

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

- heavy-hole–light-hole mixing, 67, 79, 126, 131, 241, 248
- 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
- microdisks, 169
- micropillar cavities, 139, 142, 169, 181
- Mn doping of III–V semiconductor dots, 223
- molecular beam epitaxy, 6, 106, 119, 154, 223, 256, 322
- 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
 - decoherence, 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
 - Λ system, 68
 - blockade, 266, 269, 283
 - coherence, 63, 64, 79, 243, 255
 - decoherence, 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
- wetting 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