

Index

- above-below equality of critical exponents, 178
- AHARONY, A., 31, 90, 326, 327
- AHLERS, G., 6, 29, 426
- ALBRIGHT, P.C., 31
- algorithm,
 - Janke-Kleinert, **296**, 309
 - reduction of Feynman integrals, **226**, 233, 238
- AMIT, D.J., 27, 28, 90, 155, 185
- amplitude ratio, 4, 6, 10, 11, 172
- amputated diagram, **55**, 88
- analytic regularization, 98, **103**, 106
- ANDERSON, P.W., 362
- anomalous dimension, **100**, 181
- anomaly of scale invariance, 98, 156
- ANTONENKO, S.A., 369, 406
- approach to scaling, 169, **174**, 365
- approximation,
 - Born, 27
 - Landau, 10, **74**
 - Padé, 26, 286
 - Padé-Borel, 286
- ARVANITIS, C., 361
- asymptotic
 - convergence, 183
 - series, **286**, 289
 - minimal error, 289
- AVDEEVA, G.M., 31
- BABAEV, E., 29, 30
- BACHMANN, M., 30, 76, 272
- BAGNULS, C., 31
- BAKER, G.A., 303, 407
- BALCAR, E., 28
- BALLESTEROS, H.G., 409, 427
- bare quantities, 97
- coupling constant, 102, 130, **142**
 - for $O(N)$ -cubic symmetry, 283
 - for $O(N)$ -symmetry, 276
- energy functional, **102**, 134, 136
- field, 102, 130, **142**
- Green function, 136
- mass, 102, 130, **142**
 - for $O(N)$ -cubic symmetry, 283
 - for $O(N)$ -symmetry, 276
- behavior at short distance, 185
- BENDER, C.M., 361, 426
- bending stiffness, 180
- BENZ-type diagram, 232
 - reduction algorithm, 239
- BERNREUTHER, W., 363
- BERVILLIER, C., 31
- Beta function, 104, 110, 123
- β -function, 157, **159**, 160, 167–169, 175, 181, 335, 337, 378, 422
 - five-loop, 304, 317
 - slope and ω , 168
- BINNEY, J.J., 28
- BJORKEN, J.D., 129, 154
- blocking transformation, 24
- BLÖTE, H.W.J., 408, 409
- BÖHM, M., 272
- BOGOLIUBOV, N.N., 30, 154, 196, 428
- BOGOMOLNY, E.B., 303
- BOLLINI, C.G., 129
- BONNIER, B., 361
- Borel
 - sum, **291**, 293
 - transformation, 286, **291**, 294
- BOREL, E., 303
- Borel-Leroy transformation, **293**, 294, 296–298

- Born approximation, 27
- BPHZ formalism, 186
- breakdown of rotational symmetry, 2
- BREITENLOHNER, P., 154, 196
- BROADHURST, D.J., 30, 407, 430
- BRÉZIN, E., 28, 30, 31, 90, 101, 185, 303, 313, 326, 327, 362, 363, 429
- bubble diagrams, chain of, **191**, 195
- BUCKINGHAM, M.J., 28
- BUCKLEY, I.R.C., 361
- BURNETT, S.S.C., 31
- BUTERA, P., 129, 408, 409, 427
- CALLAN, C.G., 185
- Callan-Symanzik equation, 157
- cancellation of vacuum diagrams, 48
- CARACCILOLO, S., 408
- CARLEMAN, T., 303
- CARMONA, J.M., 326
- CASTILLY, G.E., 362
- CASWELL, W.E., 154, 155, 196, 225
- CAUSO, M.S., 408
- chain
 - diagram, 242
 - of bubble diagrams, **191**, 195
 - of self-energy diagrams, 56
- CHAKRAVARTY, S., 362
- CHANG, M.-C., 31
- CHEN, J.H., 408
- CHEN, K., 409
- CHETYRKIN, K.G., 30, 225, 253, 272, 285, 313, 363, 407, 428
- CHUI, T.C.P., 28, 29, 408, 426
- CICUTA, G., 129
- classical Heisenberg model, **11**, 364, 401
- classification of diagrams, 231
- cluster decomposition, 63
- coherence length, **4**, 7, 17, 19
 - zero-temperature, 17
- COLEMAN, S., 101
- COLLINS, J.C., 128, 129, 154, 155, 185, 196
- COMI, M., 408, 409, 427
- components of diagrams
 - external, 48
 - vacuum, 48
- composite fields, 39, **75**
 - diagrammatic expansion, 50, **57**
- condensation energy, **10**, 19, 172
- configuration space methods, 240
- confluent singularities, **336**, **395**, 400
- conformal mapping technique, 286, **294**
- connected
 - correlation function, 3, 60
 - diagram, **47**, 64, 255, 257, 261, 262
 - n -point function, **62**, 72
 - part of full propagator, **55**
 - two-point function, 71
- constants,
 - Euler, 127, 251
 - Planck, 23
- continuum limit, 35
- contracted subdiagram, **210**
- convention, Einstein's summation, 61
- convergence,
 - asymptotic, 183
 - of Borel sum, 293
 - of strong-coupling expansion, 331
 - theorem, 131
- correlation functions, 3, **33**
 - connected, 3, 60
 - diagrammatic expansion of, 41
 - proper, 56
- correlation length, 4
- counterterm, 130, 141, **141**
 - diagram, 146
 - infrared, 217
 - method, 130, **140**
 - minimal subtraction, 192
 - weight factor of, 141
- coupling constant, 32
 - bare, 130, **142**
 - dimensionless, **113**, 141
 - redefinition, 150
 - reduced, 365
 - renormalized, 130, 135, **141**

