

Subject Index

- B* meson 43
 - oscillation 74, 202
 - total decay rate 107
- B_s* meson
 - oscillation 70, 76, 93
- D* meson
 - oscillation 74
- K* meson
 - CP violation 203
 - decay asymmetry 196
 - oscillation 73, 199
- K* system 31
 - CP transformation 10
 - CP violation 10, 27, 30
 - decay matrix 32
 - mass matrix 32
- R* parity 306
- T*, dimensionless time variable 63
- A* term 239
- α , mixing parameter 60
- δ_ϵ , CP violation parameter 61
- ϵ , mixing parameter 60
- η_m , mixing parameter 59
- μ term 266
- θ term 19
- d_α , CP violation parameter 61
- p, q , mixing parameters 59

- Abundance
 - elements 244
 - light nuclei 245
- Adler-Bell-Jackiw anomaly 250
- Anapole moment 6, 211
- Anomaly 310
- Anomaly equations 250
- Anticounter 35
- Antigalaxies 244
- Antimatter 97
 - primordial 27, 244
- Antinuclei 244
- Antiparticle 45, 96, 97, 134
- Arrow of time 246
- Asymmetry
 - baryon 237, 243, 244, 281
 - lepton 281
 - matter-antimatter 97, 237
- Atom
 - Cs 6, 209
 - exotic 306
 - Tl 209
- Atomic nucleus
 - ²H 212
 - ³He 209
 - ¹¹⁸Sn 210
 - ¹³⁹La 210
 - ¹⁶⁵Ho 210, 212
 - ¹⁸F 211
 - ¹⁹⁹Hg 18, 209, 212
 - ⁵⁷Fe 16, 212
- Axion 21
 - invisible 21
 - mass 21
 - searches 21, 23

- B+L number violation 251
- Background radiation 27, 245
- Baryogenesis 237, 297
 - electroweak 255, 269, 275
 - GUT 277
 - local 269
 - nonlocal 269
- Baryon asymmetry 237
 - primordial 297
 - universe (BAU) 243, 244, 281
- Baryon number violation 28, 246
 - standard model 249

- Baryon-to-entropy ratio 274, 284
- beat frequency
 - $B^0\bar{B}^0$ 66
- Beon
 - *see* B meson 196
- Big bang 245, 297
- Boltzmann equation 244
- Boundary conditions
 - thermodynamic 259
- Brane 317
- Bubble nucleation 260

- Cabibbo angle 12, 47
- Charge
 - generalized 7
 - topological 252
- Charge conjugation 7, 9, 96
 - Dirac spinors 8
 - eigenvalue 7
 - eigenvector 7
 - particle-antiparticle system 8
- Charge parity 7
- Charginos 300
- Chemical potential 241
- Chern-Simons number 252, 254
- Chiral symmetry 314
- CKM, Cabibbo-Kobayashi-Maskawa matrix 11, 45, 202, 249
 - parameter α 51, 100, 133
 - parameter β 51, 99, 129, 183, 197
 - parameter γ 51, 132, 145
 - phase 46, 52, 275
 - unitarity 12, 46
- Cold neutrons 210
- Compactification radius 317
- Compound nucleus 211
- Conservation law 28
- Correlation
 - fivefold 210, 213
 - triple 210, 212
- Cosmological constant 239, 318
- CP asymmetry
 - B meson 197
- CP symmetry
 - conserved 101
- CP transformation 9
 - B system 98
 - K system 10
 - boson 9
 - eigenstates 98
 - particle-antiparticle system 10
- CP violation
 - B meson 202
 - B system 102
 - B_s system 117
 - K meson 203
 - K system 10, 27, 30, 102
 - baryogenesis 237
 - direct 31–33, 102, 103, 202
 - experiment 34, 37, 105
 - discovery 30
 - experiment 39
 - interference mixed/unmixed 103, 110
 - experiment 183
 - mixing 31
 - non-standard 263, 277
 - Higgs sector 263
 - minimal supersymmetry 266
 - oscillation 102, 106, 202
 - experiment 110
 - phase 32, 202
 - strong CP problem 19
 - supersymmetry 313
- CPT invariance 31, 57, 247
- CPT symmetry 200
- CPT theorem 19, 22, 29
 - consequences 23, 57
 - tests of 23
- Cross section
 - K^0 nucleon 131
 - coefficients 225
 - partial 225
 - total 223

