

Index

- α
- chain, 236–238
 - cluster, 96, 128, 160, 190, 197, 203, 224, 245, 262
 - clustering, 159, 184, 239
 - condensate, 238
 - correlation, 38, 90, 117, 122, 236, 237, 260
 - decay, 1, 2, 5, 6, 13, 29, 31, 33, 37–40, 43, 53, 58, 64, 71, 77, 90, 94, 99, 101, 103, 104, 107, 111, 112, 117, 122, 123, 128, 160, 166, 169, 172, 174, 183, 190, 194, 206, 208–210, 213, 214, 216, 219, 224, 227, 229, 231, 232, 235, 236, 238, 241, 246, 248, 250, 253, 255, 260, 264, 267, 269
 - emission, 138
 - emitter, 31, 32, 97, 98, 108, 113, 122, 174, 203, 210, 215, 217, 254–256
 - intensity, 65, 108, 109, 122, 127, 130
 - line, 6, 160, 224, 232, 233, 238
 - particle, 1, 6, 7, 11, 14, 29, 31, 43, 44, 47, 59, 73, 99, 113–115, 122, 128, 146, 153–155, 159, 160, 170, 172, 183, 184, 188–190, 194–200, 203, 206, 210, 223–225, 231, 234, 235, 237, 241, 243–247, 259, 260, 271–273
 - ray, 5
 - spectroscopy, 6
- β
- decay, 5, 7–9
 - line, 7
- particle, 54
- ray, 5
- γ
- decay, 5, 7–9
 - ray, 5, 132, 138
- A**
- Adiabatic
- approach, 77, 79, 82, 84, 89, 143
 - approximation, 84
 - assumption, 86
 - calculation, 84
 - case, 149
 - character, 148
 - coupled channels method, 84, 112
 - description, 77
 - limit, 80
 - method, 83
 - process, 167
- Amplitude
- preformation, 46–48, 77, 103, 156, 159, 160, 166, 171, 174, 176, 183, 184, 190, 204–206, 208, 210, 218, 223, 225, 226, 228, 232–234, 236, 238, 241, 243, 245–247, 259, 260, 261, 263, 271–273, 292
- Analytical
- continuation, 2, 68
 - continuation method, 68
 - formulas, 101
 - function, 68
 - method, 112
 - solution, 67, 264
 - version, 100
- Angular
- behaviour, 282
 - brackets, 188, 245

A (*cont.*)

- coordinate, 42, 85, 187, 286
- function, 87, 123, 133, 134, 145, 174
- integration, 187
- momentum, 4, 8, 13, 14, 16, 17, 23, 29, 50–53, 59, 61, 68, 80, 82, 86–88, 98, 101, 102, 109, 147, 169, 174, 178, 185, 187, 191, 195, 200, 205–207, 210, 229, 242, 246, 272, 280, 281, 286
- momentum coupling, 23, 185, 242
- momentum projection, 51, 87, 272, 286
- momentum projector, 52
- momentum recoupling, 187, 205
- relative motion, 24, 53, 56, 174, 264
- variable, 135, 178
- wave function, 73
- Antineutrino, 7–9
- Antisymmetric
 - character, 5
 - product, 188
- Antisymmetrization, 39, 159, 166, 183, 184, 200, 207, 243, 271
- Asymmetry
 - proton–neutron, 138, 251, 252
- Asymptotic
 - behaviour, 15, 159, 168, 229
 - channel velocity, 24, 273
 - configuration, 265
 - form, 57, 77, 84
 - regime, 167, 168
 - region, 84, 168
 - relation, 27
 - value, 168, 169
 - velocity, 15
- Asymptotics, 21, 22, 25, 40, 62, 287

B

- Bessel function, 16
- Blocking
 - effect, 46, 210
 - parameter, 33
- Bohr–Mottelson mode, 51
- Bohr–Oppenheimer method, 51, 99
- Bohr–Sommerfeld condition, 97–99
- Boson
 - approximation, 260
 - channel, 17
 - commutation rule, 185
 - emission, 42, 51, 53, 54, 58, 70, 77, 78
 - emitter, 13, 174
 - fragment, 73
 - pair, 238
 - wave function, 76