- running, **163**, 165
- coupling tensor, **32**
- criterion
 - Ginzburg, **19**, 378
 - Kleinert, 21, **21**, 378
- critical
 - behavior, 4, 91
 - in $D = 3$ dimensions, 382
 - dimension
 - lower, 24, 354
 - upper, **20**, 24, 133
 - exponent, **1**, 15, 24, 175, 309
 - α , 5, 10, **176**, 178
 - α for $D = 3$, 373, 386
 - β , 2, 5, 10, **177**, 181
 - β for $D = 3$, 373, 386
 - δ , 5, 10, **177**, 178, 181
 - η , 4, **167**, 181, 306
 - η for $D = 3$, 371, 373, 386
 - for $O(N)$ -cubic symmetry, 314
 - for $O(N)$ -symmetry, 304
 - γ , 5, 11, **176**, 181
 - γ for $D = 3$, 372, 373, 386, 405, 406
 - graphical extrapolation, 380
 - high-temperature expansion, 401
 - in $D = 3$ dimensions, 364
 - ν , 4, **167**, 178, 181, 306
 - ν for $D = 3$, 369, 373, 386, 405, 406
 - ω , **175**, 181, 182, 307, 332, 335–337, 339, 346, 350, 361
 - ω for $D = 3$, 367, 373, 386
 - ω , self-consistent, 337
 - ω , self-consistent, for $D = 3$, 367
 - strong-coupling theory, 346, 367
 - temperature, 1
 - theory, 193
- critical
 - exponent
 - ω , self-consistent, for $D = 3$, 368, 369
- crossover, $O(N)$ -cubic, **316**, 320, 323
- cubic
 - anisotropy, 314
 - fixed point, **315**, 319, **323**, 325
 - symmetry, 77, **314**
- cumulant expansion, 63
- Curie temperature, 2, 15
- cut, coupling constant plane, 294
- cutline in diagram, **55**, 255, 257
- cutoff
 - regularization, **97**
- cutoff,
 - infrared, 200
 - momentum space, 102
 - regularization, 102
 - ultraviolet, 23
- cutvertex in diagram, **187**, 231, 254, 255, 257
 - R -operation, 190
- Darboux theorem, 293
- D -dimensional
 - polar coordinates, 120
 - surface, 120
- DE GENNES, P.G., 30, 313
- DEBROGLIE, L.V., 20
- DENNER, A., 272
- density, superfluid, 7
- DERKACHOV, S.E., 407
- diagram,
 - classification, 231
 - connected, **47**, 255
 - counterterm, 146
 - disconnected, 47
 - dual, 241
 - Feynman, 24, 38, **41**
 - for multicomponent fields, 77
 - four-point, 261
 - generation, 254
 - generic, 232
 - matrix, 255
 - n -point, 42
 - N-shaped, 248
 - one-particle irreducible, 55
 - propagator type, 200
 - shrunk, 186
 - skeleton, 131

- star, 242
- subtracted, 210
- sunset, **115**, 117
- tadpole, 107, **191**
- tree, 73
- two-point, 257
- vacuum, **47**, 257
- with vector indices, **204**
- diagrammatic expansion
 - composite fields, 50, **57**
 - correlation functions, 41
 - four-point function, 49
 - momentum space, 52
 - partition function, 46
 - two-point function, 49
- diagrammatic subtraction of subdivergences, 151, **187**, 207, 212
- differentiation with respect to
 - external momentum, 134, 144, 193, **195**, 204
 - mass, 193, **194**, 254, 262
- Digamma function, **113**, 252
- dimension,
 - anomalous, 100, 158, 181
 - engineering, 91
 - field, 91
 - free-field, 92
 - lower critical, 24
 - mass, **91**
 - naive, **91**, 165
 - noninteger, 122
 - technical, **91**, 165, 237
 - upper critical, **20**, 24, 133
- dimensional
 - analysis, 97, 165, 175
 - regularization, 104
 - four-point diagrams, 112
 - IR-divergence, 205
 - two-point diagrams, 112
 - vacuum diagram, 120
 - zero mass, 107, **205**
- dimensionless
 - counterterms, 141
 - coupling constant, **113**, 141
 - scale parameter, 163
- DINGLE, R.B., 303
- disconnected diagram, 47
- discontinuity, **287**, 288
- dispersion relation, 288
- divergence
 - infrared, 102, **198**, 199, 207, 212
 - logarithmic, 103, 131
 - overlapping, **132**, 153
 - quadratic, 103, 131
 - superficial, **131**, 133, 194
 - ultraviolet, 102, **131**, 207
- DOHM, V., 31, 185
- DOMANY, E., 327
- DOMB, C., 28, 90, 185, 326, 409
- DOWRICK, N.J., 28
- DRELL, S.D., 129, 154
- DROUFFE, J.-M., 28
- DRUMMOND, I.T., 313
- dual diagram, 241, **241**
- duality transformation, 241
- DUNCAN, A., 361
- dynamic structure factor, 27
- DYSON, F.J., 154

