

Index

A

- Abbe diffraction limit, 530
- Abbe number, 161, 484
- ABCD matrix, 169, 493, 563
- aberration, 501
 - astigmatism, 503
 - chromatic, 161, 518
 - coma, 502
 - defocus, 89
 - distortion, 504
 - field curvature, 504
 - higher-order, 89, 124, 513
 - longitudinal, 123
 - lower-order, 89, 513
 - primary, 511
 - secondary, 511
 - spherical, 501
 - spherocylindric, 89, 513
 - transverse, 122
 - wavefront, 124, 506
- aberrometer, 121
 - Hartmann-Shack, 127
 - laser ray tracing, 131
 - Tscherning, 132
- aberrometry, 121
 - ingoing light, 126, 131
 - outgoing light, 126, 127
- aberroscope lens, 132
- ablation, 383
 - depth, 384, 432
 - photodecomposition, 383
 - photothermal, 384
 - plasma-induced, 384, 389, 460
 - profile, 433
 - rate, 439
- absolute defect, 348
- absorbance, 364, 373
- absorption, 374, 551
 - coefficient, 374, 413
 - length, 374
 - multiphoton, 375
 - one-photon, 374
 - two-photon, 375
- absorption coefficient
 - molar, 364
- accessible emission limits, 396
- accommodation, 21
 - amplitude, 22
 - range, 22
- achromat, 163
- adaption, 26
- advanced glycation end product, 366
- afocal, 501
- age-related macular degeneration
 - diagnosis, 320
 - dry, 60
 - treatment, 406
 - wet, 61
- age-related maculopathy, 60
- Airy disk, 527
- Airy pattern, 527
- albedo, 377
- ametropia, 50, 96
 - astigmatism, 51
 - axial-symmetric, 51
 - correction, 141, 446
- angiography, 242
 - autofluorescence, 244
 - fluorescein, 243
 - fluorescence, 242
 - indocyanine, 243
- angular frequency, 519
- aniseikonia, 54
- anisometropia, 54
- anterior chamber, 8
- anterior chamber angle, 58, 320, 458
- anterior segment, 4
- anti-reflection points, 240

- anti-vascular endothelial growth factor, 63, 380
 aperture, 496
 - numerical, 497, 530
 - stop, 496
 aplanatic, 503
 apochromat, 163
 apodization function, 509
 applanation tonometer, 211
 aqueous humor, 9
 arcuate keratectomy, 470, 472
 argon ion laser, 573
 ARM, 60
 arterioles, 363
 arterio-venous difference, 363
 A-scan, 278
 asphericity parameter, 39
 astigmatism, 51, 89, 503
 - against-the-rule, 52
 - compound, 53
 - diagnosis, 96, 102, 128
 - hyperopic, 53
 - irregular, 51
 - mixed, 53
 - myopic, 53
 - oblique, 52
 - regular, 51
 - treatment, 470, 472
 - with-the-rule, 52
 autocorrelation, 286, 542
 autofluorescence, 366
 automated objective refractometer, 100
 autorefractor, 100
 - adjustment, 101
 - best-focus method, 105
 - coincidence method, 107
 - fixation, 101
 - illumination, 100
 - image size method, 113
 - knife edge method, 114
 - measurement, 102
 - ray deflection method, 109
 - retinoscopy
 - method, 116
 - Scheiner method, 106
 - signal strength, 101
 avalanche ionization, 385
 axial curvature, 194
- B**
- back vertex power, 35, 141, 197
 Badal lens, 105, 113
 band model, 575
 bandwidth theorem, 542
 barrier band-pass filter, 243
 Bessel function, 528
 best corrected visual acuity, 345
 best-focus method, 105
 binocular vision, 30
 biometry
 - ultrasound, 326
 birefringence, 335, 522
 - form, 262
 blindness, 68
 blood flow mapping, 338, 363
 blow-off model, 384, 432
 blue filter imaging, 242
 bowl perimeter, 352
 Bowman's membrane, 4
 Brewster angle, 524
 broad-beam ablation technique, 437
 B-scan, 278
- C**
- calibration surface, 215
 capillary nonperfusion, 65
 capsulorhexis, 457
 - continuous circular, 471
 cataract, 56
 - laser-assisted surgery, 466
 - lens fragmentation, 472
 - secondary, 457
 - surgery, 223, 457, 471
 cavitation, 390
 chief ray, 498
 chirp, 394
 chirped pulse amplification, 394, 463
 choroid, 6
 - visualization, 243
 choroidal melanocytes, 413
 chromatic aberration, 161, 518
 chromophore, 10, 377, 413
 ciliary body, 6, 430
 ciliary muscle, 6
 clear corneal incisions, 472
 CNV, 61
 coagulation, 380
 coherence, 537, 551
 - length, 286, 537
 - time, 286, 537, 542
 coherence gating, 281
 coherent amplification, 553
 coincidence method, 107
 collagen fiber, 4
 collinear illumination, 174
 color perception, 45
 color temperature, 173