Bound

- configuration, 198
- fragment, 143
- state, 34, 66, 68, 164, 172, 173, 200
- weekly, 3
- Branching ratio, 82, 89
- Breit–Wigner theory, 6
- C**
- Cauchy theorem, 12
- Centrifugal
 - barrier, 82, 102, 116, 271
 - contribution, 101
 - factor, 29
 - term, 279
- Charge
 - asymmetry, 103
 - bare, 252
 - density, 275
 - detector, 138
 - effective, 9, 247
 - electric, 9
 - equilibrium, 103
 - number, 31, 32, 39, 117, 233, 273
 - proton, 275
- Clebsch–Gordan coefficient, 16, 57, 58, 113, 135, 205, 287
- Cluster
 - bound, 6
 - component, 71, 72, 160, 223, 228, 229
 - decay, 32, 38, 73, 76, 98, 99, 101, 102, 135, 160, 174, 210, 229, 259, 269
 - decay width, 101
 - deformation, 156
 - emission, 1, 32, 33, 37, 38, 40, 46, 47, 53, 99, 101, 152, 183, 209, 259, 264, 269
 - emitter, 263
 - energy, 149
 - expansion, 166
 - frequency, 227
 - model, 96–99, 128, 225
 - potential, 1, 37, 97, 99, 150, 230
 - preformation amplitude, 46, 183, 259
 - radioactivity, 39, 101, 104, 132
 - term, 160, 224, 233
 - wave function, 159, 226
- Clustering, 48, 159, 184, 187, 219, 223, 230, 238, 239
- Coherent state model, 52
- Collective
 - character, 200, 248
 - coordinate, 44
 - eigenstate, 200
 - excitation, 243

- model, 112
- pair, 199, 200
- pairing mode, 219
- process, 8
- rotation, 44, 51
- state, 250
- wave function, 282
- Complex
 - conjugate, 26
 - eigenvalue, 23
 - energy, 13, 20, 26, 150, 269
 - energy plane, 269
 - plane, 83, 160, 197, 223
 - pole, 20
 - quantity, 21
 - scaling method, 65
 - structure, 33, 44
 - value, 23, 25
- Computer code, 26, 65
- Coordinate
 - T* system of, 144
 - Y* system of, 144
 - absolute, 187
 - angular, 42, 85, 187, 286
 - center of mass, 47, 135, 195, 197, 200, 218, 219
 - charge asymmetry, 103
 - collective, 44, 73, 112, 130
 - core, 58
 - cylindrical, 99, 264, 265
 - daughter, 122, 184
 - hyperspherical, 144
 - internal, 23, 40, 45, 111, 113, 183, 243, 273
 - intrinsic, 122, 274
 - intrinsic system of, 43, 73–75, 85, 87, 133, 272, 280
 - Jacobi system of, 144, 218
 - Jacobi–Moshinsky, 184, 243, 244, 259
 - laboratory system of, 41, 52, 53, 85, 87, 111, 132, 148, 272, 280
 - mass, 103
 - Moshinsky, 184, 243, 244, 259
 - neutron, 85, 184
 - normalized, 148
 - proton, 189
 - proton–neutron, 47
 - quadrupole, 122, 130, 271
 - radial, 187, 200, 286
 - relative, 26, 48, 187, 189, 218
 - rotational, 40
 - spatial, 4, 167, 169, 228, 260
 - spherical, 14, 144, 149
 - spheroidal system of, 149, 286
 - spin, 4, 260
 - system of, 43, 52, 73, 85, 87, 133, 136, 144, 148, 272, 286, 287
 - vibrational, 85
- Coulomb
 - angle, 57
 - barrier, 1, 6, 11, 15, 34, 35, 63, 66, 68, 98, 107, 112, 133, 135, 138, 154, 168, 169, 191, 198, 199, 226, 241, 279
 - energy, 1, 100, 102
 - equation, 15
 - field, 63
 - force, 113, 133
 - function, 15–18, 28, 63, 70, 107, 160, 176, 223, 227, 228, 232–234, 236, 237, 272, 278, 280
 - interaction, 12, 14, 15, 17, 24, 43, 77, 152, 196, 274
 - irregular function, 247, 279
 - matrix, 65, 68
 - mean field, 183
 - outgoing wave, 25, 69
 - parameter, 24, 28–32, 35–37, 67, 77, 227, 228, 232–234, 236, 237, 272
 - penetrability, 28, 143, 176, 234
 - phase shift, 15
 - potential, 16, 23, 133, 149, 196, 275, 276
 - radius, 12, 23, 66, 107, 196, 226
 - regular function, 247, 279
 - repulsion, 1, 4, 209, 236, 247
 - term, 135, 233
 - wave, 66, 68, 279
- Coulomb–Hankel
 - asymptotic form, 60, 57
 - function, 28, 35, 36, 64, 175
 - wave, 66, 68, 279
 - wave function, 27
- Coupled channels
 - analysis, 122, 123
 - approach, 84, 111, 269
 - calculation, 79, 130
 - equations, 143, 146
 - estimate, 112
 - formalism, 83, 131
 - method, 61, 84, 112
 - procedure, 83
 - system, 2, 24, 71, 88
 - technique, 269
- Coupling
 - constant, 8, 123
 - Coriolis, 76, 86, 89
 - effect, 154
 - parameter, 128, 129
 - particle–vibration, 130
 - quadrupole, 287