- ECKMANN, J.P., 303
- EDEN, R.J., 129
- effective potential, **170**
- Einstein summation convention, 61
- energy functional, 32
 - bare, **102**, 134, 136
 - Ginzburg-Landau, 16
 - renormalized, 141
- energy,
 - condensation, 172
 - effective, 69, 71, 73, 74, **169**, 173
 - ground state, 172
 - of condensation, **10**, 19
- engineering dimension, 91
- ε -expansion, 24, 114, **142**
 - critical exponent η , **181**, 306, 322

- critical exponent ν , **181**, 306, 321
- critical exponent ω , **182**, 307, 320
- fixed point g^* , **181**, 305, 315, 319
- N_c for $O(N)$ -cubic crossover, 320
- equation,
 - Callan-Symanzik, 157
 - gap, **14**
 - renormalization group, 25, **159**, 163
- ERDELY, A., 303
- Euler
 - constant, 229, 251
 - Digamma function, **113**, 127, 252
- Euler constant, 127
- exceptional momenta, 206
- expansion in $D = 3$ dimensions
 - seven loops, 382
 - six loops, 364
- expansion,
 - asymptotic, **286**, 289
 - cumulant, 63
 - Gamma function, **126**
 - high-temperature, 364, **401**
 - of Gamma function, 251
 - perturbation, 37
 - strong-coupling, **300**, 328
 - weak-coupling, 328
 - Wick, **37**
- exponent, critical, 24
- external
 - components of diagrams, 48
 - line, **42**, 53
 - point, 42
- factor, symmetry, 77, 81
- factorial growth of expansion coefficients, 288
- FAIRBANK, W.M., 28
- FATEEV, V.A., 303
- FELDMAN, J.S., 303
- FERER, M., 409, 427
- FERNANDEZ, L.A., 409, 427
- FERNÁNDEZ, F.M., 361
- FERRENBURG, A.M., 408, 409
- Feynman
 - diagram, 24, 38, **41**
 - integral, 23, 106
 - parameter, 105, 113
- FEYNMAN, R.P., 362
- field, 1
 - bare, 130, **142**
 - composite, 39, 50, 57, **75**
 - renormalization, 195
 - zero-mass, 204
 - renormalized, 130, 135, **141**
- field,
 - dimension, 91
- first-order phase transition, 1
- FISHER, A.J., 28
- FISHER, D.S., 29
- FISHER, M.E., 28, 30, 128, 129, 327, 408, 409
- FISHER, M.P.A., 29
- five-loop results, **273**
 - beta function, 304, 317
 - critical exponent
 - η , 306, 322
 - ν , 306, 321
 - ω , 307, 320
 - fixed point
 - cubic, 319
 - Heisenberg, 305
 - renormalization group functions, 305, 318
 - strong-coupling limit, 346
- fixed point, **166**, 168
 - cubic, 315, 319, **323**, 325
 - ε -expansion for g^* , **181**, 305, 319
 - Gaussian, 169, 315
 - Heisenberg, 305, 315
 - in $D = 3$ dimensions, 373, 386
 - infrared stable, 168, 169
 - Ising, 315
 - $O(N)$ -symmetric, 315
 - stability, **169**, 175, 183, 184, 320
 - trivial, 169
- FOLK, R., 326
- forest formula, 186
- formula,

- Stirling, 288
 Veltman, **108**
 formula, Stirling, 412, 414, 415
 four-point
 diagram, **49**, 56, 133, 254, 261
 in dimensional regularization, 112
 mass renormalization, 262
 symmetry factors, **89**
 function, 57, 65, 273
 diagrammatic expansion of, 49
 vertex function, 56, 137
 Fourier transformation, 52
 D-dimensional, 250
 free
 field dimension, **92**, 158
 field theory, 34
 propagator, 36
 two-point function, 36, **52**
 full propagator, **55**
 function,
 Beta, 104, 110, 123
 β , 157, **159**, 160, 167–169, 175, 181, 335,
 337, 378, 422
 connected *n*-point, 53
 correlation, 3, **33**
 Digamma, **113**, 252
 free two-point, 36, **52**
 Gamma, 104
 Green, 33
 homogeneous, 7, **93**, 96, 97
 hypergeometric, 297
 MacRobert, 297
 n-point, 33
 partition, **32**, 33
 proper correlation, 56
 proper vertex, **55**, 57, 70, 164
 renormalization group, **159**, 160, 173
 vertex, 70
 functional matrix, 34
 Gamma function, 104
 expansion of, **126**, 251
 gap equation, **14**
 Gaussian fixed point, 169, 315
 Gaussian integral, 107
 Gegenbauer polynomial *x*-space method, 240
 general triangle rule, **236**
 generalized Heisenberg model, 14
 generating functional, 32, 34, **59**
 multicomponent fields, 78
 vacuum diagrams, 64
 vertex functions, 69
 generation of diagrams, 254
 generic diagrams, **232**, 248
 GENG, Z.K., 29, 408, 426
 GIAMBIAGI, J.J., 129
 Ginzburg
 criterion, **19**, 21, 378
 temperature, **19**, 21, 378
 Ginzburg temperature, **19**
 GINZBURG, V.L., 29
 Ginzburg-Landau energy functional, 16
 GOLDNER, L.S., 29, 426
 GOMIS, J., 155
 GORISHNY, S.G., 253, 285, 407
 GOTTLOB, A.P., 408
 GOURSAT, E., 129
 GRACEY, J.A., 407
 GRAF, L.H., 29
 graph-theoretic notation, 186, 209
 graph, Feynman, 42
 graphical extrapolation of critical exponents,
 380
 GRAVES-MORRIS, P.R., 303, 327
 Green function, 33
 bare, 136
 GREEN, M.S., 28, 90, 185, 303, 326, 407
 GREYWALL, D.S., 29
 Griffith scaling relation, 180
 GRINSTEIN, G., 90
 ground state energy, 172
G-scheme, 253
 GUARDIOLA, R., 361
 GUIDA, R., 313, 361, 362, 407, 427, 429
 HAHN, Y., 154

