

## Index

### a

ablation, radiofrequency 448  
 absorption  
 – line 302  
 – of energy 85  
 – specific absorption rate (SAR) 78, 86f, 92f, 338  
 – site specific 499  
 accessory pathway 173f, 196, 268  
 N-acetyl-L-aspartate (NAA) 461, 465  
 ac-field 532, 534, 552, 561  
 action potential 512  
 activation time 182  
 activation wavefront 166f  
 ADC *see* apparent diffusion coefficient  
 adenosine 5-triphosphate (ATP) 471f  
 AEP *see* auditory evoked potential  
 alpha rhythm 218  
 alpha wave 255  
 Alzheimer disease 409, 468, 472  
 AMR-sensor 480, 488  
 angiogenesis 438  
 angioplasty 419  
 angular momentum 298f  
 animal magnetism 19  
 anisotropy 173, 216  
 antibody 559  
 – monoclonal 596  
 – tumor specific 596  
 apparent diffusion coefficient (ADC) 294, 378ff, 382, 391, 444  
 ARGOS 140ff  
 arrhythmia 195  
 – atrial 195  
 – cardiac 194  
 – fetal 274f, 278  
 – malignant 193f, 198ff  
 – ventricular 182, 185, 197f  
 arrow tip poison 5

artefact 220, 330  
 – correction 220  
 – detection 125  
 ASD *see* atrial septal defect  
 astrolabium 4  
 atrial fibrillation 195, 275  
 atrial flutter 195, 275  
 atrial septal defect (ASD) 275  
 atrial tachycardia 195  
 attention 242f  
 auditory evoked potential (AEP) 281  
 auditory system 232, 281  
 – selective 243  
 autoconduction 21  
 autocorrelation function 306f  
 Avicenna 5

### b

B<sub>0</sub> inhomogeneity 398  
 B<sub>0</sub>-field 299, 306, 308, 310, 321, 332, 338, 459  
 B<sub>1</sub> inhomogeneity 400  
 B<sub>1</sub>-field 299, 311  
 balancing, electronic 115  
 bandwidth 310  
 B-cell 580  
 BCS theory 104  
 beamformer 229  
 Bereitschaftsfeld 235  
 beta wave 255  
 bias current 105f, 129f  
 binding  
 – perceptual 241  
 – temporal 241  
 bioelectricity 21  
 biological effect 78ff  
 – of magnetic fields 79  
 – of radiofrequency electromagnetic fields 88  
 biological tissue 309

- biomagnetic field 99, 102ff
  - biomagnetic liver susceptometry 531
  - biomagnetism 18, 99ff
  - biopsy, MR guided 419, 424f, 445
    - abdomen and pelvis 427
    - breast 427
    - musculoskeletal 427
    - prostate 427
  - biosusceptometer 531f
    - high  $T_C$  534
    - room temperature 534
    - total body 534
  - Biot-Savart law 30
  - biplanar magnet design 420
  - Bloch equations 302
  - blood
    - flow rise 362
    - transfusion 530
  - blood oxygen-level-dependent (BOLD) 293, 324, 398
    - contrast mechanism 363
    - effect 362ff, 366, 368, 404
    - venography 404, 407
  - body surface potential map (BSPM) 164, 181
  - Bohr magneton 42
  - boil-off rate 116, 128, 143, 153
  - BOLD *see* blood oxygen-level-dependent
  - Boltzmann statistics 299
  - bone marrow purification 17
  - boundary element method 225
  - bradycardia, fetal 275
  - brain
    - activity, spontaneous 255
    - lesions 255
    - mapping, functional 370ff, 392
    - oscillations 218
    - processes 221, 228
  - brain surface current density (BSCD) 226, 229
  - breast cancer 437ff
  - breast conservation therapy 447
  - Broca's area 238ff, 372
  - Brown relaxation 557
  - BSCD *see* brain surface current density
  - BSPM *see* body surface potential map
  - b-value 386
- c**
- CAD *see* coronary artery disease
  - CAER *see* cortical auditory evoked response
  - Canavan disease 465, 472
  - cancer therapy 596, 598f
  - capsule
    - autonomous telemetric 501
    - camera 482
    - cogwheel 505
    - Enterion 506
    - Heidelberg 500
    - HF 505
    - IntelliSite 500, 502, 506
    - magnetic 488
    - magnetic guidance 501
    - opening by ac-magnetic field 501
    - telemetric 482
    - type features 507
    - using mechanical forces 501
  - cardiac excitation 80
  - cardiac pacemaker 81, 94
  - cardiac stimulation 92
  - cardiac diagnosis 142ff
  - cardiac function, monitoring 274
  - cardiac source modeling 276
  - cardiac time interval (CTI) 269f
    - analysis 273
    - reference values 273
  - cardiomagnetism 164ff
  - cardiomyopathy 193ff
  - cardiotocography, ultrasound-based 274
  - cardiovascular intervention, MR guided 429
  - cardiovascular magnetic resonance imaging (CMRI) 343
    - perfusion 349
  - carotid artery 357
  - catheter 13, 15, 181, 195
    - magnetically guided 13f
    - tip 421
    - tracking 420f, 429
  - cell selection 572
  - cell separation 571
    - high-gradient 573, 576
    - magnetic 571ff
  - cellular therapy 571
  - central slice theorem 312
  - central sulcus 245, 518
  - cerebral blood flow 379
  - cerebral perfusion 362, 378
  - cerebrovascular disease 407
  - CHD *see* congenital heart defect
  - chemical shift 305, 328f, 456, 465, 471
    - imaging 328
  - chemoembolization 15
  - chemotherapeutic agent 598
  - choline 461, 466
  - chronaxie 331
  - cineangiography 344ff
    - perfusion 349ff
    - real-time 345
    - segmented 345