- color vision, 45
 - brightness, 46
 - hue, 46
 - saturation, 46
 - coma, 502
 - compact perimeter, 353
 - cones, 10, 45
 - operational range, 27
 - confocal imaging, 252
 - bright-field, 253
 - dark-field, 254
 - retro mode, 254
 - confocal scanning-laser ophthalmoscope, 250
 - acquisition, 255
 - dual display mode, 255
 - illumination, 250
 - imaging methods, 253
 - imaging modes, 253
 - observation, 251
 - resolution, 255, 256
 - sensitivity, 252
 - ultra-wide-field, 257
 - wide-field, 257
 - confocal scanning-laser tomograph, 259
 - data analysis, 260
 - functional principle, 259
 - mean reflectivity, 260
 - mean topography, 260
 - z profile, 259
 - conoid of Sturm, 52
 - contact lens, 141
 - contact tips, 426
 - convolution, 140
 - cornea, 4, 15
 - back vertex power, 35, 197
 - endothelium, 6
 - radius of curvature, 180
 - refractive power, 34, 223
 - shape reconstruction, 191
 - topography, 177
 - transmittance, 15
 - corneal collagen cross-linking, 56
 - corneal topographer, 178, 187
 - application, 187, 198
 - arc step algorithm, 193
 - corneal shape reconstruction, 191
 - curvature map, 194
 - functional principle, 188
 - history, 187
 - image acquisition, 190
 - large-target, 190
 - power map, 196
 - precision, 198
 - projection system, 189
 - ray-tracing refractive power map, 198
 - small-target, 190
 - surface elevation map, 194
 - cotton-wool spot, 65
 - coupled modes, 569
 - covering points, 240
 - cross-correlation, 140
 - cw laser, 567
 - cyclophotocoagulation, 430
 - endoscopic, 430
 - cyclotorsion, 445
- D**
- daylight vision, 11
 - densitometry, 225
 - deoxyhemoglobin, 377, 414
 - depth of field, 29, 158
 - depth of penetration, 374
 - thermal, 382
 - Descemet's membrane, 6
 - deviation plot, 355
 - diabetic retinopathy, 64
 - nonproliferative, 64
 - proliferative, 65
 - dichroism, 335
 - differential light sensitivity, 348
 - diffraction, 527
 - Fraunhofer, 527
 - Rayleigh's quarter wavelength rule, 438
 - diffuse illumination, 205
 - diode, 577
 - diode laser, 577
 - emission characteristics, 579
 - injection current, 578
 - diopter, 489
 - direct focal illumination, 205
 - direct ophthalmoscope, 227
 - field of view, 230
 - illumination, 228
 - magnification, 229
 - disk laser, 581
 - disk of least confusion, 52, 503
 - dispersion, 484
 - anomalous, 484
 - normal, 484
 - distortion, 504
 - barrel, 505
 - pincushion, 505
 - Doppler OCT, 336
 - Doppler shift, 336
 - drusen, 60
 - dual-beam interferometry, 327
 - challenges, 327

E

- edge detection, 190, 215
- edge illusion, 360
- efficiency
 - power-conversion, 561
 - pump, 561
 - quantum, 312
 - slope, 560
- eikonal, 521
- Einstein coefficient, 550
- Einstein model, 550
- emmetropia, 49
- endophotocoagulation probes, 426
- endothelium, 6
 - enhanced corneal compensation, 265
- entrance pupil, 497
- epithelial laser *in situ* keratomileusis, 446
- epithelium, 4
- equivalent defocus, 136
- etendue, 499
- Euler's formula, 519
- excitation band-pass filter, 242
- excited dimer, 573
- exit pupil, 497
- exposure, 379
 - threshold, 384
 - time, 382
- exposure time, 413
- external slit lamp adapter, 422
- extinction, 373
- eye
 - Abbe number, 32
 - accommodation, 21
 - adaption, 26
 - axes, 20
 - cardinal points, 19
 - color vision, 45
 - depth of field, 29
 - dioptic apparatus, 51
 - entrance pupil, 17
 - exit pupil, 17
 - fixation axis, 21
 - focal point, 19
 - functional status, 85
 - line of sight, 21
 - metabolism, 363
 - movement, 444
 - nodal point, 19
 - nodal ray, 19
 - optical system, 15
 - principal plane, 19
 - principal point, 19
 - pupillary axis, 21

