Index

II–VI semiconductor nanocrystals, 186, 207
II–VI semiconductors, 206
absorption in single QDs, 71
adiabatic transition, 287
AlGaInAs QDs, 7
annealing, 11, 14, 347
anti-ferromagnetic spin alignment in a QD, 222
bias spectroscopy, 300
biexciton, 346
in QDs in nanowires, 32
in self-assembled QDs, 104, 320
bright excitons, 104, 122, 128, 248
carbon nanotubes, 279, 290
catalyst-assisted vapor–liquid–solid mechanism, 22
cavity
planar Fabry–Perot, 90
cavity feeding mechanism, 350
CdMnTe QDs, 207
CdSe QDs, 207
CdSe/ZnS core/shell nanocrystals, 186
CdSe/ZnS QDs, 193
CdTe QDs, 222
CdTe/ZnTe QDs, 208
central-spin problem, 273
charge sensing, 261
charge stability diagram, 263
charged exciton, 346
in a Mn-doped QD, 228
in QDs in nanowires, 27, 31
in self-assembled QDs, 71, 72, 230, 237
chemical beam epitaxy, 343
chemical vapor deposition, 23
coherent population trapping, 77
Coulomb blockade, 297, 300
Coulomb blockade spectroscopy, 261
Coulomb diamonds, 304
dark excitons, 122, 128, 230, 248
decoherence, 118, 319, 331, 336
dephasing, 64, 66, 69, 87, 88, 95, 105, 109, 110, 112, 331
excitation induced, 94, 106
non-exponential, 110
pure, 78, 110
diluted magnetic semiconductors, 221
direct excitons, 120
directed self-assembly technique, 341–344
double quantum dot, 279, 282, 283
double quantum dots, 255
droplet epitaxy method, 50
dynamic nuclear polarization, 241, 242
electric-dipole spin resonance, 271
electron beam lithography, 139, 158, 256, 258
electron cotunneling, 95, 299
electron spin resonance, 255, 269
electron tunneling, 267, 282
entangled light sources, 319, 320, 341
entangled photon pair generation, 23, 30, 32, 98, 144, 146, 319, 324, 330, 334
envelope-function approximation, 279
ferromagnetism of GaMnAs, 222
fine structure splitting, 10, 13, 32, 76, 104, 188, 320, 321, 327, 347
fluorescence, 206, 217
g-factor
hole, 124
in QD molecules, 123
in QDs in nanowires, 25
GaAs QDs, 51
GaMnAs, 221
graphene, 279, 290, 296
Hanbury Brown–Twiss experiment, 174
Hanle effect, 250
Hanle experiment, 211
heavy hole, 64, 66, 67, 122
homogeneous broadening, 10, 187
Hong–Ou–Mandel two-photon interference, 98
hyperfine constant
for electrons, 248
for holes, 248
in-situ lithography, 139, 141, 146
InAs QDs, 45, 106, 119, 144, 153, 222, 238
InAs/GaAs QDs, 242
InAs/InP QDs, 49, 341, 344
InAsP QDs in InP nanowires, 23
indirect excitons, 120
indium flush method, 47
InGaAs QDs, 6, 143, 154, 177, 326
inhomogeneous broadening, 6, 15, 16, 73, 119, 207
interaction
anisotropic hyperfine, 278
contact hyperfine, 241, 243, 279
dipole–dipole, 280
dipole–dipole hyperfine, 66, 241, 244
electron–hole exchange, 10, 13, 32, 76, 104, 122
exciton–phonon, 104, 110
hole–Mn exchange, 206
hyperfine, 64, 97, 237, 240, 266, 277, 332, 334
hyperfine for holes, 66, 79, 97, 118
hyperfine in carbon nanotubes, 290
hyperfine in graphene, 291
nuclear–nuclear, 280
orbital hyperfine, 279
p–d exchange, 232
quadrupolar, 281
sp–d, 207
sp–d exchange, 222
spin–orbit, 65, 122, 127
interdiffusion, 214
intermixing, 11, 49, 52, 335
Jaynes–Cummings Hamiltonian, 156
Knight field, 241, 273
Landau levels, 303
Landau–Zener interferometry, 271
light hole, 64, 122
light-matter interaction, 137, 153, 196
line dragging, 97, 249
magneto-photoluminescence, 223
in QDs in nanowires, 25, 27
mechanical exfoliation of graphene, 297
metal organic chemical vapor deposition, 16, 22