- circularly polarized field 308
  - CliniMACS Plus instrument 577ff, 588ff
  - closure positive shift 240
  - CMRI *see* cardiovascular magnetic resonance imaging
  - CMV *see* contingent magnetic variation
  - coil 299, 309, 318, 514f
    - array 317, 438
    - circular 515
    - design 400
    - one-turn 514
    - planar 458
    - quality factor 310
  - coils-in-vacuum 121
  - compass needle 4
  - computed tomography (CT) 382
  - congenital heart defect (CHD) 275
  - contingent magnetic variation (CMV) 242
  - continuous wave-method 303
  - contrast agent 322, 324, 349
  - contrast mechanism 363f
  - contrast-to-noise ratio 354, 402
  - Cooper pairs 104
  - coronary angiography 352
  - coronary artery
    - breath-hold 355
    - imaging 355
    - plaque 357
    - wall imaging 357
  - coronary artery disease (CAD) 179, 185ff, 190
  - coronary MR angiography 294
  - correlation time 306, 308
  - cortical auditory evoked response (CAER) 281ff
  - Coulomb potential 32
  - creatine 461
  - critical current 106
  - critical temperature 104
  - crosstalk 116
  - cryocooler 152
  - cryotherapy 449
  - CT *see* computed tomography
  - CTI *see* cardiac time interval
  - Curie point 42
  - current density 81f, 84f, 515
    - estimation 178, 189f
    - mapping 238
    - maps 179, 191
    - pseudo 191
    - vector 190
  - current dipole 170, 176f, 180, 211, 247, 283
    - equivalent 175, 245, 247
    - vector 190
  - current locked mode 106, 116
  - cytokine capture system 585ff
  - cytostatic agent 597f
  - cytotoxic edema 379
- d**
- D'Arsonval 20f
  - dc-field 532
  - decomposition algorithm 221
  - decoupling 459, 469, 472
  - deflection 218
  - demagnetizing 68
    - energy 47ff
    - field 50f
  - dendritic cell 586
    - vaccination 587
  - deoxyhemoglobin 362, 403
  - depletion 574, 580, 582
  - depolarization 165, 168, 181, 212f, 268
    - anoxic 216
    - periinfarct 217
  - DESS *see* double echo steady state
  - detection limit 70f
  - dewar (cryostat) 116
  - diamagnet 41
  - diffusion imaging 326f
  - diffusion tensor imaging (DTI) 225, 322, 378
    - tracking 384
  - diffusion-weighted imaging (DWI) 326f, 378ff, 443f
    - DWI/PWI mismatch 378, 382
    - functional 392
    - in breast cancer 443
    - lesions 382
    - pulse sequences 383f
    - SENSE 388
    - with FSE 387
    - with single-shot EPI 386
  - dipolar interaction 308
  - dipole 32, 37
    - electric 32
    - energy 48f
    - localization 238
    - magnetic 34ff
    - moment 32
  - dipole model 226ff
    - fixed 226
    - moving 226
    - rotating 227
    - spatio-temporal 222, 227
  - dipole moment 32
    - magnetical 298
  - dispersion line 302
  - disposition kinetics 470