- refractive status, 82
- resolution, 23
- transmittance spectrum, 32
- visual axis, 20

eye diseases, 49

- socio-economic impact, 70
- eye glasses, 141
- eye lens, 8, 16, 56
 - cortex, 8
 - fiber, 8
 - fragmentation, 472
 - nucleus, 8
 - opacification, 56

eye models, 33

- aberrations, 36, 42
- application, 44
- finite, 38
- Gullstrand Eye, 34, 333
- Liou–Brennan Eye, 41
- Navarro Eye, 38
- paraxial, 34
- wide-angle, 38

eye pupil, 6

- eye tracking, 444
 - analog, 445
 - image-based, 445
 - latency time, 444
 - photoelectric-based, 445
 - sampling rate, 444

F

- Fabry–Pérot interferometer, 562
- far point, 22
 - distance, 22
 - refraction, 22, 50
- far vision, 21
- FD-OCT, 291
- femtosecond laser-assisted keratoplasty, 468
- femtosecond pulses, 391, 568
- fiber laser, 581
- field curvature, 504
- field stop, 496
- fixation axis, 21
- flicker-defined form perimetry, 359
- fluorescein, 243
- fluorescence, 551
 - angiography, 242
 - lifetime measurement, 367
- fluorophore, 366
 - endogenous, 245
- flying-spot ablation technique, 437, 442
- Foucault's knife edge, 92
- Fourier transformation, 539

- four-member zoom, 168
- four-quadrant detector, 108, 116
- fovea, 12
- foveola, 12
- frequency doubling illusion, 358
- frequency doubling technology, 357
- frequency-domain OCT, 291
 - advantages, 292
 - analysis, 308
 - drawbacks, 292
 - maximum scan depth, 292
 - mirror image artifact, 293
 - sensitivity, 312
 - signal drop-off, 293
 - theory, 304
- Fresnel equations, 484, 523
- Fresnel number, 528
- functional diagnostics, 345
- functional status, 85
 - global, 85, 345
 - local, 86, 345
- fundus, 4
 - autofluorescence, 244
 - reflex, 91
- fundus camera, 236
 - field of view, 241
 - functional principle, 238
 - history, 237
 - illumination, 238
 - imaging modes, 236, 241
 - magnification, 241
 - mydriatic, 239
 - nonmydriatic, 239
 - observation, 240
 - requirements, 237
 - resolution, 240
 - stereoscopic imaging, 246
 - wide-field, 241
- fundus-controlled perimetry, 360
- funduscopy, 225

- G**
- gain cross-section, 559
- gain factor, 559
- gain medium, 553
- gain medium amplification factor, 559
- gain switching, 568
- Galilei telescope, 150, 166
 - magnification, 150
- ganglion cell
 - koniocellular, 357
 - magnocellular, 357
- gas laser, 572

- Gaussian ABCD law, 533
- Gaussian beam, 531
 - complex beam parameter, 532
 - divergence, 533
 - focus, 534
 - paraxial, 533
 - profile, 452, 532
 - wavefront curvature, 532
- Gaussian oscillator, 563
 - divergence, 565
 - g parameter, 564
 - M factor, 566
 - modes, 564
 - polarization, 566
 - stability condition, 563
- Gaussian spectral distribution, 303
- geographic atrophy, 60
- geometric pupil separation, 233
- geometric spot, 501
- glaucoma, 57, 345
 - angle-closure, 58, 320, 458
 - diagnosis, 209, 224, 261, 319
 - hypertension, 59
 - low-tension, 59
 - open-angle, 57
 - primary, 57
 - secondary, 57
- Goldmann applanation tonometer, 211
- Goldmann stimulus, 353
- gonioscopy, 209
- group velocity, 302, 538
- group velocity dispersion, 309, 393, 464
- Gullstrand condition, 240
- Gullstrand Eye, 34
 - exact, 34
 - simplified, 36, 333
- Gullstrand formula, 34, 333

- H**
- half-wave plate, 264
- harmonic wave, 519
- Hartmann screen, 132
- Hartmann–Shack aberrometer, 127
 - accuracy, 130
 - analysis, 128
 - measurement, 128
 - sensitivity, 130
- Hartmann–Shack wavefront sensor, 128
- Helmholtz equation, 520
- Helmholtz–Lagrange invariant, 498
- hemoglobin, 364, 377
- Henle fiber layer, 12, 264
- Herzberger formula, 40