C (*cont.*)

- scheme, 74, 185, 188
- spin-orbit, 265
- strong, 74, 112
- weak, 59

Cross section, 22

D

Decay

- β , 8
- constant, 25, 272
- double beta, 8
- electromagnetic, 123
- energy, 173, 180
- intensity, 6, 107, 112, 123
- law, 25
- mode, 101, 210
- probability, 56, 208
- process, 1, 5, 6, 8, 9, 12, 40, 45, 58, 94, 95, 111, 114, 116, 117, 143, 165, 166, 225–227, 243, 252–254
- property, 129, 154
- rate, 8, 167, 263
- rule, 28, 33
- state, 21
- theory, 176
- width, 2, 12, 19, 22, 25–28, 34, 45, 57, 64, 65, 68–71, 73, 76, 81–86, 88, 89, 93, 95, 96, 99, 115, 131, 135, 144, 145, 150, 159, 160, 165, 166–169, 171, 172, 176, 179, 184, 197, 223–225, 231–235, 241, 246, 247, 263, 272

Deformation

- angle, 90
- barrier, 233, 241, 247
- energy, 263, 266
- factor, 95, 152
- function, 233, 263
- hexadecapole, 135, 274
- nuclear, 58
- parameter, 52, 72, 80, 82, 113, 117, 121, 122, 138, 151, 214, 232, 234, 271
- prolate, 264
- quadrupole, 38, 59, 80, 86, 94, 108, 117, 118, 121, 151, 225, 232–234, 249, 255, 263, 274
- triaxial, 89, 90

Deformed

- approach, 94
- axially, 74, 77, 86, 113, 168
- band, 206
- barrier, 94, 98

- component, 24
- configuration, 286
- emitter, 64
- emitters, 17, 72, 83, 94, 176, 233
- field, 149
- Gamow state, 63
- interaction, 44, 56
- mean field, 78
- nuclei, 6, 13, 23, 46, 47, 64, 68, 69, 73, 83, 168, 203, 206, 269
- penetrability, 64
- penetration, 247
- potential, 54, 74, 77, 273, 288
- proton emitter, 64
- reduced width, 39, 64
- shape, 287
- shell model, 169
- spin-orbit, 44, 273
- spin-orbit formfactor, 83
- spin-orbit interaction, 78, 84, 277
- spin-orbit potential, 276, 277
- state, 204
- surface, 44, 63, 113, 275
- system of coordinate, 136, 287

Degree of freedom, 100

Deuteron, 3, 11

Diagonalisation

- basis, 71, 79, 84, 165, 174, 179, 199, 265
- method, 66
- procedure, 68, 69, 71, 80, 87, 179, 290

Diproton, 99, 144

Distorted wave

- approach, 2, 68, 69, 83
- channel, 69
- formula, 71, 73
- relation, 238, 244

Distribution

- angular, 27, 56, 58, 59, 146, 147, 150–152, 156, 168, 198, 201
- Boltzman, 110, 122
- density, 42, 152, 276
- energy, 154
- Fermi, 136, 274–276
- Gaussian, 114, 170
- initial, 217
- Lorentzian, 12, 165
- of fragments, 42, 136
- spatial, 169
- two proton, 144
- width, 154

Drip line

- neutron, 269
- proton, 82, 269

E

- Effective Liquid Drop Model, 102
- Eigenfunction, 83, 89, 265, 281, 290, 291
- Eigenstate, 25, 34, 52, 87, 123, 128, 167, 173, 185, 199, 241, 247
- Eigenvalue, 23, 61, 66, 68, 72, 88, 112, 134, 147, 154, 176, 179, 185, 188, 195, 200, 228, 290, 291
- Eigenvector, 243, 264, 265, 291
- Electro-weak emission, 7
- Electromagnetic
 - E2 rate, 123
 - quadrupole transition, 247
 - radiation, 5
 - transition, 9, 135, 138, 208, 247, 250, 253–255
- Electron
 - capture, 8
- Energy
 - time scale, 12
 - averaged, 146, 152
 - barrier, 28
 - binding, 3–7, 232, 271
 - channel, 24
 - correction, 100, 102
 - emission, 15, 27, 271
 - excitation, 7, 82, 100, 110, 115, 116, 122, 201, 241, 248, 249, 252, 253
 - ground state, 5, 7
 - kinetic, 7, 104, 152
 - level, 4, 265
 - macroscopic, 266
 - quartet, 200
 - quasiparticle, 204
 - range, 20, 110
 - shift, 19, 165, 173, 176, 179, 180, 181
 - single particle, 271
 - spectrum, 8, 108, 146
 - surface, 33, 103, 209, 210
 - value, 4, 22, 108, 152, 173, 203
 - vibration, 100
- Equipotential surface, 44
- Euler
 - angles, 43, 73, 74, 85, 132, 280
 - coordinate, 40, 85, 113
 - Gamma-function, 15
- Expectation value, 52