- domain wall 51ff
  - double donut configuration 419
  - double echo steady state (DESS) 320
  - Dowser reflex 19f
  - drug delivery 596
    - in GI-tract 499ff
    - site specific 499
  - drug targeting 499
    - remote controlled 499ff
  - DTI *see* diffusion tensor imaging
  - DWI *see* diffusion-weighted imaging
  - dynamic signal behavior 439
- e**
- early left anterior negativity 238, 240
  - early right anterior negativity 240
  - Earth magnetic field 5, 103, 113
  - ECD *see* equivalent current dipole
  - ECG *see* electrocardiogram
  - echocardiography 192, 274
    - intrapartial fetal 274
  - echo-planar imaging (EPI) 323, 364, 379f, 443f
    - single-shot 386
  - echo-planar spectroscopic imaging (EPSI) 459
  - ectopic beat 175
  - eddy current 502f, 512ff, 552, 558
  - EEG *see* electroencephalogram, *see* electroencephalography
  - electrical stimulation 517
  - electric field strength 82
  - electrocardiogram (ECG) 168
  - electroencephalogram (EEG) 13, 22
  - electroencephalography (EEG) 210, 218, 221, 255
    - intercranial 254
  - electrogastrography 482f
  - electromagnet 67f
  - electromagnetic field
    - in therapy 479
    - pulsed 479
  - electromedicine 21
  - electrophysiology 212ff, 218
  - electrothrombosis 13
  - Elektra Neuromag 132ff
  - embolization 15
  - emotion 244
  - Emplastrum Magneticum 5
  - endocardial pacing 173
  - endocardial surface 176
  - endocardium 173
  - endovascular intervention, MR guided 431
  - energy level 308
  - energy metabolism 472
  - Enterion capsule 506
  - EPI *see* echo-planar imaging
  - epicardial surface 176
  - epicardium 173, 178
  - epidemiology 80, 83, 88
  - epilepsy 251ff
  - epileptic spikes 118, 150
  - EPISTAR 364
  - EPSI *see* echo-planar spectroscopic imaging
  - equivalent current dipole (ECD) 175, 245, 247
  - European Union Directive 78
  - event-related field 220
  - event-related potential 220
  - event-related synchronization/ desynchronization 219
  - evoked activity 219
  - evoked field
    - auditory 232, 247ff
    - brainstem auditory 136
    - movement 236
    - somatosensory 136, 230, 244ff, 247
    - visually 249
  - evoked response
    - cortical auditory 282f
    - fetal 283
    - visual 283
  - exchange integral 44
  - exchange interaction 45
  - exposure limit 81
    - magnetic fields 84
    - power density 86
    - radiofrequency electromagnetic fields 84ff
  - external feedback 116
  - extraction, magnetic 6
- f**
- Fabricius of Hildanus, Wilhelm 7
  - FACS *see* fluorescence-activated cell sorting
  - FAIR 364
  - fast imaging with steady precession (FISP) 320f
  - fast low angle shot (FLASH) 320, 352
  - fast spin echo (FSE) 343, 383, 387f
    - T2-weighted 405
  - feedback current 107
  - ferritin 535f, 541
  - ferritometer 531f, 535, 542
  - ferrofluid 597, 601
  - ferromagnet 41
  - ferromagnetism 42ff
  - ferrosilicone 15
  - fetal heart rate variability 272

- fetal-magnetocardiogram (fMCG) 103
  - fetal-magnetocardiography (fMCG) 614
  - fetal-magnetoencephalogram (fMEG) 103
  - fiber tracking 384
  - FID *see* free induction decay
  - field configuration
    - closed 214
    - open 214
  - field per unit current 310
  - field sensitivity 108
  - figure-eight coil 513, 515, 517
  - filling factor 310
  - fine splitting 305
  - finite element method 224
  - first-pass measurement 350
  - FISP *see* fast imaging with steady precession
  - FLAIR 407
  - FLASH 320, 352
    - contrast enhanced 351
  - flip angle 315, 402
  - flow 348
    - compensation 326
    - imaging 324
  - fluorescence-activated cell sorting (FACS) 577, 581
  - 5-fluorouracil (5-FU) 469f
  - flux
    - integral 537f
    - locked mode 128ff
    - transformer 107f, 125, 130ff
  - fluxgate 481, 540
    - magnetometer 607
  - fMCG *see* fetal-magnetocardiogram, *see* fetal-magnetocardiography
  - fMEG *see* fetal-magnetoencephalogram
  - fMRI *see* functional magnetic resonance imaging
  - forward monitoring 485
  - forward problem 223ff
  - forward solution 167, 177
  - Fourier space 312, 323
  - Fourier transformation 307, 312ff
  - fractal dimension 220
  - fractional anisotropy 385
  - free induction decay (FID) 302
  - FSE *see* fast spin echo
  - functional brain mapping 370ff, 392
    - attention ROI 371
    - motor ROI 371
    - presurgical mapping 373
  - functional magnetic resonance imaging (fMRI) 362ff, 392, 404, 522
    - BOLD-techniques 364ff
    - mapping 368, 370
      - motion correction 366
      - perfusion-based techniques 364
      - post-processing 366
      - resolution 369
      - statistical analysis 367
      - task paradigm 365ff
      - visual stimulation 369f
  - functional map 513
  - functional mapping 517
  - fuse thread 502
- g**
- GABA 213, 520
  - gadolinium DTPA 349f, 438
  - Galen of Pergamum 5
  - GAMT *see* guanidinoacetate methyltransferase
  - gastrointestinal tract 481ff, 489f
    - adsorption process 493
    - drug delivery 499
  - Gaussian fiber diffusion tensor model 385
  - Gauss theorem 28, 63
  - generalized diffusion tensor model 386
  - GFAP 523
  - giant magnet 67f
  - Gilbert, William 3ff
  - gradient compensation 399
  - gradient echo 319, 321, 364
    - contrast 402
    - image 399
    - magnitude 409
  - gradient recalled acquisition in steady state (GRASS) 320
  - gradient system 335f
  - gradiometer 113ff, 132, 487
    - axial 114
    - distribution 127
    - electronic balancing 115
    - first-order 114
    - high-spatial resolution 148
    - high-temperature 144
    - HTS 153
    - planar 115, 149
    - second-order 114, 143, 151
    - sensor 531, 534
    - software 115
    - thin-film 132
    - third-order 115
    - wire-wound 114
  - graft versus host disease (GVHD) 580, 582
  - GRAPPA 345
  - GRASS *see* gradient recalled acquisition in steady state
  - guanidinoacetate methyltransferase (GAMT) deficiency 295, 463