- HALFKANN, F.J., 31
- HALPERIN, B.I., 31
- HAMID-AIDINEJAD, A., 409
- HASENBUSCH, M., 408
- HEAP, B.R., 272
- HEDRICK, E.R., 129
- Heisenberg
- fixed point, 305, **315**
 - model, **11**, 364, 401
 - model, generalized, 14
- HEPP, K., 154
- HERINGA, J.R., 408, 409
- high-temperature expansion, 15, 364, **401**
- HIKAMI, S., 362, 363
- HOHENBERG, P.C., 31
- HOLM, C., 409
- HOLOVATCH, Y., 326
- homogeneous functions, 7, **93**, 96, 97
- HONKONEN, J.R., 407
- HONTEBEYRIE, M., 361
- HOOFT, G., 30, 129, 155, 185, 428
- HOUGHTON, A., 31
- HUGHES-JONES, R., 303, 327
- HUNTER, D.L., 408, 409
- HUSE, D.A., 29
- hyper-Borel transformation, **410–412**
- hypergeometric function, 297
- hyperscaling relations, 8, 17
- ideal
- index constellation, 226
 - method, 26
 - method of, **241**
 - one step from, 244
 - triangle, 244
 - vertex, 243
- identical vertex permutation, **44**, 255
- incidence matrix, 123
- incomplete R -operation, 189
- index
- line, **226**
 - transformation, 245
- infrared
- counterterm, 197, 217, **219**
 - cutoff, **198**, 200, 213
 - disjoint subdiagrams, 211
 - divergence, **102**, 197, 207, 209, 211, 212
 - dimensional regularization of, 205
 - superficial, 213
 - superficial degree of, **198**, 199
 - divergent subdiagram, 209, 211
 - irreducible, **211**
 - power counting, 198
 - rearrangement, 25, **197**, 200, 240, 250
 - stable, 168, 169
 - subdivergences, 200
- insertion of mass, 75, 95
- integral,
- Feynman, 23
 - Gaussian, 107
- internal
- lines, 53
 - point, 42
- IR, *see* infrared
- Ising
- fixed point, 315
 - model, 8, **12**
- ISRAELSON, U.E., 28, 29, 408, 426
- ITZYKSON, C., 28, 129, 154, 196, 408
- JACK, I., 363
- JACOBSON, H., 90
- JAN, N., 408
- JANKE, W., 302, 303, 361, 362, 408, 409, 426, 427
- Janke-Kleinert algorithm, **296**, 309
- JASCH, F., 426
- JONES, D.R.T., 155, 225, 363
- JONES, H.F., 361
- \mathcal{K} -operation, **143**, 187
- KADANOFF, L.P., 28–30
- KANAYA, K., 409
- KASTENING, B., 30, 76, 272, 285
- KATAEV, A.L., 30, 253, 285, 407, 428
- KAYA, S., 409