- Dark energy 239
- Dark matter 306
- Decay asymmetry
 - K meson 196
- Decay rates
 - time dependent 201
- Decaying state
 - differential equation 197
- Density matrix 214, 216, 229
 - statistical 217
- Density operator 247
 - statistical 217, 231
- Detector

- KTeV 36
- NA48 34
- Early universe 254, 262, 281
- Eigenstates 10, 11
 - B meson 201
 - CP 29, 31, 98, 113, 129, 141
 - mass 11, 58, 115
 - T 14
 - weak 10, 11
- Einstein equations 238
 - with extra dimensions 318
- Electric dipole moment 4, 18, 20, 98, 207, 265
 - atom 6, 17, 209
 - neutron 6, 17, 207
 - upper limit 18, 207
- Electroweak symmetry breaking 299, 303
- Energy density 241
- Entropy density 241, 242
- Equation of state 239
- Equilibrium
 - local thermal 243, 255
 - thermal 243
- Equilibrium thermodynamics 241
- Extra dimensions 316
 - experimental tests 321
 - open problems 319
- FCNC, Flavour-Changing Neutral Currents 307
- Fermion masses 55
- Fine-tuning 300, 304
- Fivefold correlation 210, 213
- Flavour oscillation
 - mechanical analogon 65
- Flavour problem 307
- Flavour tagging 64
- flavour tagging 81, 147
- Forward scattering amplitude 210, 214
 - decomposition 227
 - spin-1/2 230
 - elastic 215
 - expansion coefficients 228
- Freeze out 244
- Friedmann equation 239, 240
- Gauge symmetry
 - electroweak 249
 - left-right symmetric 306
 - SO(10) 277
 - spontaneously broken 249
 - SU(5) 277
- Gauge theory
 - non-Abelian 294
- Gaugino 266
 - mass generation 310
- Gedanken-Experiment
 - Sakharov conditions 248
- GIM mechanism 310
- Gluinos 300
- Goldstone boson 299
- Goldstone theorem 314
- Gravitino 300
- GUT, Grand unified theories 277, 295
 - SO(10) 298
 - SU(5) 295
 - experimental tests 296
 - gauge boson 296
 - gauge coupling constant 295
 - scale 295
 - SO(10) 277
 - SU(5) 277
 - supersymmetric 302
 - unification scale 296
- Hamiltonian
 - two-particle 57
- Helmholtz free energy 257
- Hierarchy problem 299
 - technicolour 314
- Higgs field 55, 249
 - fermion coupling 55
 - mass 259
 - radiative correction 305
 - mechanism 303
 - potential 259
 - two doublet model 263, 303
- Higgs particle 299
- Higgs potential
 - classical 259
 - high temperatures 259
 - parameters 305
 - two doublet model 303
- Higgsino 275
- Hubble distance 238

- Hubble parameter 239, 243
- Ideal gas
 - distribution 241
- Inflation 241, 246, 280
- Instantons 253
- Interaction
 - milliweak 30
 - superweak 11, 30
 - T-odd QCD 19
- Interference technique 208
- Isotropic pressure 241

- Jarlskog parameter 49

- Kähler metrics 308
- Kaluza-Klein 318, 321
- KM, Kobayashi-Maskawa
 - mechanism 31, 237

- Larmor frequency 208
- Larmor precession 210
- Leptogenesis 284
- Lepton-number-to-entropy ratio 283

- Mach's principle 9
- Madison convention 232
- Majorana fields 287
- Majorana masses 266
- Majorana neutrino 281
- Mass matrix 55
- Mass scale
 - fundamental 319
- Matter-antimatter asymmetry 97, 237
- Microwave photon background 245
- Mirror
 - image 29
 - reflection 4
 - transition 198
- Mixing
 - K meson 200
 - p-wave 211
 - s- and d-wave 211
- Molecules
 - PbO 209
 - TIF 209
- Monopole problem 280

- Naturalness problem 299

- Neutralino 300, 306
- Neutrino
 - Dirac 249, 298
 - Majorana 238, 249, 277, 281
 - mass matrix 298
 - massive 298, 320
 - oscillation 281
 - right-handed 298
 - seesaw mechanism 281, 320
 - solar 281
- Neutron transmission 230
- Noether's theorem 250
- Nonequilibrium
 - thermal 243, 246, 255
 - thermodynamic 28
- Nucleosynthesis
 - primordial 245, 275
- Number density 241