- hill of vision, 348
 Huygens–Fresnel principle, 537
 hyperfluorescence, 243
 hyperopia, 51, 89
 hyperpigmentation, 60
 hyperthermia, 380, 418
 hypo fluorescence, 243
- I**
 illuminance, 526
 image disparity, 246
 image doubling method, 181, 211
 image plane metrics, 139
 image point, 487
 image size, 488
 – method, 113
 imaging, 486
 incoherence, 537
 indirect focal illumination, 207
 indirect ophthalmoscope, 230
 – binocular, 233
 – field of view, 232
 – head-mounted, 234, 425
 – history, 236
 – magnification, 232, 425
 – stereo base, 234
 indocyanine, 243
 intensity, 525
 interference, 285, 535
 – constructive, 537
 – destructive, 537
 – polychromatic, 537
 – self-, 537
 interpupillary distance, 30
 intersystem crossing, 380
 intracorneal pockets, 470
 intraocular lens, 456, 471
 – phakic, 224
 – specification, 326
 intraocular pressure, 9, 57, 59, 428
 – measurement, 211
 intrastromal corneal ring segments, 470
 inverse bremsstrahlung, 385
 inverter tube, 165
 iridocorneal angle, 58, 320, 458
 iridotomy, 458
 iridotrabecular contact, 58
 iris, 6, 16
 iris registration, 445
 isobestic point, 364
 isopters, 348
- J**
 Javal–Schiötz keratometer, 183

- K**
 Kepler telescope, 151
 keratoconus, 51, 55
 – diagnosis, 224
 – treatment, 470
 keratoglobus, 56
 keratometer, 178
 – coincidence setting, 182
 – distance dependence, 180
 – equation, 197
 – functional principle, 179
 – Helmholtz, 183
 – history, 179
 – image doubling, 181
 – Javal–Schiötz, 183
 – Littmann, 183
 – manual, 181
 – one-position, 182
 – optoelectronic, 186
 – Sutcliffe, 181
 – test mire, 179
 – two-position, 182
 keratometric diopter, 195
 keratometric index, 195
 keratomileusis, 446
 – epithelial laser *in situ*, 446
 – laser *in situ*, 448
 – laser sub-epithelial, 446
 keratoplasty, 468
 Kerr effect, 391
 Kerr lens, 392
 kinetic perimetry, 350
 knife edge diaphragm, 115
 knife edge method, 114
 Köhler illumination, 173, 203
- L**
 Lambert–Beer's law, 364, 374
 Landolt ring, 25
 laser, 549
 – argon ion, 573
 – classes, 396
 – continuous wave, 567
 – disk, 581
 – excimer, 573
 – fiber, 581
 – four-level, 556
 – gas-ion, 572
 – ground state, 553
 – ion, 572
 – mode, 562
 – multimode operation, 562
 – population difference, 554
 – properties, 552

- pumping, 553
 - semiconductor, 577
 - single-mode operation, 562
 - solid-state, 580
 - three-level, 556
 - tunable, 295, 314
 - two-level, 555
 - vanadate, 582
 - YAG, 582
 - laser in situ keratomileusis*, 448
 - flap creation, 467
 - laser anterior capsulotomy*, 471
 - laser Doppler flowmetry*, 336, 363
 - laser Doppler velocimetry*, 363
 - laser hazard*, 394
 - direct, 395
 - indirect, 395
 - laser indirect ophthalmoscope*, 425
 - laser level*, 553
 - lower, 553
 - upper, 553
 - laser link*, 410, 422
 - laser peripheral iridotomy*, 456, 458
 - laser posterior capsulotomy*, 455, 457
 - laser ray tracing aberrometer*, 131
 - laser safety*, 86, 394
 - procedures, 399
 - standards, 396
 - laser slit lamp*, 410, 421
 - active safety filters, 424
 - passive safety filters, 424
 - laser sub-epithelial keratomileusis*, 446
 - laser trabeculoplasty*, 428
 - LASIK*, 448
 - flap, 467
 - lateral scanning-slit projection*, 213
 - calibration, 215
 - functional principle, 213
 - surface elevation map, 216
 - wide-field pachymetry map, 216
 - LED*, 578
 - lens*, 8
 - achromatic, 163
 - apochromatic, 163
 - biconvex, 488
 - concave, 491
 - equation, 489
 - meniscus, 491
 - negative, 491
 - plano-convex, 491
 - positive, 488
 - thick, 490
 - thin, 487
 - lens capsule*, 8, 56, 450
 - lens maker's equation*, 488
 - light energy*, 525
 - light hazard protection*, 86, 394
 - light-emitting diode*, 578
 - light-atom interaction*, 550
 - limbal relaxing incisions*, 470
 - limbus*, 208
 - line of sight*, 21
 - Liou-Brennan Eye*, 41
 - lipofuscin*, 245, 366
 - lipofuscin granule*, 60
 - Littmann keratometer*, 183
 - locked modes*, 569
 - logMAR scale*, 24
 - loupe*, 147
 - field of view, 149
 - magnification, 148
 - medical, 149
 - nominal magnification, 149
 - low-coherence interferometry*, 277, 324
 - application, 329
 - dual-beam, 327
 - low-coherence light*, 286, 538
 - luminance*, 347, 526
 - luminous intensity*, 525
 - luminous power*, 525
- M**
- macula*, 12
 - macular edema*, 64
 - diagnosis, 259
 - magnification*, 489
 - nominal, 149
 - usable, 156
 - magnification changer*, 166
 - Galilean, 166
 - step, 166
 - zoom, 167
 - magnifier loupe*, 147
 - marginal ray*, 496
 - maximum permissible exposure*, 86, 400
 - medical device innovation*, 284
 - medical loupe*, 149
 - Galilei telescope, 150
 - Kepler telescope, 151
 - requirements, 149
 - melanin*, 413
 - meridional curvature*, 194
 - mesopic vision*, 27
 - metabolic end products*, 366
 - metabolic mapping*, 363
 - metabolic status*, 86