F

- Fermi
 - like shape, 42
 - distribution, 136, 274–276
 - golden rule, 159, 163, 165, 166
 - level, 80, 250

- surface, 46, 210, 250
- transition, 8, 9

Fermion

- emission, 17, 43, 51, 54–56, 70, 78
- formalism, 77
- motion, 55

Feshbach reaction theory, 144, 172, 263

Fine structure

- double, 42, 107, 132, 135, 136, 138
- single, 43, 107

Fission

- barrier, 100, 210
- barrier height, 100
- binary, 7
- cold, 7, 33, 39, 102, 104, 132, 133, 135, 138, 147, 151, 153, 183, 269
- model, 99, 210
- neutronless, 151
- super asymmetric, 99
- ternary, 2, 7, 132, 143, 146, 147, 261
- theory, 160

Force

- electromagnetic, 3
- nuclear, 3, 4, 20
- nucleon–nucleon, 112, 132
- pairing, 8
- residual, 159
- spin-orbit, 4
- strong, 3
- surface delta, 191
- two-nucleon, 219

Fourier transform, 12, 42

Fragmentation Theory, 103

Frequency

- angular, 207
- assault, 94, 100, 102, 104, 168, 272
- cluster, 227
- phonon, 131

Fundamental

- ingredient, 174
- solution, 62
- system, 62, 224

G

- G-matrix, 251
- Gamow–Teller transition, 8
- Gap
 - experimental, 251
 - pairing, 219
 - parameter, 204, 234
- Geiger–Nuttall law, 1, 6, 29
- Green
 - function, 69
 - operator, 172

G (*cont.*)

theorem, 178

Ground

band, 52, 73, 133, 206

state, 8, 58, 65, 73, 75, 79, 81, 82, 86, 88, 104, 107, 112, 123, 135, 147, 151, 195, 198, 200, 204, 208, 209, 211, 213, 215, 216, 218, 241, 243, 248, 250, 263, 282

H

Half life, 12, 25, 28–30, 33, 36, 45, 72, 79, 80, 82, 86, 100, 112–114, 116–118, 127, 132, 154, 155, 159, 214, 223, 267, 273

Hamiltonian

effective, 225

harmonic oscillator, 52

kernel, 231

operator, 225

triaxial, 87, 88

vibrational, 123

Harmonic oscillator, 35, 66, 69, 98, 115, 152, 154, 160, 174, 179, 180, 184, 223, 228, 230, 264, 271–273, 288, 290