- KAZAKOV, D.I., 30, 253, 302, 303, 313, 407, 428
- KELLER, C.F., 28
- KELLY, K., 408
- KENNEDY, A.D., 154, 155, 196, 225
- KETLEY, I.J., 90, 327
- KHURI, N.N., 185
- KITE-type diagram, 232, 235
reduction algorithm, 235, **240**
- KIVEL, N.A., 363
- Kleinert
criterion, 21, **21**, 378
temperature, 21, **21**, 378
- KLEINERT, H., 28–31, 40, 51, 76, 90, 272, 285, 302, 303, 313, 327, 360–363, 407, 408, 426, 427, 429
- KOGUT, J., 28, 128, 129, 185
- KONISHI, K., 361, 362
- KOSTERLITZ, J., 28, 362
- Kosterlitz-Thouless transition, 1
- KREIMER, D., 30, 407, 430
- KÜLBECK, J., 272
- LADDER-type diagram, 232
reduction algorithm, 239
- lambda transition, 5, 15
- Landau
approximation, 10, **74**
theory, 1, **9**
- LANDAU, D.P., 408, 409
- LANDAU, L.D., 29, 76
- LANDSHOFF, P.V., 129
- LANGHAMMER, F., 76
- large- N expansion, 368
- large-order behavior, 286, **288**, 296, 391
 $O(N)$ -cubic symmetry, 323
 $O(N)$ -symmetry, 307
- LARIN, L.A., 31
- LARIN, S.A., 31, 185, 253, 272, 285, 313, 363, 407
- LARSON, M., 29, 408, 426
- latent heat, 1
- LE BELLAC, M., 28
- LE GUILLOU, J.C., 28, 90, 101, 185, 303, 313, 327, 407, 427
- LEIBBRANDT, G., 129
- LEROY, E., 303
- LI, B., 408
- LIFSHITZ, E.M., 29
- limit
thermodynamic, **59**
- line
external, **42**, 53
index, **226**
internal, 53
topologically equivalent, 50
with vector indices, **196**, 204
- LIPA, J.A., 28, 29, 408, 426
- LIPATOV, L.N., 303
- logarithmic divergence, **103**, 131
tadpole, 191
- loop, 24
function, **227**, 228
momentum, 54
- LOVESEY, S.W., 28
- lower critical dimension, 24, 354
- L -scheme, 231
- LUIJTEN, E., 408
- LUTHER, A., 90
- LYUKSUTSOV, I.F., 90
- MA, S., 27
- MACDONALD, D., 408
- MACFARLANE, A.J., 155, 185
- MacRobert function, 297
- MADRAS, N., 408
- MAGNEN, J., 303
- magnetization, spontaneous, 2, 3, 5, 9–11, 177
- MAISON, D., 154, 196
- MAKI, K., 76
- MAKINSON, G.J., 303, 327
- MANASHOV, A.N., 407
- MAREK, D., 28
- MARTIN-MAYOR, V., 409, 427
- mass
bare, 130, **142**

- dimension, **91**
- insertion, 39, 75, 95
- parameter, **91**, 98, 99, 113, 119, 141, 143, 150, 158, 159, 164, 165
 - redefinition, 150
- renormalization, 195
 - four-point diagram, 262
- renormalized, 130, 135, **141**
- running, **163**, 165
- scale, 113, 165, 230
 - redefinition, 230
- massless tadpole integral, 107
- MAYER, I.O., 30, 327
- MCCOY, T.H., 29
- MCKANE, A.J., 313
- MCKENZIE, S., 409
- mean-field stability wedge, 314
- MEIRON, D.I., 303, 406, 407, 429
- method,
 - configuration space, 240
 - Gegenbauer polynomial \mathbf{x} -space, 240
 - of counterterms, 130, 140
 - of ideal index constellations, 241
 - of partial integration, **233**
 - of uniqueness, 26
 - recursive subtraction, 130
- MEYER, S., 408
- MICHEL, L., 30, 90, 326, 429
- MIGDAL, A.A., 30, 31
- minimal error of asymptotic series, 289
- minimal subtraction scheme, 25, 103, 108, **143**, 158, 160, 161, 174, 192
 - modified, 143, **230**
- Minkowski spacetime, 32
- model,
 - Heisenberg, **11**, 364
 - Ising, 8, **12**
 - $O(N)$ -cubic symmetric, **77**, 314
 - $O(N)$ -symmetric, **12**, 77, 304
 - spherical, 8, **14**, 364
- modified MS-scheme, 143, **230**
- MÖNNIGMANN, M., 31, 185
- MOHAMMEDI, N., 363
- molecular-field theory, 9
- momenta, nonexceptional, 140
- momentum space
 - cutoff, 23
 - diagrammatic expansion in, 52
 - methods, 226
- MONTALDI, E., 129
- MOORE, M.A., 409, 427
- MS-scheme, 25, 103, **143**, 158, 160, 161, 174, 192
 - modified, 143, **230**
- MUELLER, K.H., 426
- MUKAMEL, D., 327
- MULDERS, N., 29, 426
- multicomponent fields, 77
 - generating functional, 78
 - perturbation expansion, 79
 - symmetry factor, 79
- multiplicative renormalization, 135, **141**
- multiplicity of diagrams, **42**, 45, 254
 - disconnected, 47
- MURRAY, D.B., 407, 427, 429
- MUÑOZ-SUDUPE, A., 409, 427
- n -point
 - correlation function, 165
 - diagram, 42
 - function, **33**, 50, 53, 62, 64, 133, 158
 - connected, **53**, 62, 72
 - proper vertex function, 158, 165, 166
 - vertex function, 72, 148
- N-shaped diagram, 248
- NAGLE, J.F., 272
- naive
 - dimension, **91**, 165
 - scaling relation, 171
- NAKANISHI, N., 58, 129, 272
- Nambu-Goldstone theorem, **4**, **11**, 179
- NATTERMANN, T., 90
- N_c for $O(N)$ -cubic crossover, **316**, 320, 323
- NEU, J., 25, 30, 272, 285, 313, 363, 407
- NEVANLINNA, F., 303