metabolism, 60
 method of least squares, 135
 Michelson interferometer, 285
 microaneurysms, 64
 microcirculation, 86, 346
 microlens array, 128
 microperimetry, 360
 micropulse treatment, 417
 microsurgery, 152
 microtubule, 261
 minimum angle of resolution, 23
 minus cylinder notation, 53, 138
 mirror contact glass, 209
 mode locking, 463, 568

- maximum output power, 569
- minimum pulse duration, 570

 moving breakdown model, 387
 multiphoton absorption, 375
 multiphoton ionization, 385
 multipulse pattern scan treatment, 423
 multispectral imaging, 242
 Munnerlyn formula, 439
 Munnerlyn profile, 433, 439
 mydriatic agents, 239
 myopia, 51, 89

- progressive, 55
- treatment, 470

N

Navarro Eye, 38
 Nd:YAG laser, 582

- applications, 582
- frequency doubled, 582

 Nd:YVO laser, 582
 near point, 22

- distance, 22
- refraction, 22

 necrosis, 380
 neovascularization, 61, 381

- classic, 62
- occult, 62
- treatment, 406
- visualization, 243

 Newton formula, 103
 night vision, 11
 nominal ocular hazard area, 400
 noninvasive intervention, 405
 nonlinear optics, 391

- group velocity dispersion, 393
- self-focusing, 392
- self-phase modulation, 392

 normative database, 83, 319

O

object height, 488
 objective refraction, 90
 OCT, 277

- application, 316
- axial resolution, 279
- Doppler, 336
- Fourier-domain, 291
- frequency-domain, 291
- history, 280
- light source, 313
- polarization-sensitive, 335
- signal-to-noise ratio, 311
- spatially encoded, 297
- spectral-domain, 291
- spectroscopic, 338
- swept-source, 295
- system overview, 297
- time encoded, 297
- time-domain, 289
- ultrahigh resolution, 335
- ultrahigh speed, 335

 onchocerciasis, 67
 online dosimetry, 418, 431
 OPD aberrometer, 119
 operating microscope, 151
 ophthalmoscope, 225

- direct, 227
- functional principle, 226
- history, 226
- indirect, 230
- reflection-free observation, 233
- subsystem, 102

 ophthalmoscopy lens, 231, 425
 optic disk, 10

- diameter, 319
- excavation, 319

 optic nerve head, 10, 319

- stereometric parameters, 259

 optical axis, 486
 optical biometry, 324

- application, 329

 optical breakdown, 385, 461
 optical breakthrough, 385
 optical coherence tomography, 277
 optical fiber, 420

- cladding, 420
- coupling conditions, 421
- numerical aperture, 421
- step-index, 421

 optical gain condition, 553
 optical low-coherence reflectometry, 331
 optical path difference, 125, 434

- optical path length, 125
- optical rotation, 335
- optical section, 202
- optical sectioning, 212
- optics
 - geometric, 482
 - matrix, 494
 - wave, 518
- optometer, 102
 - formula, 105
 - principle, 102
 - subsystem, 102
- orthoscopic, 505
- oscillator, 558
- oximetric retinal map, 365
- oxygen saturation mapping, 364
- oxyhemoglobin, 377, 414