metallic nanostructures, 188
micro-photoluminescence, 221, 345
microcavity, 322, 341
micromachined, 169
micropillar cavities, 139, 142, 169, 181
Mn doping of III–V semiconductor dots, 223
molecular beam epitaxy, 6, 106, 119, 154, 223, 256, 222
Mollow sideband, 92, 96
nanoantenna effect, 188
nanocrystals, 185
nanorods, 186, 187
non-classical light, 164, 165, 171, 341, 342
nuclear magnetic resonance, 240, 273
nuclear spin bi-stability, 246
nuclear spin polarization, 97
nuclear spins, 64, 96, 237, 265, 279, 332
optical cavity, 137
quality factor, 138, 145, 177, 341
optical selection rules, 63, 122, 187, 238, 320
optical transition
diagonal, 67, 97
Overhauser field, 65, 241, 265, 285, 332
photo-induced circular dichroism, 240, 244
photocurrent, 105, 108
photolithography, 139, 257, 258
photoluminescence, 6, 25, 70, 98, 119, 139, 162, 193, 206, 238
photon anti-bunching, 89, 164, 165, 332
photon blockade, 165
photon correlation, 143, 147, 169, 170, 176, 179, 323
photon counting, 175
photon statistics, 157, 172
photon-induced tunneling, 165
photonic band gap, 154
photonic crystal cavity, 139, 155, 157, 348
photonic crystals, 153, 154, 169
plasmon, 185, 189
propagation length, 192
plasmon polaritons, 189, 197
pump-probe method, 240, 244
Purcell effect, 137, 141, 144, 342, 349
Purcell factor, 148, 341
QD lasers, 6, 169
QD micropillar lasers, 176
quantum cryptography, 63
quantum dash, 17
quantum dots (QDs)
colloidal, 185, 187, 191
electrostatically defined, 63
graphene, 296, 299
interface fluctuation, 239
magnetic, 207
self-assembled, 3, 5, 27, 55, 63, 154, 177, 207, 221, 342
quantum information processing, 63, 73, 87, 98, 137, 153, 166, 205, 255, 281, 319, 341, 351
quantum key distribution, 319, 341
quantum non-demolition measurement, 164
quantum optics, 86
qubit, 103
do coherence, 103, 288
Rabi frequency, 91, 113, 162
Rabi oscillations, 93, 103, 110, 269
Rabi splitting, 162, 195
resonance fluorescence, 86, 89
rf-reflectometry, 260, 262
scanning tunneling microscopy, 222
Schottky structure, 70, 95, 106, 228
selective area epitaxy, 342
single photon sources, 138, 142
single-photon counting, 91
singlet–triplet mixing, 285
singlet–triplet qubit, 255
singlet–triplet relaxation time, 265
singlet–triplet splitting, 258, 264
site-controlled dots, 342
spin
A system, 68
blockade, 266, 269, 283
cohherence, 63, 64, 79, 243, 255
decohherence, 211, 237, 242, 243, 245, 265, 282
dephasing, 64, 65, 67, 95, 211, 241, 243–245, 265
electron, 63, 95, 118
hole, 63, 64, 74, 118
initialization, 69, 74, 206, 210
of an individual magnetic atom, 205
relaxation, 65, 69, 209, 214
single shot read-out, 138
transport, 284
spin qubit, 63, 205, 269, 297
spin–to–charge conversion, 264
spintronics, 205
Stark shift, 327
in QDs in nanowires, 33
Stranski–Krastanov growth, 4, 21, 109, 119
strong coupling regime, 137, 143, 157, 162, 195
substrate rotation interruption, 223
temperature tuning
in photonic crystals, 159, 160
time-resolved optical spectroscopy, 104, 169, 175, 176, 181, 217
twinning superlattices in nanowires, 25
two-dimensional electron gas, 255, 282
two-level system, 103, 112, 118, 255, 263, 285, 287
ultra-fast optical spectroscopy, 106
weak-coupling regime, 157, 195
wet layer, 4, 9, 10, 45, 109, 119
Zeeman splitting, 68, 74, 123, 227, 239, 246, 258, 265, 285, 292, 307
giant, 207
in QDs in nanowires, 26