- guidance on protection 76ff
  - biologically effective quantity 77
  - critical effect 77
  - reduction factors 77
- guide wire 13
- gustatory system 234f
- GVHD *see* graft versus host disease
- gyromagnetic ratio 299, 305, 457
  
- h**
- half Fourier acquired single shot turbo spin echo (HASTE) 323
- Hall effect 73
- hardware disease 10
- HASTE *see* half Fourier acquired single shot turbo spin echo
- head cancer 600
- head position indicator 135
- heart rate variability (HRV), fetal 272
- heat conduction 559
- helmet 119f, 123, 125
- Helmholtz coil 532
- hematite 5
- hematological disorder 580
- hemochromatosis 530, 538f
  - primary 542
  - secondary 543
- hemoglobin 362, 536
- hemosiderin 535f, 538, 541
- higher-order tensor 386
- high-intensive focused ultrasound 448
- high-temperature superconductivity (HTS) 102, 152ff, 333
- Hilbert transform 219
- Hildegard von Bingen 10
- Hippocrates of Cos 5
- hormone replacement therapy 442
- hot spot 87
- HRV *see* heart rate variability
- HTS *see* high-temperature superconductivity
- hydrodynamic radius 557
- hydrogen nucleus 299
- HYPERNOM 109
- hypertension 191ff
- hyperthermia 550ff, 564ff, 596
  - intracellular 565
  - magnetic 15f
- hysteresis 552f
  - loop 53f
  
- i**
- ICA *see* independent component analysis
- ICNIRP *see* International Commission on Non-Ionizing Radiation Protection
- idling rhythms 218
- IEC *see* International Electrotechnical Commission
- IHD *see* ischemic heart disease
- ill-conditioned problem 63
- ill-posed matrix 228
- image postprocessing 439ff, 445
  - image subtraction 442
  - in-phase 444
  - maximum intensity projection 439
  - opposed-phase 444
  - ROI 439
- imaging epicardial activity 178f
- imaging system 324, 330
- immobilization 557
- immune effector 580f
- immune therapy 586
- immunity 564
- independent component analysis (ICA) 222
- induced activity 219
- infarct 351
- injury current 217
- InteliSite capsule 500, 502, 506
- interictal epileptic discharge 251
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 76ff, 89
- International Electrotechnical Commission (IEC) 89
- interneurons 517
- interstimulus interval 520
- interstitial laser therapy 448
- interventional magnetic resonance imaging 416ff
- intestine 481, 490
- intrauterine devices (IUD), magnetic 16f
- intrauterine growth-restriction 276
- inverse monitoring 484
- inverse problem 61, 223, 226
- inverse recovery preparation 349
- inverse solution 175ff
- inversion fast spin echo 406
- inversion recovery contrast 406
- iron 598, 601
  - chelator 529f, 543
  - overload 529f, 536
  - oxide 3, 597
- ischemia 255, 378f, 382, 391
  - chronic 179
  - induced 185, 187
- ischemic heart disease (IHD) 183ff, 190, 589
- isointegral maps 189
- Isolex 300i 17
- IUD *see* intrauterine devices