- Operator
 - antiunitary 22
- Optical theorem
 - generalized 214, 217
- Oscillation (particle-antiparticle) 197
 - B meson 74, 202
 - B_s meson 76
 - D meson 74
 - K meson 73, 199
 - formalism 57, 197
 - mechanical analogon 65
- Out-of-equilibrium 281

- Parity 4, 96
 - eigenvalues 5
 - even, odd 17
 - intrinsic 5
 - spherical harmonics 6
 - spinors 6
- Parity violation 86
 - neutron scattering 6
 - proton proton scattering 6
- Particle-antiparticle conjugation
 - *see also* Charge conjugation 29
- PCAC, Partially conserved axial vector current 314
- Penguin diagram 100, 105, 135
- Phase
 - unobservable 52
- Phase convention 232

- Phase diagram 256
- Phase transition 256
 - electroweak 261, 262
 - first order 260
 - second order 261
- Photon temperature 242
- Planck mass 243
- Planck scale 317
- PNC, parity nonconserving 6
- Polarization geometry correlation
 - factors 225
 - matrix 230
- Polarization vector 230
- Proton decay 297

- QCD
 - θ term 19
 - anomaly 21
 - instanton 21
 - strong CP problem 19
 - sum rules 20
 - T-odd interaction 19
 - vacuum 20
- Quantum gravity 321
- Quark masses
 - generation 55
 - two equal 50

- Radiative correction
 - Higgs mass 305
- Radioactive ion beam 209
- Rare decay
 - supersymmetry 313
- Reflection probability 271, 273
- Robertson-Walker metric 239

- Sakharov conditions 246
- Schiff shielding 209
- Seesaw mechanism 281, 320
- Solar neutrino problem 281
- Space reflection 28
- Sphaleron 254, 261, 274
- Spinor transport 211
- Standard model 294
 - baryon number violation 249
 - beyond 294
 - extensions 262
- Standard Model of Cosmology 238, 240, 245, 246, 249

- Statistical tensor 217
- Storage bottles 209
- String theory 316
- Strong CP problem 19
- Super-heavy particles 276
- Supergravity 267, 300
- Superstrings 308
- Supersymmetric partner 300
 - mass spectrum 312
- Supersymmetry 262, 300
 - breaking 301
 - breaking scale 308
 - CP violation 313
 - experimental tests 306
 - Higgs sector 304
 - minimal (MSSM) 262
 - next-to-minimal 263
 - rare decay 313
 - soft breaking parameters 304
 - soft breaking scale 301

- T invariance 248
- T-matrix 215
 - partial wave expansion 219
 - relation to S-matrix 222
- Tagging, flavour 64
- tagging, flavour 81, 147
- Technicolour 313
 - extended 315
 - walking 316
- Techniquarks 315
- Temperature
 - critical 254, 257, 262, 276
 - photons 242
 - universe 242
- Time dependence
 - particle decay 197
- Time reversal 12, 29
 - Newton equation 12
 - electromagnetic transition multipoles 15
 - final state interactions 15, 16
 - invariance 14
 - Kramer’s theorem 15
 - null test 227
 - of Hermitian observable 14
 - Schrödinger equation 12
 - spherical harmonics 13
 - tests

- β decays 16
- γ transition 16
- detailed balance 17
- edm electric dipole moment 17
- neutron transmission 210
- nuclear physics 206
- principle of reciprocity 16
- resonance 212
- transmission 18
- Time reversal violation
 - P-even 212
 - P-odd 211
- Topological charge 252
- Transformation
 - antiunitary 12
 - CP *see also* CP transformation 9
 - discrete 29
 - non-unitary 4, 13
- Transition rates
 - B- and L-violating 254
 - time evolution 200
- Triple correlation 210, 212
- Uncertainty principle 208
- Unitarity triangle 48
 - area 50
- Universality 309
- Universe
 - big bang 27
 - dark matter 306
 - expanding 27
- Vacuum configurations 253
- Vacuum expectation value 257
 - Higgs field 55, 257, 267
- Vacuum structure 252
- Violation
 - B, L 297
 - baryon number 246
 - flavor symmetry 308
- Weak mixing angle 296
- Weyl fields 287
- Wu-Yang triangle 32