

Index

- abrikosov vortex lattice, 130
- AdS/CFT, 197
- anisotropic expansion, 86
- anti-ferromagnetic spin order, 264
- atom-dimer resonance, 65
- attractive polaron, 165
- band gap, 205
- band index, 204
- band mapping, 209
- band width, 210
- BCS limit, 183
- BCS theory, 175
- BCS-BEC crossover, 185
- BEC limit, 183
- Beliaev damping, 94
- Berezinskii–Kosterlitz–Thouless transition, 126
- Bethe–Ansatz solution, 100
- Bloch oscillation, 210
- Bloch wave function, 204
- Bogoliubov theory, 88
- Bose pair condensate, 75
- Bose–Einstein condensation, 74
- Bragg spectroscopy, 96
- breathing mode, 86
- bulk-edge correspondence, 230
- Chandrasekhar–Clogston limit, 181
- charge density wave, 270
- charge gap, 205
- Chern number, 123
- clock states, 9
- closed channel, 49
- compressional mode, 86
- condensate fraction, 77
- condensate wave function, 77
- confinement induced resonance, 58
- contact, 179
- continuity equation, 80
- continuous scaling symmetry, 62
- cooper problem, 173
- critical exponent, 250
- d-wave pairing, 183, 272
- D1, D2 lines, 7
- dark soliton, 120
- dark state, 27
- diffusion equation, 80
- dipole mode, 85
- Dirac monopole, 144
- Dirac point, 215
- direct band gap, 207
- discrete scaling symmetry, 63
- dynamic structure factor, 97
- dynamical critical exponent, 250
- dynamical gauge field, 240
- effective Floquet Hamiltonian, 238
- effective mass, 162
- effective range, 33
- Efimov effect, 63
- Efimovian expansion, 64
- eigenstate thermalization hypothesis, 275
- emergent symmetry, 256
- Fermi liquid parameters, 162
- Fermi polaron, 163
- Fermi surface, 161
- Fermi surface nesting (see also 7.5), 245, 265
- Fermi surface nesting (see also 8.2), 265
- Fermi surface nesting (see also 8.2), 245
- Fermi’s pseudo-potential, 41
- ferromagnetic state, 136
- Feshbach resonance, 49
- first Brillouin zone, 204
- Floquet theory, 236
- free particle limit, 204
- Goldstone mode, 81
- Gross–Pitaevskii equation, 79
- Gutzwiller projection, 273
- Haldane model, 224

- half vortex, 141
- Hanbury–Brown–Twiss effect, 113
- healing length, 90
- Higgs mechanism, 257
- Higgs mode, 257
- high temperature expansion, 65
- hole excitation (see also 5.1), 155, 249
- hole excitation (See also 8.1), 155, 249
- holographic duality, 197
- homotopy group, 122
- Hopf map, 123, 231
- Hubbard model, 211
- Hund’s rule, 5
- hydrodynamic equation, 79
- indirect band gap, 207
- infrared divergence (see also Sec. 3.4), 43, 99
- itinerant ferromagnetism, 272
- Josephson effect, 105
- Kondo physics, 48
- Landau criterion, 83
- Landau damping, 94
- Landau Fermi liquid, 161
- Langevin force, 243
- Laser cooling, 20
- Lee–Huang–Yang correction, 90
- Levinson’s theorem, 37
- light-induced Zeeman energy, 21
- linking number, 231
- local density approximation, 84
- LS coupling, 6
- macroscopic quantum tunneling, 115
- magnetic trapping, 12
- Majorana stellar representation, 132
- Majorana transition, 14
- many-body localizations, 276
- maximally localized Wannier wave function, 206
- Mermin–Ho vortex, 140
- micromotion term, 237
- mixed dimension, 61
- momentum mapping, 208
- monopole, 141
- Mott insulator (see also 8.2), 249, 266
- narrow resonance, 54
- Newton equation, 79
- Nozières–Schmitt-Rink approach, 192
- off-diagonal long-range order, 75
- one-dimensional scattering length, 59
- open channel, 49
- optical clock, 9
- optical Feshbach resonance, 56
- optical lattices, 19
- optical trap, 19
- orbital Feshbach resonance, 58
- order by disorder, 92
- pairing symmetry, 182
- particle excitation (see also 5.1), 155, 249
- particle excitation (see also 8.1), 155, 249
- particle-hole symmetric point, 249
- particle-hole transformation, 262
- Peierls substitution, 235
- phase shift, 33
- phase slip, 120
- polar condensate, 137
- quadratic Zeeman effect, 11
- quadrupole mode, 85
- quantized conductance, 162
- quantum anomalous Hall effect, 230
- quantum defect, 5
- quantum depletion, 90
- quantum measurement, 110
- quantum phase transition (see also Sec. 7.5), 243, 249
- quantum point contact, 159
- quantum simulation, 212
- quantum thermalization, 274
- quasi-energy, 236
- quasi-momentum, 204
- quasi-particle, 90
- quasi-particle lifetime, 94
- quasi-particle residue, 161
- quench dynamics, 231
- radio-frequency spectroscopy, 168
- Raman spectroscopy, 168
- rényi entropy, 280
- renormalizable contact potential, 41
- renormalization, 43
- repulsive polaron, 165
- roton, 151
- scalar light shift, 18
- scale invariant quantum gases, 102
- scattering amplitude, 37
- scattering cross-section, 37
- scattering length, 33
- scattering resonance, 37
- scattering volume, 34
- schrödinger Cat state, 115
- Schwinger–Dyson equation, 42
- screening effect, 5
- self-consistent mean-field theory, 175
- self-energy, 163
- self-trapping, 106
- semimetal, 217
- shallow bound state, 36
- shape resonance, 54

- singlet pair condensate, 137
- skyrmion, 143
- soliton mass, 121
- sound velocity, 80
- spin density wave, 264
- spin exchanging scattering, 48
- spin healing length, 140
- spin vortex, 139
- stimulated Raman adiabatic passage (STIRAP), 26
- stripe phase, 148
- SU(N) symmetric interaction, 45
- Su–Schrieffer–Heeger model, 221
- super-exchange, 266
- superfluid critical velocity, 82
- superfluidity, 82
- superradiant transition, 243
- surface mode, 85
- symmetry breaking, 114
- symmetry protected topological phases, 223
- symmetry protection, 220
- synthetic gauge field, 12
- synthetic magnetic field, 14
- synthetic spin-orbit coupling, 22
- term-diagram, 4
- Thomas–Fermi distribution, 84
- Thouless criterion, 191
- three-atom resonance, 65
- time-of-flight, 76
- Tonks–Girardeau gas, 103
- topological band insulator, 229
- topological defect, 126
- topological phase transition, 127
- two-channel model, 54
- two-fluid hydrodynamics, 87
- two-terminal transport, 158
- ultraviolet divergence, 42
- universality, 34
- upper branch, 68
- vacuum energy, 91
- vacuum polarization, 93
- Van Hove singularity, 208
- vector light shift, 20
- virial coefficient, 66
- volume law of entanglement entropy, 276
- Wannier wave function, 206
- wave equation, 80
- Weyl point, 219
- wide resonance, 54
- winding number, 123
- zero-energy edge mode, 230