**j**

Josephson junction 104, 107, 153

**k**

Karhunen-Loeve transformation 189

k-space 312, 355, 388, 420

**l**

laboratory system 315

language 238f, 372

language related field 251

Larmor frequency 299f, 305, 308, 315, 330

Larmor-spin precision 70

late fields 198f

leadfield matrix 227

left anterior descending 354

left circumflex 354

left ventricular hypertrophy (LVH) 192

Lenz's law 41

lexical-semantic integration 239

linear estimation 228

line width 306

liposomes 596

liver iron 529ff

– concentration 530, 538

lodestone 4f

longitudinal relaxation 308

long term potentiation (LTP) 524

Lorentz force 35f

LORETA *see* low resolution electromagnetic tomography

loss power 556

– specific 552, 555, 562

low resolution electromagnetic tomography (LORETA) 229

low-temperature superconductivity (LTS) 154

LTS *see* low-temperature superconductivity

LVH *see* left ventricular hypertrophy

Lyapunov exponent 220

**m**

MACS technology 572ff

magnetic resonance techniques, protection of patients and volunteers 89, 91, 93

maghemite 556, 562

MAGMA-system 488ff

MagMOON *see* magnetically-modulated optical nanoprobe

Magnes 3

magnesite 5

magnet

– cow 10

– electromagnetic 8, 13

– giant 8

– hand-held electromagnet 8

– horse shoe 8

– NdFeB 12ff

– permanent 14, 333, 479, 500

– pole 4

– SmCo 12ff

– superconducting 13f

– superconductivity 333, 336

magnetically marked tablet, disintegration 493

magnetically-modulated optical nanoprobe (MagMOON) 608

magnetically targetable carrier (MTC) 600

magnetic anisotropy 46ff, 553, 556, 563

magnetic carrier 607

magnetic cell separation 571ff

magnetic dipole moment 298

magnetic domains 51ff

magnetic drug targeting 596ff

– schematic principle 601

magnetic field 29, 35, 37ff, 65, 78f, 330, 596

– alternating 502

– alternating pulse 512

– basic restrictions 77, 85f

– biological effects 79, 82, 85

– cardiac 279

– component 169

– conversion rules 66

– distribution 169

– effects on man 18

– electromagnetic (EMF) 18

– exposure limits 78, 81, 84f

– generation 66ff

– gradient 19, 83, 89ff, 90, 305, 311, 314, 348

– in diagnosis 479

– in therapy 479

– intensity 39

– interaction mechanisms 78ff

– measurement 66, 70ff

– parameters 186

– physiologic effects 18ff

– pulsed EMF 18

– reference levels 86f

– rotating 503

– safety aspects 81, 84, 89

– static 18, 78ff, 90

– time varying 78ff, 512, 514

– units 66

magnetic field map (MFM) 164, 168ff, 174, 181

– orientation 187ff

magnetic field tomography (MFT) 229, 239

magnetic fluid hyperthermia (MFH) 15

magnetic flux 105f, 537

- magnetic guidance 608f
- magnetic hysteresis loss 502
- magnetic implant 610
- magnetic induction 38, 49
- magnetic labeling 574
- magnetic loss energy 552
- magnetic marker 483ff, 490
- magnetic mismatch negativity 238
- magnetic moment 309
- magnetic monitoring 481ff
- magnetic nanoparticle 551
- magnetic noise 531, 540
- magnetic particle imaging (MPI) 606f
- magnetic potential 30f, 35
  - scalar 30
  - vector 31
- magnetic receptor 19
- magnetic relaxation 59ff
- magnetic resonance
  - antenna 337
  - guidance 417f
  - monitoring 417
  - stereotactic systems 417, 424
- magnetic resonance angiography (MRA)
  - 324, 353, 383, 403
  - black-blood 343, 356
  - breath-hold 354
- magnetic resonance imaging (MRI) 17, 293, 311ff, 521, 529, 536, 541
  - basic 362f
  - contrast enhanced 438
  - delayed-enhancement 351
  - diffusion- and perfusion-weighted 378
  - dynamic 438
  - echo-based 343
  - functional 362ff, 392, 404, 522
  - high speed 383
  - intraoperative 423
  - methods for 363
  - of GI-tract 482
  - parallel 443
  - post processing 439
  - ultrahigh-field 294, 398
- magnetic resonance mammography (MRM)
  - 295, 437ff
  - DWI 443
  - dynamic 437
  - parallel imaging 443
  - sensitivity 441
  - sequence techniques 443
- magnetic resonance (MR), microscopy 314
- magnetic resonance spectroscopy (MRS)
  - 295, 327ff, 456ff
  - carbon 460, 469
  - fluorine 469
  - high-resolution 459
  - high-resolution molecular 456
  - phosphorus 460, 463, 466, 471
  - proton 458, 460ff
  - signal 301
- magnetic resonance techniques,
  - contraindications 93f
- magnetic sense 19
- magnetic sensor 486
- magnetic source imaging (MSI) 146, 148
  - biomagnetic recording 613
- magnetic stereotaxis 67
- magnetic stimulation 511ff
- magnetic substance 479
- magnetic susceptibility 41, 398, 531
- magnetic viscosity 59
- magnetic volume susceptibility 536
- magnetism, history of 3ff
- magnetite 3, 5, 556f, 559, 562
  - milk mixture 5
- magnetization 38ff, 41, 45, 309, 315, 327
  - curves 53ff
  - homogeneous 45
  - stray fields 51
  - vector 40
- magnetization transfer contrast (MTC) 309
- magnetocardiogram (MCG) 102, 164, 189
  - fetal 103
  - multichannel 192, 197f
  - single channel 172
- magnetocardiography (MCG) 164ff
  - fetal 268, 614
  - multichannel 269
  - signal 184
- magnetoencephalogram (MEG) 103, 130f
  - fetal 103
  - whole-head 145
- magnetoencephalography (MEG) 210ff, 219, 236, 255
  - fetal 279ff
  - generation 223f
  - influencing factors on data quality 280
  - signals 221
- magnetofection 600
- magnetogastrogram (MGG) 103
- magnetography, fetal 268ff
- magnetoliposome 564, 569, 602
- magnetometer 132
  - AMR 71f
  - atomic 70
  - CMR 73
  - flux-gate 70ff
  - GMR 72