- P**
- pachymetry, 225
 - wide-field, 215
- pan-retinal photocoagulation, 416
- parallax distance, 30, 246
- paraxial approximation, 487, 530
- partial waves, 535
- partial-coherence interferometry, 328
- patient interface, 465
 - contact glass, 465
- PDT, 379, 406
- Pechan prism, 119
- penetrating keratoplasty, 468
- perimeter, 351
 - background illumination, 353
 - bowl, 352
 - compact, 353
 - data analysis, 355
 - design, 351
 - direct projection, 353
 - duration of stimulus, 353
 - fixation, 354
 - history, 351
 - monitor-based, 353
 - projection system, 352
 - reporting, 355
 - size of stimulus, 353
 - test conditions, 353
 - test pattern, 354
 - test strategy, 354
- perimetry, 346
 - flicker-defined form, 359
 - frequency doubling technology, 357
 - fundus-controlled, 360
 - kinetic, 350
- short wavelength automated, 357
- static, 350
- static threshold, 350
- phacoemulsification, 457, 472
- phase difference, 262, 535
- phase velocity, 302, 520
- phoropter, 90
- photoablation, 383, 431
 - alignment system, 444
 - beam shaping, 442
 - energy monitoring, 445
 - eye tracking, 444
 - focusing, 442
 - history, 431
 - intrastromal, 448
 - laser source, 442
 - limitations, 449
 - photodecomposition, 383
 - photothermal, 384
 - profiles, 433
 - refractive error, 433
 - scanning, 442
 - side effects, 438
 - surface, 446
 - techniques, 436
 - topography-guided, 435
 - wavefront-guided, 434
 - wavefront-optimized, 434
- photochemical interaction, 379, 406
- photocoagulation, 380, 412
 - application, 414, 426
 - beam transmission, 420
 - functional principle, 412
 - history, 412
 - laser source, 419
 - micropulse treatment, 417
 - pan-retinal, 381, 416
 - process parameters, 412
 - retinal rejuvenation therapy, 418
 - selective retina therapy, 417
 - short-pulse treatment, 417
 - transpupillary thermotherapy, 418
 - transsscleral, 430
 - treatment modes, 415
- photodisruption, 384, 390, 450
 - aiming laser, 455
 - exposure threshold, 386
 - focus shift, 455
 - functional principle, 451
 - process parameters, 451
 - with nanosecond pulses, 450
- photodynamic therapy, 379, 406
 - laser source, 410

- process steps, 408
 - setup, 409
 - treatment, 411
 - photoisomerization, 379
 - photometric quantity, 525
 - photon, 550
 - photopic vision, 11, 27
 - photoreceptor, 10
 - endoplasmic reticulum, 10
 - mitochondria, 10
 - nucleus, 10
 - photorefractive keratotomy, 446
 - photosensitized oxidation, 379
 - photosensitizer, 379, 408
 - photothermal interaction, 380, 412
 - Placido disk, 187
 - Placido ring corneal topographer, 178
 - plane wave, 520
 - plasma, 386
 - absorption, 387
 - energy density, 389
 - maximum expansion, 387, 461
 - shielding, 387, 451
 - plateau iris, 59
 - plus cylinder notation, 53
 - point-spread function, 139, 500, 509
 - broadening, 311
 - polar notation, 53
 - polarimeter, 261
 - polarimetric layer thicknesses, 263
 - polarization, 522
 - circular, 524
 - elliptical, 525
 - linear, 523
 - polarization-sensitive OCT, 335
 - polychromatic wave function, 538
 - population inversion, 553
 - conditions, 553
 - four-level system, 556
 - three-level system, 556
 - threshold, 558
 - two-level system, 555
 - posterior capsular opacification, 457
 - posterior chamber, 8
 - posterior segment, 4
 - power, 525
 - power spectral density, 541
 - power vector notation, 53, 138
 - power-conversion efficiency, 561
 - presbyopia, 23, 51
 - treatment, 470
 - primary visual cortex, 10
 - principal meridian, 97
 - principal plane, 490
 - principal point, 491
 - pulse parameter, 288
 - pulsed laser, 567
 - gain switching, 568
 - mode locking, 568
 - Q-switch, 568
 - pump efficiency, 561
 - pump source, 553
 - pumping, 553
 - transition probability, 556
 - pupil matching, 231
 - pupil plane metrics, 136
 - pupil reflex, 27, 239
 - pupil splitting, 154
 - pupillary axis, 21
 - pupillary block, 58, 458
 - Purkinje image, 178
- Q**
- Q-switch, 568
 - controllable switch, 568
 - maximum output power, 568
 - quarter-wave plate, 264
- R**
- radiometric quantity, 525
 - rapidly scanning delay line, 290
 - rate equations, 554
 - ray aberration, 122, 501
 - longitudinal, 123, 501
 - transverse, 122, 501
 - ray deflection method, 109
 - ray tracing, 492
 - Rayleigh criterion, 530
 - real image, 490
 - reconstruction plane, 191
 - red filter imaging, 242
 - red reflex, 93, 174
 - red-free imaging, 242
 - reflectance, 484, 523
 - reflection-free observation, 233, 240
 - refraction, 483
 - refractive correction, 141, 446
 - refractive error, 49, 89
 - correction, 141, 446
 - diagnosis, 96, 102, 128
 - distribution, 54
 - refractive index, 483
 - refractive lenticule extraction, 468
 - refractive power, 489
 - refractive status, 89
 - refractive surgery, 446

