion, 716, 720  
 Hausdorff dimension, 6, 802, 808  
 Heat bath algorithm, 460

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods, Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)*Index*

Heat kernel, 332, 776, 790  
 Hierarchical model, 192  
 Higgs fields, 350  
 High temperature expansion, 33, 421  
 Highest weight vector, 526  
 Hilbert–Einstein action, 768  
 Hioe, Montroll, 715  
 Hohenberg, 197, 219  
 Homology and cohomology groups, 349  
 Hopping parameter, 492  
 Hopping probability, 759  
 Huse, 588  
 Hypergeometric equation, 561  
 Hyperscaling hypothesis, 165

## I

Importance sampling, 458  
 Infrared fixed point, 171  
 Interacting fields, 25  
 Interface energy, 480  
 Intersection probability, 16  
 Irrelevant operators, 174, 307  
 Ising model, 33, 58, 573, 605

## J

Jordan–Wigner representation, 63  
 Julia set, 193

## K

Kac character formula, 640  
 Kac determinant, 528, 532  
 Kac table, 555, 559, 589  
 Kac–Moody algebra, 526, 581, 619, 638  
 Kadanoff, 168  
 Kadanoff–Ceva, 87  
 Kaufmann, 574  
 Kazakov, Kostov, Migdal, 808

Killing field, 786  
 Killing vector, 790, 794  
 Kirchoff’s theorem, 410, 805  
 Kirkwood–Yvon theory, 110  
 Kosterlitz–Thouless transition, 193, 200  
 Kramers–Wannier duality, 61  
 Kronecker’s formula, 567  
 Kubo’s formula, 732

## L

Lagrangian, 233  
 Landau levels, 675  
 Landau–Ginzburg criterion, 158, 166  
 Langevin equation, 486  
 Laplace transform, 153  
 Laplace–Beltrami operator, 332  
 Lattice fermions, 393  
 Lattice gauge fields, 328  
 Lattices, 43  
 Laughlin, 688, 729  
 Lee–Yang singularity, 125, 129, 131, 547, 566, 588  
 Legendre transformation, 155, 159, 239, 415  
 Level spacings, 696  
 Level, 581  
 Liapunov exponent, 666  
 Lie algebra, 330, 579, 619  
 Lifshitz tail, 654  
 Liouville action, 773, 779, 795  
 Liouville theory, 798  
 Lipatov, 310, 447  
 Localization length, 670  
 Loop expansion, 246  
 Loop group, 626  
 Low temperature expansion, 430  
 Lower critical dimension, 143

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods, Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)*Index***M**

Ma, 456  
 Majorana field, 93, 554, 721  
 Majority rule, 183  
 Marginal operators, 174, 218, 307  
 Markov process, 5, 458  
 McBryan–Spencer, 222  
 McCoy–Wu, 78  
 Mean field approximation, 108, 352  
 Meijering, 743  
 Mermin–Wagner theorem, 143, 193, 197, 219  
 Metropolis algorithm, 462  
 Microcanonical simulations, 465  
 Migdal–Kadanoff approximation, 178  
 Minimal coupling, 330  
 Minimal models, 546  
 Minimal subtraction scheme, 337  
 Modular group, 567  
 Modular invariance, 564  
 moduli, 786  
 Monodromy, 562  
 Monte Carlo renormalization group, 456, 481  
 Monte Carlo sweep, 460  
 Multicritical points, 317  
 Möbius transformation, 510

**N**

$n$ -vector model, 25, 118, 259, 427, 436, 595  
 Nambu–Goto action, 781  
 Neveu–Schwarz and Ramond boundary conditions, 577, 616  
 Nickel, 311  
 Nielsen–Ninomiya theorem, 396  
 Niemeijer–Van Leeuwen, 183  
 Noether current, 508  
 Noether’s theorem, 97

nonlinear  $\sigma$ -model, 26, 107, 436, 769

Number of loops, 247

**O**

One particle irreducible Green functions, 239  
 One-loop correction, 155  
 Onsager, 48, 58, 68, 75  
 Orbifold, 554, 594  
 Order–disorder variables, 87  
 Oscillator wavefunctions, 698

**P**

Padé approximants, 448  
 Painlevé equations, 98  
 Parisi, Sourlas, 686, 715  
 Parisi, Wu Yong Shi, 486  
 Pasquier, 579, 588, 595  
 Path integral, 12  
 Peierls’ argument, 432  
 Perimeter law, 345  
 Perturbation theory, 242  
 Perturbative renormalization, 264  
 Peter–Weyl theorem, 427  
 Pfaffian, 57  
 Phenomenological renormalization, 224  
 Pippard–Ginsberg, 165  
 Planar approximation, 703  
 Planar limit, 805  
 Plaquette, 60, 331  
 Poisson distribution, 665  
 Poisson formula, 204, 580  
 Polyakov loops, 469  
 Polyakov, 738, 779, 780, 798  
 Potts model, 176, 557, 595  
 Power counting, 261  
 Primary divergent diagrams, 262  
 Primary field, 512  
 Pseudofermion method, 494

