

Index

- Δ_{\pm} -distributions, 39, 44
- K/π -ratio, 227
- S -operator, 33, 38
- β -function, 85, 407
- δ -distribution, 39, 45, 50
- η' -puzzle, 261
- κ -method for analytic λ -calculations, 350, 363
- λ -measure, generalised rapidity, 270, 298, 347, 350, 384
- ρ -trajectory, 190, 347
- a , a^* -operators, 29
- a -parameter in the Lund model, 151, 166, 178, 190, 239, 347
- b -parameter in the Lund model, 151, 178, 192, 196, 197, 199, 205, 347
- n -particle phase space, 62, 178, 181, 192
- Aharanov-Bohm effect, 202
- Amati-Fubini-Stanghellini (AFS) model, 183
- Anomalous dimensions of QCD, 270, 352, 391, 407, 410
- Antenna pattern, 314, 320
- Area interpretation of the decay formulas, 153, 158, 178, 192
- ARIADNE, Monte Carlo program for the DCM, 318, 320, 321, 325, 337, 339, 340, 346, 349, 356, 363, 381, 391, 424, 432, 433, 441
- Artru-Menessier-Bowler model, AMB, 159, 238, 322, 343
- Attractive fixed point, 88
- Baryon fragmentation, 423
- Baryon production, 234, 241, 298, 344
- BFKL mechanism, 401
- Bohr radius, 20, 98
- Bowler's area suppression, 236, 237
- Breit frame, 307
- Breit-Wigner form factor, 240, 259
- Brownian motion, 189, 213, 219, 389
- Callan-Symanzik equation, 85, 351, 365, 398, 400, 407
- Casimir effect, 37
- Causal dependence region of MRS, 278
- Causality, 16, 18, 42, 108, 121, 135, 146, 430
- Centre-of-mass system, cms, 16
- Chaotic limit, 252
- Classical electron radius, 25
- Classical turning point, 116
- Coherence, gluon bremsstrahlung, 292, 303
- Coherent limit, 253
- Coherent states, 40, 118, 253
- Color charges, 114, 134, 283, 329, 345, 346
- Color-flow direction, 282
- Commutator, Δ , 42
- Compton wavelength, 25
- Confinement, 117, 126, 135, 146, 249
- Constituent and current quark, 225
- Cooper pair size, ξ , 127
- Coulomb potential, 97, 100
- Crossing symmetry, 73, 306, 406
- Current conservation, 70, 71
- Cut diagrams, 60, 77, 79
- Deep inelastic scattering, DIS, 106, 250, 392, 423
- DGLAP (Dokshitzer-Gribov-Lipatov-Altarelli-Parisi) equation, 400, 409
- Dielectrics, 19
- Dipole cascade model, DCM, 318, 320, 333, 352
- Dipole emission cross section, 307
- Dipole size, 326
- Dipole virtuality, 326
- Diquarks, 242, 246, 344
- Directrix curve, 276, 318, 328, 331, 333, 347, 349, 351
- DIS events on a valence constituent, 423, 430
- DIS events on an ocean constituent, 424, 432
- Discrete QCD, 376
- Distribution, test-function, 20, 42, 45