- NEWMAN, K.E., 327
 NEWMAN, M.E.J., 28
 NICKEL, B.G., 303, 362, 406–408, 427, 429
 NICOLL, J.F., 31
 NISSEN, J., 28, 29, 408, 426
 NOGUEIRA, P., 272
 nonexceptional momenta, 140, **140**, 198, 206
 noninteger dimension, 122
 nonlinear σ -model, 354
 NONPLANAR-type diagram, 232
 normal phase, **2**, 23, 32, 41, 51, 62–64
 normalization
 conditions, 136
 of coupling constant, 230
 point, 133
 number of connected diagrams, 262

 OBERHETTINGER, F., 303
 OKABE, Y., 407
 OKU, M., 407
 OLIVE, D.I., 129
 $O(N)$ -cubic symmetry, 77, 279, **314**
 critical exponents, 314
 factors, **84**
 fixed point, **323**
 large-order behavior, 323
 resummation, 322
 $O(N)$ -symmetry, 12, 77, **304**
 critical exponents, 304
 expansions
 in $D = 3$ dimensions, 365
 factors, **81**
 fixed point, 305, 315
 large-order behavior, 307
 renormalization constants, 274, 275
 resummation of expansions, 309
 one step from ideal index constellation, 244
 one-particle
 irreducible, **55**, 133
 reducible, 55
 one-point function, 62, 71
 operation,
 \mathcal{K} , 143
 R , 25, **187**
 \bar{R} , 187
 R^* , 26, **207**
 operator, quantum field, **32**
 order
 field, 1
 parameter, 1
 ordered phase, 2
 ORLOV, E.V., 409
 OSTERWALDER, K., 303
 overlapping divergences, **132**, 153

 Padé approximation, 26, 286, **290**, 320
 Padé-Borel transformation, 286
 pair contraction, 37
 parameter,
 Feynman, 105, 113
 mass, **91**
 of approach, 174
 of approach to scaling, 174, 365
 parametric representation, 106, **123**
 PARASIUK, O.S., 30, 154
 PARISI, G., 28, 326, 406
 PARKER, C.S., 361
 partial integration, 122, **233**, **234**
 partial p , 109, 122
 partition function, **32**, 33
 diagrammatic expansion, 46
 PAULI, W., 129
 Pauli-Villars regularization, 103
 PEARSON, R.B., 408
 PELISSETTO, A., 326, 362, 408, 409, 427
 PELSTER, A., 30, 76, 272
 perturbation expansion, 37
 of multicomponent fields, 79
 PFEUTY, P., 326
 phase
 normal, **2**, 23, 41, 51, 62–64
 ordered, 2
 phase transition
 first-order, 1
 Kosterlitz-Thouless, 1
 second-order, 1

- Landau theory, 9
- phase,
 normal, 32
- PHILIPS, D., 28
- p -integral, **200**, **226**
 calculation of, 226
- PIS'MAK, YU.M., 407
- Planck constant, 23
- POBELL, F., 426
- Pochhammer symbols, 297, 299
- POKROVSKII, V., 90
- pole term, **103**, 113, 114, 143, 188, 189, 197–
 199, 209, 213, 214, 219, 226
 superficial, 150
- POLKINGHORNE, J.C., 129
- polymer, 23
- potential
 effective, **170**
- power counting, 131
 infrared, 198
 theorem, **131**, 133
- power law, 2
- precocity of asymptotic behavior, 388
- propagator-type,
 integral, **200**, 226, 232, 241, 242, 249, 250
- propagator,
 connected part of, **55**
 free, 36
 full, **55**
 type diagram, 200
 with vector indices, **204**
- proper
 correlation functions, 56
 subdiagram, 186
 time, 106
 vertex function, **55**, 57, 70, 164
- quadratic divergence, **103**, 131
- quantum chromodynamics
 (QCD), 230
- quantum chromodynamics (QCD), 230
- quantum field operator, **32**
- RAJANTIE, A.R., 31
- RAMOND, P., 28, 129
- range of attraction, 169
- ratio test, 402
- recursive subtraction method, 130, 150, **186**
 UV and IR, 207
- REDUCE, 229
- reduced coupling constant, 365
- reduction algorithm
 by partial integration, **234**
 for Feynman integrals, 226, **233**, 238
 for loop function, 229
- REGGE, T., 29
- regularization, 102
 analytic, 98, **103**, 106
 cutoff, **97**, 102
 dimensional, 104
 Pauli-Villars, 103
- REHR, J.J., 408
- relevant permutation, 42
- renormalizable, **130**, 131
- renormalization
 multiplicative, 135, **141**
 of field, 195
 of mass, 195
- renormalization constant, 24, **97**, 130, 136, 141,
 273
 coupling constant, 135
 field, 135
 for $O(N)$ -cubic symmetry, 279
 for $O(N)$ -symmetry, 274, 275
 mass, 135
 vacuum energy, 284
 wave function, 135, **136**
- renormalization group, 24, **156**
 equation, 25, **159**, 163
 functions, 25, **159**, 160, 288, 365
 five-loop, 305, 318
 vacuum, 173
- renormalized quantities
 coupling constant, 130, **141**
 for $O(N)$ -cubic symmetry, 284