- Hall 73
  - magneto-optical 73
  - magnetoresistive 72
  - SQUID 70
  - twin-dewar 145
  - vector 151f
  - magnetomyogram (MMG) 102
  - magnetoneurogram (MNG) 103
  - magnetooculogram (MOG) 103
  - magnetoctinogram (MRG) 103
  - magnetosomes 553, 563
  - marker 483ff, 490
    - localization 488
    - neuronal 465
    - passage 491, 495
    - rotation 492
  - Maximilian Höll 11
  - maximum intensity projection (MIP) 325
  - maximum likelihood 228
  - Maxwell equations 27ff, 31, 39, 223
  - Maxwell gradient 335
  - MCG *see* magnetocardiography
  - median nerve 230
  - MEG *see* magnetoencephalography, *see* magnetoencephalography
  - MEM *see* minimum entropy method
  - MEP *see* motor evoked potential
  - MGG *see* magnetogastrogram
  - Meissner-Ochsenfeld effect 104
  - membrane potential 212
  - memory 243
  - memory metal 501
  - Mesmer, Franz Anton 11f
  - Mesmer's tub (baquet de Mesmer) 12f
  - mesmerism 10
  - meso-caval shunt 432
  - MFH *see* magnetic fluid hyperthermia
  - MFM *see* magnetic field map
  - MFT *see* magnetic field tomography
  - MicroBeads 573f, 588
    - antibody-conjugated 575
    - superparamagnetic 575
  - microcoil 422
  - microsphere 597
    - albumin 597
  - minimally invasive therapy 445f
  - minimum entropy method (MEM) 367
  - minimum norm estimate 179, 190
  - minimum norm least squares (MNLS) 228, 228f
  - MIP *see* maximum intensity projection
  - mirror neuron system 241
  - mismatch negativity 281, 283
  - MMG *see* magnetomyogram
  - MNG *see* magnetoneurogram
  - MNLS *see* minimum norm least squares
  - MOG *see* magnetooculogram
  - molecular imaging 449
  - molecular motion 309
  - moment of inertia 310
  - mononuclear phagocyte system 602
  - motility 481f, 489, 491
  - motion compensation 326
  - motor action 242
  - motor evoked potential (MEP) 518ff
  - motor imagery 241
  - motor system 230ff, 235
  - movement evoked field 235
  - MPI *see* magnetic particle imaging
  - MPR *see* multiplanar reformatting
  - MR *see* magnetic resonance
  - MRA *see* magnetic resonance angiography
  - MRG *see* magnetorectinogram
  - MRI *see* magnetic resonance imaging
  - MRM *see* magnetic resonance mammo-  
graphy
  - MRS *see* magnetic resonance spectroscopy
  - MSI *see* magnetic source imaging
  - MTC *see* magnetically targetable carrier,  
*see* magnetization transfer contrast
  - multiplanar reformatting (MPR) 321
  - multiple sclerosis 408, 462
  - multiple signal classification 230
  - MUMETALL 109
  - MUSIC 226
  - music 239
  - myocardial infarction 172, 183
  - myocardial injection 429
  - myocardial tagging 346
  - myocardial viability 190
  - myocardium 167, 349ff
- n**
- N400m 239
  - NAA *see* N-acetyl-L-aspartate
  - nanoparticle 599f
  - natural killer cell therapy 583f
  - navigated brain stimulation (NBS) 512
  - navigator 353
  - NBS *see* navigated brain stimulation
  - Néel relaxation 555, 557
  - neuromagnetism 210ff, 218, 232ff
  - neuronal activity 362
  - neuronal marker 465
  - neuronal networks 240
  - neuropathology 406
  - neurosurgery, stereotactic 14