Harmonics

angular, 74, 273, 282

core-angular, 2, 23, 24, 27, 51, 53–55, 96, 112, 113, 123, 173, 174, 177, 178

core-neutron-spin-orbit, 85

core-orbital, 74

core-spin-orbit, 55, 74, 87

hyperspherical, 2, 144, 145

orbital, 281

spherical, 9, 14, 24, 45, 58, 76, 113, 282

spheroidal, 2, 286

spin-orbital, 16, 24, 57, 70, 130, 281

vectorial, 277

Hermite function, 265

Hermitian, 26, 178, 207

Hindrance factor, 107, 109, 110, 123, 129, 200, 211, 247, 254

Hyperharmonics, 144

Hyperspherical

component, 2

I

Inertia coefficient, 102

Integral

action, 100, 101

double, 40

double folding, 1, 40–42, 45, 98, 99, 101, 112–114, 122, 132, 149, 210, 267

equation, 170

formula, 163

overlap, 47, 174, 183, 184, 186–191, 194, 197, 199, 231, 243, 245, 272

penetration, 91, 97, 102, 168

principal value of the, 173

residue of the, 173

sign, 180

surface, 71, 166

volume, 45, 46, 71, 99

WKB, 100, 104

Integration

backward, 62

condition, 61

forward, 61, 62

numerical, 2, 61, 65, 150, 190, 199

procedure, 61, 62, 65

Interaction

 α -core, 34, 59, 96, 98, 112, 113 α -daughter, 14, 115, 116, 122, 196, 227

attractive, 3, 127

Brink–Boecker, 201

central, 43, 77

channel, 191

core-proton, 74

Coriolis, 84, 86

distorted, 71

double folding, 41, 98, 99, 267

effective, 252

electro-weak, 9

energy, 101

expansion of the, 69, 76

inter-fragment, 111

internal, 67

isoscalar, 252

M3Y, 40, 45, 122, 149

monopole, 114, 122, 251

multipole–multipole, 43

non-local, 159

nuclear, 15, 17, 104, 149, 226

pairing, 5, 84, 219

parameter, 255, 256

particle, 52, 122, 185

core, 52, 98

particle–particle, 122, 185

particle–phonon, 132

phenomenological, 196

pocket-like, 115

pole-to-pole, 135

radius of the, 97

residual, 251, 255

spherical, 66

spheroidal, 287

spin-orbit, 43, 45, 77, 78, 80, 84, 276, 277, 283, 284

- strength, 192, 252
- strength parameter, 192, 251
- strong, 5, 7, 11, 73
- surface delta, 192
- total, 78
- triaxial, 45
- two-body, 40, 41, 191, 200, 225, 242, 251
- universal, 80
- weak, 5, 8, 9
- Woods–Saxon, 230
- Interpolation, 72
- Isomer, 217
- Isomeric state, 72, 82, 132, 210, 214
- Isospin
 - index, 4, 136
 - projection, 228, 235
 - space, 160, 224
- Isotope, 6, 7, 36, 83, 122, 138, 172, 214, 249, 252, 263
- Isotopic, 30, 36, 110, 132, 249
 - chain, 249
 - yields, 132
- L**
- Laguerre polynomial, 67, 233, 265, 272, 288
- Laplacian, 14
- Lepton, 8, 9
- Linear
 - ansatz, 108, 179
 - combination, 25
 - dependence, 36, 37, 237
 - fit, 35, 37, 38
 - function, 232
 - independent, 61
 - superposition, 62
 - system, 284, 285
 - term, 123
- Liquid
 - drop, 4, 136, 266
 - drop model, 33, 100, 102, 209, 210
 - drop picture, 209
- Logarithmic derivative, 18, 19, 175–177, 271
- M**
- Magic
 - nuclei, 4, 36
 - number, 101, 239
 - radioactivity, 6
- Mass
 - asymmetry, 33, 102, 103, 147, 264, 265
 - center of, 47, 135, 195, 197, 200, 218, 219
 - constant, 33, 102
 - density, 102
 - nucleon, 264
 - nucleonic, 145
 - number, 4, 38, 124, 234, 248, 255, 271
 - odd, 31, 33, 58, 73, 97, 98, 112, 210
 - parameter, 102, 104
 - reduced, 14, 111, 132, 146, 228, 272, 289
 - splitting, 103
- Matching
 - coefficient, 81
 - condition, 26, 46, 115, 150, 226
 - constant, 62, 63, 68, 70, 71, 77, 131
 - radius, 20, 66, 80, 83, 94, 115, 179, 224, 227, 233, 246, 247, 273
- Matrix
 - of outgoing solutions, 62
 - adiabatic, 148, 154
 - Coriolis, 84
 - correcting, 63
 - coupling, 53, 112, 134, 271
 - diagonal, 76, 80, 89, 129
 - element, 54, 70, 78, 113, 123, 131, 166, 171, 242, 247, 282, 283
 - equation, 242
 - factorization, 64
 - Fröman, 64, 94, 234, 247
 - Gamow, 62, 66
 - Hamiltonian, 67, 187
 - hermitean, 290
 - logarithmic derivative, 175–177
 - metric, 171, 186, 187, 192, 193, 200, 290, 292
 - multiplication, 285
 - notation, 61, 62
 - of coefficients, 8, 62
 - of initial conditions, 61, 62, 285
 - of solutions, 66
 - Pauli, 9
 - penetration, 94
 - propagator, 38, 62, 63, 80, 94, 284, 285
 - QRPA, 242
 - rotation, 280, 281
 - square, 284
 - symmetric, 291
 - system, 285
 - transposition, 290
 - unity, 56, 63
- Mean
 - error, 108
 - factor, 29
 - field, 4, 44, 52, 77, 99, 113, 138, 159, 183, 190, 209, 234, 264
 - square deviation, 253
 - value, 169, 201, 212, 214, 238
- Microscopic
 - amplitude, 226, 228

M (*cont.*)