- for $O(N)$ -symmetry, 278
- energy functional, 141
- field, 130, **141**
- mass, 130, **141**
- resummation, 25, **286**
 - Borel, 286, **291**
 - by conformal mapping, 294
 - Janke-Kleinert algorithm, 296
 - $O(N)$ -cubic symmetry, 322
 - $O(N)$ -symmetry, 309
 - Padé, 286, **290**
 - Padé-Borel, 286
 - variational, 328, 396
- RICCI-TERSENGHI, F., 326
- RIEDEL, E.K., 327
- Riemann zeta function, 228
- RITCHIE, D.S., 409
- ROS, J., 361
- ROSSI, P., 409
- rotational symmetry, 2
- R -operation, 25, 186, **187**
 - cutvertex, 190
 - for tadpoles, 191
 - incomplete, 189
- \bar{R} -operation, **187**, 189, 223
- R^* -operation, 26, **207**, 212
- RUDNICK, J., 90, 327
- RUIZ-LORENZO, J.J., 326
- running
 - coupling constant, **163**, 165
 - mass, 165
 - mass scale, **163**, 165
- RUVALDS, J., 29
- scale
 - parameter, dimensionless, 163, 165
 - transformation, **91**, 93, 94
 - technical, 97
 - transformations, **91**
- scaling
 - approach, 174, 365
 - behavior, 3
 - trivial, 165
 - relations
 - above T_c , 8
 - below T_c , 177
 - Griffith, 180
 - Widom, 180
- SCHLOMS, R., 31
- SCHULTE-FROHLINDE, V., 30, 272, 285, 313, 327, 362, 363, 407, 427
- Schwinger's proper time representation, 106
- second-order phase transition, 1
 - Landau theory, 1, **9**
- self-consistency relation, 368
- self-consistent ω , 337, 367–370
- self-energy
 - chain of diagrams, 56
- SENEOR, R., 303
- SENGERS, J.V., 28
- SHALAYEV, B.N., 30, 327
- SHIRKOV, D.V., 154, 196, 302, 303, 313, 428
- SHORE, G.M., 313
- short-distance behavior, 185
- shrunk diagram, 186
- SIGGIA, E.D., 31
- SIMON, B., 426
- simple loop integral, 226
- singularities, confluent, **336**, **395**, 400
- skeleton diagram, 131
- SMIRNOV, V.A., 225
- SOKAL, A.D., 408
- SOKOLOV, A.I., 30, 327, 369, 406, 409
- special triangle rule, **235**
- specific heat, 176
- SPEER, E.R., 129, 154, 196
- spherical model, 8, **14**, 364
- spontaneous
 - magnetization, 2, 3, 5, 9–11, 177
 - symmetry breakdown, **2**, 64
- stability, fixed point, **169**, 175, 183, 184, 320
- STANLEY, H.E., 27, 408
- star diagram, 242, **242**
- star-triangle rule, 243
- STEPANENKO, A.A., 363

- stiffness, 13, 20
- Stirling formula, 288, 289, 412, 414, 415
- STRICKER, D.A., 29, 408, 426
- STRÖSSER, M., 31, 185
- strong-coupling
 - behavior, 296, **296**
 - expansion, **300**, 328, 331, 374
 - limit, 328, 329, **335**, 365
 - parameter, **298**, 302
 - theory, 328
 - in $4-\varepsilon$ dimensions, 337, 346
 - in $D = 3$ dimensions, 367, 382
 - large-order, 391
- structure factor, 3
 - dynamic, 27
- subdiagram,
 - contracted, **210**
 - IR-divergent, **209**, 211
 - proper, 186
 - UV-divergent, 186
- subdivergence, 131
 - diagrammatic subtraction, 151, **187**
 - infrared, 207, 212
 - infrared, **200**
- subtracted diagram, 210
- subtraction method, 130
 - minimal, 108, 143, 158, 160, 161, 174
 - modified, 143, **230**
 - recursive, 186
 - UV and IR, 212
- subtraction of subdivergences,
 - diagrammatic, 151, **187**, 207, 212
 - infrared, 207, 212
- summation convention
 - Einstein, 61
- sunset diagram, **115**, 117
- superficial
 - degree of divergence, **131**, 194
 - infrared, **198**, 199
 - divergence, **131**, 133
 - IR-divergence, 213
 - pole term, 150
- superfluid density, 7
- SURGULADZE, L.R., 253
- susceptibility, 5, 10, 176, 179
- SUZUKI, H., 361, 362
- SWANSON, D.R., 28, 29, 408, 426
- SYMANZIK, K., 185
- symbols, Pochhammer, 297, 299
- symmetry
 - breakdown, spontaneous, **2**, 64
 - factors, 77, **79**, 81
 - four-point diagram, 89
 - $O(N)$ -cubic symmetry, **84**
 - $O(N)$ -symmetry, **81**
 - two-point diagram, 88
 - vacuum diagram, 88
 - tensor, 314
- tables for Feynman integrals, 246
- tadpole, 191
 - diagram, 107, **191**
 - massless, **107**, 207
 - part, **191**, 254
 - R -operation for, 191
- TALAPOV, A.L., 408
- TARASOV, O.V., 303, 313, 407
- technical
 - dimension, **91**, 165, 237
 - scale transformations, 97
- temperature,
 - critical, 1
 - Curie, 2, 15
 - Ginzburg, **19**, 378
 - Kleinert, **21**, 378
- tensor
 - coupling, **32**
 - factor, 80
- theorem,
 - Darboux, 293
 - Nambu-Goldstone, **4**, **11**, 179
 - power counting, **131**, 133
 - Weinberg-Dyson, 131
- theory,
 - critical, 193