- ReLEX, 468
 - flex, 468
 - smile, 468
- reporting biomarker, 367
- resolution, 528
- resonator, 558
 - unstable, 565
- retarder, 264
 - bias, 265
- retina, 9, 10
- retinal illuminance, 526
- retinal image size, 17, 21, 44, 114
- retinal imaging aberrometers, 127
- retinal ischemia, 65
- retinal metabolism, 363
 - extracellular, 363
 - intracellular, 363
- retinal nerve fiber layer, 320
 - thickness analysis, 261, 320
- retinal pigment epithelium, 366
- retinal rejuvenation therapy, 418
- retinal spot diagram, 131
- retinal thickness analysis, 217
- retinal vein occlusions, 65
 - branch, 65
 - central, 65
- retinoscope, 91
 - accuracy, 98
 - application, 99
 - flicker point, 96
 - illumination, 92
 - measurement, 96
 - observation, 93
 - principle, 91
 - spot, 92
 - streak, 92
- retinoscopic reflex, 93
- retinoscopy, 91
- retro-illumination, 174
- ring illumination, 239
- rods, 10, 45
 - operational range, 27
- root mean square error, 136
- rotating slit projection, 217
 - application, 223
 - device setup, 221
- round-trip group delay, 302

- S**
- saccade, 444
- sagitta, 439
- scanning-laser device, 249
 - history, 250
- scanning-laser polarimeter, 261
 - corneal scan, 264
 - data analysis, 265
 - enhanced corneal compensation, 265
 - functional principle, 261
 - measurement, 263
 - report, 265
 - RNFL scan, 264
 - variable corneal compensation, 263
- scanning-slit ablation technique, 437
- scanning-slit projection, 212
 - designs, 212
 - lateral, 213
- scattering, 373, 375
 - coefficient, 375, 413
 - elastic, 375
 - Mie, 376
 - Rayleigh, 376
- Scheimpflug imaging, 217
 - application, 223
 - arrangement, 218
 - history, 219
- Scheimpflug line, 218
- Scheimpflug principle, 218, 219
- Scheiner disk, 106, 110
- Scheiner method, 106
- schematic eye models, 33
- Schlemm's canal, 9
- sclera, 4
- sclero-corneal illumination, 208
- scotoma, 348
 - relative, 348
- scotopic vision, 11, 27
- secondary spectrum, 163
- selective retina therapy, 417
- self-focusing, 392
- self-phase modulation, 392
- semiconductor, 575
 - acceptor level, 575
 - donor level, 575
 - doping, 575
 - intrinsic, 575
 - n-type, 575
 - p-type, 575
- semiconductor laser, 577
- semi-meridian, 190
- shock wave, 390
- short wavelength automated perimetry, 357
- short-pulse treatment, 417
- signal drop-off, 293
- simulated keratometer readings, 197
- single-pulse method, 416
- single-pulse treatment, 423