Index

469

- Dyson's propagator equation, 66, 75
- Elastic scattering, 16, 101
- Energy-momentum conservation, 146, 262
- Energy-momentum four-vector, 10
- Equation of motion for MRS, 269, 276
- Exclusive-inclusive formulas, 179
- External-part formulas, 158, 163
- Fermi motion, intrinsic transverse momentum, 429
- Fermi's Golden Rule, 50, 178
- Feynman path integrals, 221
- Feynman propagator, Δ_F , 42, 43, 46, 53, 131, 195, 240, 245, 260
- Feynman-Wilson gas, 193, 207
- Fine structure constant, 24
- Finite-energy cluster, 154
- Flavor generation, 213, 289
- Flux factor, 24, 50, 51, 95, 110
- Flux quantisation, 132
- Form factor, 101, 105, 240, 297
- Formation time, 144, 291
- Four-vectors, 9
- Fractal dimensions in QCD cascades, 351, 390
- Fragmentation function in the lund model, 151, 166, 177, 236, 289
- Fragmentation region, 169, 300
- Gain-loss equations, 86, 365
- Gauge invariance, 18, 71, 200, 203, 303, 306, 346
- Generalised Bessel functions \mathcal{I} and \mathcal{K} , 357, 374
- Gluon cascade, fluctuations, 334, 361
- Gluon cascade, self similarity, 331, 347
- Gluon emission process, 319, 328, 334, 338, 372
- Gluon fragmentation, Sjöstrand's, 288, 390
- Gluon model, the Lund, 269, 271
- Gluon phase space, generalised emission region, 325, 341, 342
- Gluon splitting process, 319, 338, 373
- Gluons in QCD, 8-charge, 318, 319
- Green's function method, 32, 358
- Gribov-Levin-Ruskin (GLR) model of shadowing, 400, 421
- Group velocity, 22
- Hagedorn spectrum, 161
- Hamilton's principle for the MRS, 281
- Hanbury-Brown-Twiss (HBT) effect, 249, 251
- Harmonic oscillator, 29, 97
- Heaviside distribution Θ , 33, 43
- Heavy flavor fragmentation, 234, 235
- Heisenberg, 13, 48, 195, 240, 245
- Helicity conservation, 69, 73
- Hotspots in the wave function of a hadron, 401, 422
- Hyperbola breakup, 166, 254, 270, 299
- Hyperbola relation between adjacent vertices, 136
- Ideal gas law for rapidity gas in the Lund model, 209
- Impact parameter, 22
- Impact parameter dual to transverse momentum, 186
- Indeterminacy relations, 13, 48, 195, 240
- Index of refraction, 21
- Infinite momentum frame, 52, 240
- Infrared stability, 24, 269, 284, 295
- Initial-state bremsstrahlung (ISB), 400
- Internal-part formulas, 158, 163
- Isospin, 112
- Isotropic emission, 255
- Iterative cascade fragmentation models, 141, 168, 169, 359
- Jet of flavor-connected hadrons, 138
- Källén-Lehmann representation, 61, 68
- KNO scaling, 350, 358
- Kramers-Kronig relations, 22, 61
- L*-method for analytic λ -calculations, 350, 352
- Langevin equation, 219, 389
- Leading-log approximation (LLA), 351, 397, 400
- Left-right symmetry of Lund fragmentation, 158
- Lightcone components, 12
- Lightcone physics, 108, 399, 400
- Lightcone singularities, 43
- Lightlike vector, 14
- Linked dipole chain (LDC) model, 3, 423, 440
- Lipatov results, 413
- Local conservation of quantum numbers, 147
- Local field, 42
- Local parton-hadron duality, 352, 386
- London equations, 129
- Lorentz boost, 7
- Lorentz contraction, 9, 23, 291, 427
- Lorentz covariance, 9, 69, 72, 121, 273, 331
- Main momentum transfer flow, Feynman graph relevance, 433
- Marchesini-Webber model, HERWIG, 318, 334, 337, 339, 340, 349
- Markovian stochastic process, 141
- Mass renormalisation, 24, 67
- Massless relativistic string, MRS, 114, 213, 269, 423, 425, 430