- approach, 2, 47, 123, 159, 198, 210, 233
 - calculation, 128, 263
 - computation, 115
 - description, 39, 159, 229
 - emission theory, 163
 - estimate, 152, 210
 - evaluation, 174
 - part, 228
 - structure, 194, 200
 - theory, 174, 224
 - treatment, 146
 - way, 229
- Moment of inertia, 74
- Momentum
- space, 146
- Multi-step Shell Model, 159, 184, 185, 198
- Multipolarity, 8, 185, 192

N

- Neutrino, 8, 9
- Neutron

- less, 132
 - chain, 31, 160, 223, 232, 248
 - deficient, 122, 249
 - deficient isotope, 112, 122, 249
 - delayed emission, 54
 - density, 43, 136–138
 - diffusivity, 136, 138, 139
 - emission, 16, 24, 39, 40
 - even-, 51
 - excess, 136
 - excitation, 212
 - number, 4, 35, 99, 108, 109, 122, 236–239, 272
 - odd, 55, 86, 131
 - orbital, 115, 159
 - pair, 122, 160, 224, 259, 262
 - radius, 138
 - ratio, 251, 252
 - rich fragment, 152
 - rich nuclei, 7
 - shell, 196
 - skin parameter, 138
 - spectrum, 199
 - state, 85, 199
 - strength, 251, 254
 - system, 252
 - unpaired, 86
- Nilsson
- component, 82
 - model, 77, 80, 265
 - state, 210, 211, 214, 216
 - wave function, 53, 84

Non-adiabatic

- approach, 76, 84, 89
- coupled channels formalism, 83

Nuclear

- stability, 6
- surface, 1, 6, 39, 42, 63, 89, 107, 113, 114, 128, 131, 143, 144, 160, 166, 167, 169, 191, 194, 197, 200, 224–226, 228, 230, 274

Nuclei

- daughter, 1, 82, 84, 89, 101, 206, 218, 249, 251
 - even–even, 30, 31, 42, 52, 224, 235, 247, 254
 - exotic, 68
 - heavy, 11, 234
 - light, 190, 198
 - medium, 217
 - mother, 32
 - neutron rich, 7
 - odd–even, 73, 84, 86
 - odd–odd, 8, 84, 86
 - parent, 47, 101
 - proton rich, 6, 54
 - rotational, 108–110, 112, 117, 118, 123, 129
 - spherical, 13, 16, 168, 208
 - superdeformed, 206
 - superfluid, 208, 251
 - superheavy, 6, 99, 209, 210, 212–214, 269
 - transitional, 108, 109, 123, 124, 129, 253
 - transuranic, 4
 - triaxial, 45, 51, 87, 89, 90, 179
 - unstable, 6, 135
 - vibrational, 44, 111, 122, 129, 130, 241
- Numerov
- integration scheme, 284
 - method, 62, 284

O

Operator

- λ -pole, 44
- annihilation, 8
- antisymmetrisation, 166, 271
- boson, 52
- conjugate, 4, 244
- creation, 46, 47, 185, 186, 208, 244, 271
- differential, 44, 45, 277
- electric transition, 9
- evolution, 163
- excitation, 244
- Fermi transition, 9
- gradient, 27
- momentum, 276