- nigrosomes 408
  - Niobe system 14f
  - NMR *see* nuclear magnetic resonance
  - NOE *see* nuclear Overhauser effect
  - noise 310
    - cancellation 127, 135, 139
    - environmental 102ff, 121, 140
    - level 153
  - nonverbal communication 241
  - nuclear magnetic resonance (NMR) 297ff
    - precession frequency 311
  - nuclear magnetization 299, 308
    - motion 300
    - precession 299, 303
    - transverse 312, 316
  - nuclear Overhauser effect (NOE) 457, 459
  - nuclear relaxation 306
  - Nyquist 310, 338
- o**
- object recognition 241
  - occupational exposure 78, 84ff, 89, 93
    - to magnetic fields 86
    - to radiofrequency electromagnetic fields 93
  - olfactory system 234
  - oncology 597
  - orthodontics 16
  - osmolyte 465
  - overhead gantry system 121
  - oxyhemoglobin 362
- p**
- pacemaker 13, 81, 94, 268
  - Paracelsus 11
  - parallel imaging 384
  - paramagnet 41
  - para-operational device (POD) 611
  - Parkinson disease 408
  - partial acquisition techniques (PAT) 317f, 338
    - PAT *see* partial acquisition techniques
  - patient support system 121, 128
  - PCA *see* principal component analysis
  - penumbra 381
  - percutaneous therapy, MR guided 427f
  - Peregrinus 3f
  - perfusion-weighted imaging (PWI) 378
    - DWI/PWI mismatch 378, 382
    - pulse sequences 383f
  - permanent magnet 69
  - PET *see* positron emission tomography
  - PGSE *see* pulsed gradient spin echo
  - phase
    - encoding 321
    - memory 320
    - sensitive detection 325
  - phase-contrast angiography 325
  - phosphocreatine 461, 465
  - photic driving 232
  - pick-up coil (detection coil) 127, 146, 148ff
  - pigeon 19
  - pixel 313, 322
  - Pliny the Elder 5
  - POD *see* para-operational device
  - point-resolved spectroscopy (PRESS) 458, 462, 467
  - Poisson equation 31
  - polarized field, circular 308
  - positron emission tomography (PET) 17, 458
  - postsynaptic potential 213
  - PQRST complex 273
  - pre-excitation 174, 178, 196f
  - PRESS *see* point-resolved spectroscopy
  - primary motor cortex 245
  - primary somatosensory cortex 245
  - principal component analysis (PCA) 222
  - PROPELLER method 387ff
  - prostate cancer 473
  - prosthesis, oral and maxillo-facial 16
  - protection
    - guidance 76f
    - of patients and volunteers 93f
  - proton density 402
  - pseudo current density 191
  - PSIF 320
  - 90° pulse 301, 304, 321
  - 180° pulse 304, 321
  - pulsed gradient spin echo (PGSE) 305
  - pulse sequence 318
  - P wave 195, 269, 271, 276
  - PWI *see* perfusion-weighted imaging
  - pyramidal cell 214
- q**
- QRS 172, 188, 192
    - complex 185, 269, 271, 276
    - fragmentation 199f
    - interval 170, 186
  - QT dispersion 185, 199f
  - QT intervall 271
  - QT prolongation 275
  - Q wave 171

**r**

radiation shield 109  
 radiofrequency bombarder unit 504  
 radiofrequency electromagnetic field 84, 91  
 – basic restrictions 85f, 92  
 – biological effects 87, 91  
 – exposure limits 89, 93  
 – interaction mechanisms 84ff  
 – reference levels 86f  
 – safety aspects 89  
 radiofrequency field 299ff, 330, 336  
 – circular 337  
 – perpendicular 337  
 radiofrequency heating 15  
 radiofrequency power 336  
 radiofrequency pulse 315, 320  
 – tailored 399  
 RATN 240  
 Rayleigh loss 554  
 Rayleigh regime 561  
 reading 239  
 receiver 336  
 reciprocity theorem 537  
 Reed switch 501  
 reference coil 145  
 relaxation 301, 555f  
 – longitudinal 301, 304, 314  
 – nuclear 306  
 – rates 307  
 – spin-lattice 302  
 – spin-spin 302  
 – time 319  
 – transversal 302f  
 relaxation time 362  
 – changes 400  
 repetition time 320ff  
 repolarization 167f, 190  
 resolution matrix 229  
 resonator 337  
 response to therapy 473  
 retinotropic mapping 370  
 rheobase 331  
 right anterior temporal negativity 240  
 right coronary artery 354  
 rigid lattice 306  
 RMS *see* root mean square  
 robotic system 446  
 root mean square (RMS) 108  
 root mean square of successive differences 272  
 rotating frame 299, 311, 315  
 R wave 170, 274, 344, 346

**s**

safety pin removal 10  
 SAM *see* synthetic aperture magnetometry  
 SAR *see* specific absorption rate  
 sampling theorem 313  
 saturation 309, 322  
 saturation recovery magnetization preparation 349  
 scalar coupling (J-coupling) 457  
 scanning method 229  
 scintigraphy 482, 506f  
 selective excitation 314ff  
 SENSE *see* SENSitivity Encoding  
 sensitivity 457f  
 – profile 317  
 SENSitivity Encoding (SENSE) 318, 387f  
 sensor separation 127  
 separation column 576  
 shielded room 109ff  
 shielding 109ff, 136, 338  
 – active 112  
 – factor 109ff  
 – passive 109, 111  
 – superconducting magnetic 112  
 shim 458  
 shimming 328, 334, 400  
 sickle cell disease 539  
 signal morphology 184  
 signal space projection 135  
 signal space separation 136  
 signal-to-noise ratio 309ff, 345, 364, 458  
 simultaneous acquisition of spatial harmonics (SMASH) 317f, 293  
 single-domain state 56ff  
 single-shot image 349  
 single-side band modulator 338  
 single-voxel spectroscopy 328, 458, 462, 473  
 SMASH *see* simultaneous acquisition of spatial harmonics  
 social recognition system 241  
 software gradiometer 115  
 somatosensory system 230f  
 somatotopy 245  
 sonography 482  
 source localization 176, 230, 276  
 source modeling 223f, 276  
 source reconstruction 222  
 SPAMM *see* spatial modulation of magnetization  
 spatial analysis 192  
 spatial filters 220, 229  
 spatial frequency 313  
 spatial modulation of magnetization (SPAMM) 346