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods, Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)*Index***Q**

- Quadratic differential, 518
- Quantum Chromodynamics, 329, 490
- Quantum Hall effect, 675
- Quasiprimary field, 512
- Quenched approximation, 491

**R**

- Radial quantization, 521
- Radius of gyration, 801, 804
- Random geometry, 738
- Random lattice, 664, 739
- Random matrices, 690
- Random number generator, 463
- Random potential, 647, 679
- Random surfaces, 764
- Random walk, 1
- Real space renormalization, 162, 168
- Regge, 768
- Relevant operators, 174
- Renormalization flow, 213, 270
- Renormalization group, 270
- Renormalized Green functions, 265
- Replica trick, 658
- Reproducing kernel, 684
- Resolvent, 680
- Ricatti equation, 649
- Riemann's  $\zeta$  function, 569
- Riemann-Christoffel symbol, 785
- Roots, 620
- Roughening transition, 91, 205, 385

**S**

- Scaling dimension, 505
- Scaling fields, 174
- Scaling hypothesis, 165
- Scaling laws, 162

- Scaling regime, 89
- Schwarzian derivative, 517, 551
- Schwinger functions, 238
- Schwinger term, 631
- Second order phase transition, 70
- Self-avoiding walk, 31
- Semicircle law, 690, 708
- Shankar, 721, 729
- Simply laced Lie algebra, 579
- Sine-Gordon model, 206
- Six vertex model, 554
- Slater determinant, 698
- Solid on solid (SOS) model, 82, 205, 386
- Spherical model, 140
- Spin wave approximation, 197
- Spontaneous magnetization, 61, 72
- Spontaneous symmetry breaking, 112
- Staggered Kogut-Susskind fermions, 399
- Star-triangle transformation, 183
- Stochastic quantization, 486
- String tension, 344, 385
- Strong coupling expansion, 371
- Strong coupling series, 33
- Sugawara, 634
- Sum over paths, 9, 27
- Sum over surfaces, 780
- Super-renormalizability, 262
- Super-Schwarzian derivative, 615
- Superconformal algebra, 613
- Superficial convergence, 262
- Superfield, 683, 718
- Supersymmetry, 682
- Surface tension, 85
- Swendsen, 456, 482
- Szegő's lemma, 74, 76

Cambridge University Press

978-0-521-40806-6 - Statistical Field Theory: Strong Coupling, Monte Carlo Methods,  
Conformal Field Theory and Random Systems, Volume 2

Claude Itzykson and Jean-Michel Drouffe

Index

[More information](#)*Index*

- T**
- 't Hooft loop, 352  
't Hooft, 703  
Tadpole graph, 244  
Teichmüller space, 786  
Thermalization time, 460  
Thermodynamic limit, 23  
 $\theta$ -series, 609  
Toeplitz matrix, 74  
Topological complex, 345  
Transfer matrix, 37, 62, 136  
Tree diagrams, 154, 248  
Triangulated manifold, 765  
Tricritical Ising model, 618
- U**
- Universality, 33  
Upper critical dimension, 144
- V**
- Vacuum diagrams, 244  
Vandermonde determinant, 77  
Verma module, 526  
Vertex functions, 239  
Vertex operator, 554  
Villain action, 204, 332  
Virasoro algebra, 521, 523  
Virasoro characters, 547  
Virial theorem, 663  
von Neumann–Wigner theorem, 734  
Vortices, 197, 201, 553
- W**
- Ward identity, 145, 508, 513  
Ward–Slavnov identity, 337  
Watson's quintuple product, 611  
Wavefunction renormalization, 264  
Wegner, 679  
Weierstrass function, 612  
Weights, 624  
Weinberg's theorem, 274  
Wess–Zumino–Witten model, 626  
Weyl character formula, 625  
Weyl group, 622  
Weyl invariance, 782  
Wick ordering, 247, 536  
Wick's theorem, 24, 57, 94, 99, 243, 434  
Wigner, 647, 690  
Wilson fermions, 396  
Wilson loop, 344, 765  
Wilson, 233, 235, 290, 311, 328, 456, 482  
Wilson's action, 331  
Wulff construction, 89
- X**
- XY-model, 193, 594
- Y**
- Yang, 75  
Yang, Mills, 328, 335
- Z**
- $Z_n$  clock model, 474  
Zamolodchikov, 436, 587, 808  
 $\zeta$ -regularization, 568