- multipole, 44, 45, 74, 273, 283
 - pair, 241, 242, 271
 - particle, 8, 9, 203, 210, 244
 - permutation, 166, 272
 - phonon, 241, 242
 - potential, 26
 - projection, 172
 - propagator, 63
 - quadrupole, 123
 - quartet, 188, 194
 - quasiparticle, 203, 210, 244
 - rotation, 52
 - Schrödinger, 231
 - single particle, 8, 9
 - spin-orbit, 277
 - symmetry, 87
 - transition, 8, 9, 72, 166, 167, 173
 - unity, 9
- Optical model, 98
- Orbital
 - intrinsic, 83
 - lowest, 260
 - s-, 8
- Othogonality, 14
- Orthogonality Condition Model, 198
- P**
- Padé approximant, 68
- Parity, 11, 58, 77, 78, 88, 185, 210
- Partial
 - channel shift, 179
 - channels widths, 64
 - decay width, 27, 64, 65, 69, 73, 85, 107, 131, 135, 136, 166, 224
 - half life, 79, 80
 - quantities, 179
 - rotational width, 136
 - spherical waves, 204
 - spheroidal waves, 288
 - waves, 14, 69, 211, 288
 - width, 81, 88
 - yields, 136
- Pauli principle, 39, 47, 113, 133, 183, 200, 243
- Penetrability, 11, 19, 28, 31, 64, 104, 107, 128, 143, 176, 179, 197, 224, 234, 246, 272
- Perturbation, 73, 164
- Phase shift, 17, 18, 22
- Phenomenological
 - analysis, 229
 - ansatz, 112
 - approach, 96
 - component, 224, 229
 - counterpart, 159
 - description, 1, 11, 96, 198
 - method, 210
 - potential, 96
 - theory, 216
 - treatment, 198
- Pole, 20–22, 26, 176, 179
- Positron, 8, 11
- Potential
 - α -core, 34, 96, 112, 113
 - α -daughter, 116
 - axially symmetric, 286
 - barrier, 102
 - Bonn one-boson-exchange, 251
 - bound, 72
 - central, 16, 43, 78, 264, 282
 - cluster-core, 37, 99
 - cluster-daughter, 33
 - Coulomb, 16, 23, 133, 149, 196, 275, 276
 - deformed, 54, 74, 77, 273, 288
 - depth, 117
 - depth of the, 80, 83, 154, 265
 - double folding, 40, 42, 45, 101, 132
 - energy, 100, 263, 266, 267
 - energy surface, 33, 103, 209, 210
 - equivalent, 39, 195, 196, 200
 - fissioning, 170
 - fragmentation, 35–39
 - harmonic oscillator, 230
 - Hermitian, 178
 - inter-fragment, 1, 23, 24, 39, 96
 - interaction, 15, 40, 43
 - internal, 247
 - local, 1, 194, 196, 233
 - non-local, 39
 - nuclear, 43, 152, 156, 274
 - one center, 264
 - optical, 131
 - parameter, 117, 124, 248
 - particle, 82
 - picture, 39
 - pocket-like, 39, 116, 117, 136, 198, 267
 - proximity, 103, 104
 - radial, 104
 - repulsive, 113, 116, 133
 - selfconsistent, 5
 - semi-symmetric harmonic, 264
 - shifted, 73
 - single particle, 82
 - smooth, 264
 - spherical, 64, 98, 229, 273
 - spin-orbit, 276, 277
 - strength, 68
 - ternary, 149
 - two center, 264

P (*cont.*)

- two harmonic oscillator, 230
- two-body, 39, 154
- universal, 99
- valley, 209
- Woods–Saxon, 11, 71, 80, 86, 190, 199, 218, 229, 234, 250
- Yukawa, 40

Preformation

- amplitude, 46–48, 77, 103, 156, 159, 160, 166, 171, 174, 176, 183, 184, 190, 204, 205, 208, 218, 223, 225, 226, 228, 232, 234, 236, 238, 241, 243, 245, 246, 259, 260, 261, 263, 271–273, 293
- factor, 48, 112, 122, 160, 223, 228, 232, 234, 237, 260, 272
- probability, 93, 128, 159, 246

Proton

- delayed emission, 54
- emission, 2, 6, 11, 12, 29, 30, 39, 46, 54, 56, 71, 77, 80, 82, 84, 86, 89, 98, 130, 131, 143, 144, 167, 168, 174, 176, 180, 217, 269
- number, 232
- odd, 51
- radioactivity, 102, 269
- ratio, 251, 252
- shell, 71
- state, 199
- system, 6

Q

- Q -value, 1, 3, 5, 8, 12, 29, 34, 39, 57, 72, 80, 83, 96, 97, 101–103, 112–118, 122, 128, 133, 135, 143, 149, 152, 168, 266, 267, 271

Quantum

- description, 151
- mechanical rule, 246
- mechanics, 13
- number, 87, 88, 98, 99, 191, 229, 234, 265
- penetration, 13, 29
- physics, 22

- Quasiparticle Random Phase Approximation, 122, 160, 241

R

- R-matrix, 6, 17, 19, 24, 89, 144, 159, 174–178, 180, 269, 273
- Radioactive beam, 6, 269
- Radioactivity, 5
- Reaction
 - nuclear, 6, 172, 264

- theory, 159, 173, 269

Reduced

- half life, 29
- matrix element, 77, 247, 282, 283
- radius, 14, 15, 24, 53, 112, 144, 227, 273
- width, 19, 28, 33, 35–39, 64, 110, 122, 175, 177–179, 224, 271, 272

Relativistic Mean Field Theory, 210

- Repulsive core, 39, 61, 113, 116, 122, 127–129, 135, 149

Resonance

- α , 202
- α -like, 198
- decaying, 13, 26, 232
- energy, 13
- four-particle, 192
- Gamow, 1, 21, 160, 190, 193–195, 198, 223, 269
- giant, 160, 199, 223
- levels, 198
- many-body, 198
- narrow, 1, 20, 26, 71, 148, 159, 160, 223, 231, 269
- proton, 191, 200
- quartet, 200
- quasimolecular, 196, 198, 203
- single particle, 198, 199
- structure, 199, 202
- theory of nuclear, 6
- wide, 65
- width, 199