- Maxwell equations, 18
 Method of virtual quanta, 22, 93, 392
 Minimal surface property of MRS, 269, 281
 Minkowski space, 17
 Modified leading-log approximation (MLLA), 351, 373
 Moment method (MM) of Christ, Hasslacher and Mueller, 399, 403
 Momentum and period translation of the MRS, 123, 273
 Momentum transfer, 16
 Mother-daughter relation, 227
 Mott cross section, 100
 Multiperipheral diagrams, 172, 192
 Multiplicative renormalisation, 82
 Normal-ordering, 30
 Number of parameters of a model, 235, 244
 Ocean quarks, 112
 One-dimensional bag model, 229
 One-particle irreducible diagrams, 65
 Operator exponential, 31
 Operator product expansion (OPE), 399, 403
 Ordering variable, 321, 333, 346
 Ornstein-Uhlenbeck process, 219, 352, 389
 Partition function, statistical mechanics, 192, 207
 Parton model, 90, 302
 Partons as quarks, 111
 Penetration depth λ , 127
 Period of motion of the MRS, 120, 273
 Peterson formula, 234, 236, 240
 Phase-space triangle, 325, 341, 342, 352, 402
 Phase velocity, 21
 Plasma frequency, 21
 Poisson distribution, 32
 Polarisation, 249, 262
 Pomeron trajectory, 190
 Popcorn mechanism, 244
 Poynting vector, 21
 Proper time, 8, 288, 290
 relation to momentum transfer, 164, 172
 Pseudo-rapidity, 15
 Quarkonia decay, 270, 296
 Rank, for hadron in a cascade, 141, 147, 242
 Rapidity, 11, 270
 Rapidity density, 167
 Rapidity gaps, 175
 Rapidity plateau, 169
 Recoil problems, 319, 345, 370
 Kleiss' prescription, 345
 Reduced matrix element, 72, 102
 Regge theory, 177, 183, 189
 Regge trajectory, 177, 190, 239, 347
 Reggeon calculus, 185
 Renormalisable field theories, 59, 71
 Renormalisation group, 60, 83, 400, 407
 Rosenbluth formula, 105, 111
 Running coupling, 88, 89, 351, 398, 407
 in QCD, 374
 Rutherford scattering, 90, 95, 98
 Rydberg energy, 98
 Scalar quantum free field, 35
 Scalars, 9
 Scale breaking, 88, 399
 Scattering cross sections, 49, 103, 192
 Schwinger model, 117, 169, 171
 Self-energy contribution, 68
 Self-similarity, 331, 347, 390
 Sign-distribution, ϵ , 42
 Sjöstrand cascade, JETSET, 318, 334, 337, 339, 340, 342, 349
 Snow star curve, von Koch's, 390
 Soft and collinear gluon emission, 295, 327, 344
 Soft radiation model (SRM), 424, 434
 Spacelike difference between vertices, 137
 Spacelike vector, 15
 Space-time area, mass of the MRS, 120, 281
 Spectator relation, 171
 Sphericity, 293
 Spin-averaged matrix elements, 69, 72
 Spin-orbit coupling, 265
 Spin-spin interaction, 214, 228
 Splitting functions, 319, 334, 338, 339, 410
 State density, 36, 50, 52
 Strangeness, 112
 String effect, 290, 291, 319
 Strong angular ordering, 440
 Strong angular ordering condition, 303, 314, 319, 329, 331, 341, 344
 Structure functions, 110
 Sudakov form factor, 321, 340, 341
 Super-renormalisable field theories, 58
 Super-selection quantum numbers, 284
 Superconductor type I, 'bag-type', 128
 Superconductor type II, 'string type', 128
 Superconductors, 126
 The law of large numbers, 188
 Thomas precession, 265
 Thompson cross section, 25
 Thrust, 294
 Time dilation, 8, 403
 Time dilation of tension of the MRS, 126
 Time-ordering, 41

Index

471

- Timelike vector, 14
Transition rate, 50, 192
Transverse correlation length, 219
Transverse momentum generation, 213, 258, 262, 290
Tunnelling, 192, 193, 214, 242
UCLA model use of Lund fragmentation, 235, 247
Unitarity equations of the S -matrix, 177, 180, 183
Vacuum persistence probability, 195
Valence quarks, 112
Vector-to-pseudoscalar meson ratio, 214, 228
Velocity, 9
Vertex, for breakup of the MRS, 134
Vertex proper time, area, 142, 148
Virial expansion, 193
Volume momentum cutoff, 36, 49, 62, 118
Vortex line like the MRS, 132, 433, 435
Webber-Marchesini fragmentation model, 319, 342, 343
Weizsäcker-Williams method, 22
Wick's theorem, 41
Wilson phase operators, 192, 200
WKB approximation, 194
Wroblewski relation, 358
 x -curve, 351, 384
Yoyo-mode of the MRS, 114, 119, 146