- skiascopy, 91
 - slit lamp, 200
 - auxiliary lenses, 208
 - filter, 210
 - functional principle, 201
 - fundus observation, 208
 - gonioscopy, 209
 - history, 200
 - illumination, 202
 - laser therapy, 210
 - light source, 203
 - magnification, 204
 - mechanical components, 204
 - microscope, 204
 - types of illumination, 205
 - slit light projector, 202
 - slope efficiency, 560
 - small incision lenticule extraction, 468
 - Snellen chart, 25
 - Snell's law, 483
 - solid-state laser, 580
 - spectroscopic OCT, 338
 - specular illumination, 207
 - speed of light, 483
 - spherical equivalent, 54, 136
 - spherical wave, 520
 - spherocylindric aberrations, 89
 - spherocylindric refraction, 53, 136
 - least-squares fitting, 137
 - paraxial curvature fitting, 138
 - polar notation, 53
 - power vector notation, 53
 - spontaneous emission, 551
 - SS-OCT, 295
 - standard automated perimetry, 351
 - standard deviation, 509
 - standard photocoagulation, 416
 - multipulse method, 423
 - single-pulse method, 416
 - threshold power, 416
 - standing wave condition, 562
 - static perimetry, 350
 - stereo angle, 30
 - stereo base, 32, 234
 - stereo fundus camera, 248
 - stereo image pair, 246
 - stereo microscope, 154
 - stereo-coaxial illumination, 174
 - stereopsis, 30, 158, 234
 - stereoscopic depth perception, 30, 158, 246
 - Stiles–Crawford effect, 28, 138
 - stimulated emission, 551
 - stimulated transition rate, 555
 - Stokes shift, 243
 - streak retinoscope, 92
 - Strehl ratio, 509
 - stroma, 4
 - fibrils, 6, 16
 - lamella, 4
 - structural analysis, 82, 147, 277, 360
 - structure–function diagnostics, 334
 - subjective refraction, 90
 - suction skirt, 465
 - super-Gaussian profile, 452
 - superluminescent diode, 313
 - gain-narrowing, 313
 - superposition, 519, 535
 - surgical microscope, 151
 - application, 151
 - chromatic aberration, 161
 - depth of field, 158
 - field of view, 155
 - functional principle, 154
 - fundus imaging, 165
 - history, 152
 - illumination, 172
 - magnification, 154
 - numerical aperture, 156
 - objective lens properties, 160
 - requirements, 152
 - resolution, 156
 - stands, 174
 - stereoscopic depth perception, 158
 - usable magnification, 156
 - zoom system, 165
 - Sutcliffe keratometer, 181
 - SWAP, 357
 - swept-source OCT, 295
 - advantages, 296
 - challenges, 297
 - synaptic terminal, 10
- T**
- Taylor expansion, 302, 510
 - TD-OCT, 289
 - tear film, 4
 - telecentric zoom system, 171
 - TEM mode, 564
 - therapeutic window, 417
 - thermal
 - conduction, 382
 - damage, 412
 - diffusion constant, 382
 - penetration depth, 382, 413
 - relaxation time, 382
 - thermionic emission, 387

three-member zoom, 168
 threshold differential luminance, 347
 threshold exposure, 384, 451
 threshold photocoagulation, 416
 threshold pumping power, 560
 time-correlated single photon counting, 367
 time-domain OCT, 289

- axial resolution, 289, 304
- theory, 301
- transverse resolution, 289

 titanium-sapphire laser, 313
 tonometer, 211
 top hat profile, 453
 topographic measurements, 177
 topometry, 178
 total average intensity, 539
 total internal reflection, 420, 484
 trabecular meshwork, 9, 429
 trachoma, 66
 transpupillary thermotherapy, 418
 transversal electromagnetic mode, 564
 trephine, 447
 trial lens, 90
 trichromatic vision, 45
 Tschnering aberrometer, 132
 typical near viewing distance, 31

U

ultrasound biometry, 326
 uvea, 6

V

variable corneal compensator, 263
 varioscope, 163

- internal focus, 163

 venous loops, 65
 venule, 363
 vignetting, 498
 virtual image, 490
 visible spectrum, 45
 visual acuity, 24, 85, 345
 visual aids, 147
 visual axis, 20
 visual disorders, 49

visual field, 16, 86, 345

- examination, 346
- index, 355

 visual illusions, 4
 visual impairment, 67
 vitrectomy, 426
 vitreous, 8
 vitreous hemorrhage, 65

W

wave aberration function, 125, 434, 507
 wave function, 519
 wave number, 520
 wave packet, 538
 wave vector, 520
 wavefront, 506

- aberration, 124
- analyzer, 121
- error function, 125
- reconstruction, 133
- slope, 126, 133

 wavefront aberration, 506
 wavefront analysis, 133, 135

- application, 140

 wavelength-tuning OCT, 295
 white-to-white distance, 332
 Wiener-Khinchin theorem, 304, 542

X

xanthophyll, 377, 414

Y

Yb:YAG laser, 582

Z

Zernike coefficients, 135
 Zernike polynomials, 134, 512
 zonular fiber, 8, 22
 zoom factor, 171
 zoom telescope, 167

- afocal, 167
- compensator lens, 167
- matrix calculation, 169
- requirements, 167
- telecentric, 171
- variator lens, 167