Resonant

- energy, 18, 81, 176, 179
- function, 83
- process, 13
- region, 68
- solution, 61
- state, 13, 20, 39, 66, 68, 97, 122, 135, 136, 138, 149, 150, 154, 155
- type, 23
- wave function, 69, 71, 145

Resonating Group Method, 198

Rose convention, 74, 280

- Rotational band, 51, 52, 54, 55, 73, 83, 85, 94, 138, 198, 290

Runge–Kutta method, 285

S

- S-matrix, 17–20, 22, 26, 63, 65, 176, 178, 179, 273
- Scalar product, 44, 288
- Scattering
 - α , 170, 190, 198, 200

- amplitude, 25, 28, 46, 63, 69, 70, 71, 79, 224, 272
- anomalous large angle, 190, 198
- data, 98, 196
- elastic, 201
- electron, 42, 260
- experiment, 152, 260
- heavy ion, 45
- of particle, 22
- process, 170
- region, 68
- state, 22, 173, 269
- theory, 13
- Schrödinger equation, 11, 13, 16, 17, 19, 23, 26, 28, 39, 68, 71, 72, 88, 97, 103, 132, 148, 150, 159, 163, 167, 169, 170–172, 177, 187, 190, 194, 245, 265, 286, 288
- Semiclassical
 - approach, 33, 93, 94
 - approximation, 100
 - method, 2
 - theory, 132
- Shell
 - closure, 99
 - correction, 100, 236
 - effects, 101, 103, 209, 266, 267
 - model
 - basis, 198
 - configuration, 263
 - continuum, 144
 - space, 159, 223, 231
- Single particle
 - basis, 190
 - component, 232
 - ho parameter, 234
 - level, 5, 264, 265
 - motion, 52
 - orbital, 8, 250
 - potential, 82
 - shell model, 169
 - spectrum, 199
 - state, 4, 47, 98, 195, 202, 265
 - wave function, 76, 159, 223, 272
- Spectroscopic
 - amplitude, 1, 46, 81, 86
 - factor, 6, 37, 45, 48, 86, 98, 114, 124, 128, 132, 196, 200, 203, 206, 239, 247, 263
 - measurement, 216
 - notation, 265, 266
 - property, 209
- Spin
 - coordinate, 4
 - function, 55, 282
 - high, 81, 210, 213–215, 217
 - initial, 11, 53, 59, 86, 88, 130
 - lepton, 8
 - odd, 203
 - orbital, 81
 - projection, 5, 46, 57, 59, 77, 85, 228, 229, 235, 272
 - singlet, 184
 - state, 84, 214
- Stability
 - line, 4
 - valley, 4, 5
- Standard
 - error, 29
 - model, 9
- Stationary
 - approach, 167
 - assumption, 167
 - equation, 13, 26, 132, 148, 170, 172, 228
 - form, 13
 - formalism, 39
 - process, 11, 13
 - state, 13
- Strength
 - attraction, 117
 - coupling, 127, 128
 - harmonic oscillator, 154
 - isoscalar, 200
 - isovector, 200
 - pairing, 251
 - parameter, 192, 251
 - proton–neutron, 251
 - quenching, 116, 117
 - repulsive, 116, 117, 128
 - vibrational, 130
- Strutinsky correction, 100
- Super Asymmetric Fission Model, 99
- Supersymmetric Two Center Shell Model, 267
- Symmetric
 - axial, 89
 - axially, 41, 51, 73, 87, 282, 286
 - pole, 21
- Symmetry
 - axial, 43, 113, 147
 - spherical, 167, 275
 - triaxial, 2
- Systematics, 29, 31, 72, 82, 114, 117, 123, 135

T

- Threshold, 68
- Time dependent, 11
 - approach, 159
- Triangle rule, 11
- Turning point, 97
- Two Center Shell Model, 33, 113,
160, 263, 264
- Two potential method, 72
- Two proton
 - emission, 6

U

- Uncertainty relation, 12
- Universal parametrisation, 82, 86,
190, 199, 218, 234,
250, 263

V

- Vibration
 - surface, 52
 - zero-point, 100
- Vibrational
 - core, 44
 - excitation, 51
 - mode, 44
 - sequence, 52
 - state, 44, 52, 54, 55, 104, 160
- Viola-Seaborg rule, 30, 32, 33

W

- Wigner function, 73, 74, 89, 113, 271
- Wildermuth rule, 99, 115

Y

- Yukawa term, 100