- molecular-field, 9
- renormalized, 141
- Van der Waals, 9
- thermodynamic limit, **59**
- THOMS, S., 30, 302, 327
- 'T HOOFT, G., 30, 129, 155, 185, 428
- THOULESS, D., 28, 362
- three-point function, 71
- TICEMBAL, E.H., 361
- TKACHOV, F.V., 30, 225, 253, 285, 407, 428
- TOLEDANO, J.-C., 30, 90, 326, 429
- TOLEDANO, P., 30, 90, 326, 429
- topologically equivalent lines, **50**, 257, 262
- TOULOUSE, G., 326
- transformation,
 - Borel, 291, 294
 - Borel-Leroy, 293, 294, 297, 298
 - duality, 241
 - hyper-Borel, **410–412**
 - of diagram indices, 245
 - scale, **91**
- transition
 - phase, 1
 - phase, first-order, 1, 9
 - phase, second-order, 1
- transition,
 - lambda, 5, 15
- translational invariance of functional matrix, 37
- tree diagrams, 73
- triangle rule, **235**, **236**
 - general, **236**
- triangle-star rule, 243
- TRICOMI, F.G., 303
- TRIMPER, S., 90
- trivial
 - fixed point, 169
 - scaling behavior, 165
- truncated zeta function, **229**, 252
- TSYPIN, M.M., 409
- TURBINER, A.V., 361
- two-point
 - diagram, **49**, 56, 133, 254, 257
 - in dimensional regularization, 112
 - symmetry factors, **88**
- function, 57, 62, 273
 - connected, 71
 - diagrammatic expansion of, 49
 - free, 36, **52**
- vertex function, **135**, 138
- ultraviolet
 - cutoff, **23**, 102
 - disjoint subdiagrams, 187
 - divergences, 102, 186, 207
 - of subdiagrams, 186
 - superficial degree, 131
 - stable fixed point, **169**
- uniqueness, method of, 26
- universal behavior, 4
- universality, 4, 354
- upper critical dimension, **20**, 24, 133
- USHVERIDZE, A.G., 361
- UV, *see* ultraviolet
- vacuum
 - components of diagrams, 48
 - diagram, **47**, 172, 257
 - actor, 88
 - cancellation, 48
 - dimensional regularization, 120
 - generating functional, 64
 - energy, 172, **173**
 - renormalization constant for, 284
 - renormalization group function, 173
- VAINSHTEIN, A.I., 303
- VAN DEN BOSSCHE, B., 30, 31, 362
- VAN HOVE, L., 28
- Van der Waals theory, 9
- variational perturbation theory, 328
- variational resummation, 396
- VARNASHEV, K.B., 326
- VASIL'EV, A.N., 363, 407
- vector index, **196**, 204
- Veltman's formula, 107, 226
- VELTMAN, M., 30, 129, 155, 428

- vertex, 42
 - ideal, 243
 - identical permutations, **44**, 255
 - insertion, 194
- vertex function, 70
 - generating functional for, 69
 - proper, **55**, 57, 70, 164
- vertex,
 - virtual, **198**, 199, 201, 209
- VICARI, E., 326, 362, 408, 409, 427
- VILLARS, F., 129
- virtual vertex, **198**, 199, 201, 209
- VLADIMIROV, A.A., 155, 225

- WALLACE, D.J., 31, 90, 313, 326, 327
- Ward identity, **95**, 132
 - anomaly in, 97
- WARD, J.C., 154
- WATSON, G.N., 303
- wave function, renormalized, 135, **136**
- weak-coupling expansion, 328
- WEGNER, F.J., 31, 362, 363
- WEIGEL, M., 409
- weight factor, **43**, 254
 - of counterterms, 141
- WEINBERG, S., 154, 155, 185
- Weinberg-Dyson convergence theorem, 131
- Wick
 - rotation, 23
 - rule, 262
- Widom scaling relation, 180
- WIDOM, B., 29
- WILLIAMSON, P.R., 29, 408, 426
- WILSON, K.G., 28, 30, 31, 128, 129, 185
- WORTIS, M., 409, 427
- WU, T.T., 426

- YAVORSKII, T., 326

- zero mass,
 - field renormalization for, 204
 - tadpole, 207
- zero-temperature coherence length, 17

- zeta function
 - Riemanns, 228
 - truncated, **229**, 252
- ZIA, R.K.P., 31, 326
- ZIMMERMANN, W., 154, 196
- ZINN-JUSTIN, J., 28, 90, 101, 154, 185, 302, 303, 313, 327, 362, 407, 408, 427, 429
- ZUBER, J.-B., 129, 154, 196, 407