- spatial resolution 314, 317
  - spatio-temporal dipole model 222, 227
  - specific absorption rate (SAR) 78, 86f, 92f, 338, 405
  - spectral density 307
  - spectral editing 328
  - spectroscopic imaging 329, 458
  - speech production 239
  - sphere model 224
  - spikes 253ff
  - spin 299, 325
  - spin echo 322, 326, 364
    - contrast 404
    - density 310
  - spin-spin coupling 457
  - spin-spin relaxation 302
  - spiral imaging 388f
  - splinter removal 7
  - spreading depression 148
    - cortical 150
  - SQUID 102, 104ff, 108, 123, 139f, 164, 190, 279, 481, 484, 529
    - ac-field 532
    - biomagnetic 482f, 613
    - dc 104, 125
    - dc-field low  $T_C$  531
    - flux-lock-loop 129
    - low  $T_C$  539
    - micro 144, 147ff
    - MMM 482, 493
    - rf 105
    - single-channel rf 533
    - voltage 537f
  - standard deviation of normal-to-normal beats 272
  - standard inversion recovery spin echo 406
  - statistical analysis 367f
  - ST depression 184
  - ST segment 184, 188, 269
  - steady-state free precession technique 344ff
    - breath-hold (volume targeted) 355
  - STEAM *see* stimulated echo acquisition mode
  - stem cell 431
    - enrichment 580
    - transplantation 580f, 584, 589
  - stereotaxis 14
  - stimulated echo 304
  - stimulated echo acquisition mode (STEAM) 458
  - stimulation 367f
  - Stokes theorem 28, 39
  - stomach 490, 492
  - Stoner-Wohlfarth model 57
  - Stoner-Wohlfarth particles 553
  - stray field 51
    - curves 53ff
  - stroke 378, 382ff
    - imaging 391
    - subacute 407
  - substantia nigra 408
  - Sucruta 5f
  - sudden cardiac death 192
  - supercon 322f
  - superconductive systems, cylindrical 418
  - superinsulation 116
  - superparamagnetism 56ff, 552, 556, 562, 575
  - surface coils 421
  - surface Laplacian 219
  - susceptibility 41, 323, 398, 556
  - susceptibility-weighted imaging (SWI) 403f
  - SWI *see* susceptibility-weighted imaging
  - syntactic violation 238
  - synthetic aperture magnetometry (SAM) 230
- t**
- $T_1, T_2$  301, 308, 321, 364, 366, 402
    - relaxation 401
  - $T_2^*$  544
  - $T_2$  shine through 381
  - tachycardia 275
    - ventricular 173, 175, 181
  - tangential derivative 219
  - targeting 566
  - Taylor expansion 31
  - T cell 574
    - activation 585
    - antigen-specific 585
  - T cell isolation 586
    - cytotoxic 584
    - regulatory 585
  - TEM coil 400
  - temperature rise 87f, 92
  - temporal analysis 192
  - terrella 4
  - Tesla 103
  - thalassemia 530, 539
  - Thales of Miletus 4
  - thermal ablation 418, 427, 550ff
  - thermal activation 555
  - thermometry 428
  - thrombolytic therapy 382
  - TIM *see* total imaging matrix
  - time of flight (TOF) 325
  - TMS *see* transcranial magnetic stimulation
  - TOF *see* time of flight
  - tonotopy 232

- torque 299
- total epileptic discharge 255
- total imaging matrix (TIM) 338
- trackable interventional device 420, 425
- tracking coil 422
- transcranial magnetic stimulation (TMS) 513f, 614
- transfection 600
- transferrin 531, 533
- transition probability 308
- transmitter 308
- transversal relaxation 320
- trial of transplacental cardioversion 275
- TSE *see* turbo spin echo
- TSENSE 345
- tumor 406, 438, 449, 466, 468f, 473, 522, 550, 559, 564ff, 598
- tumor purging 582
- tumor therapy 571
- turbo spin echo (TSE) 343
  - imaging 323
- T wave 170, 184f, 188, 192, 269, 271
  
- u**
- unshielded setting 180f
- user-interface 423
  
- v**
- vectorial stimulation 513
- vector magnetograph 140f
- vector magnetometer 140f
- VENC 348
- ventricular tachycardia 173, 175, 181
- vernix 276
- viability 343
- visual system 232, 282, 370
- volume conductor 171, 177
- volume current 169, 215
- voxel 309, 311, 328f, 366, 385
  - size 310
- VSM MedTech 125ff
  
- w**
- Wada test 373
- Wallerian degeneration 384
- wavefront propagation 176
- wavelet transform 219
- Weidemann relationship 536
- weighting matrix 228
- Wernicke's area 239, 372
- white matter tract 385
- Wilhelm Fabricius of Hildanus 7
- William Gilbert 3ff
- Wolff-Parkinson-White (WPW) syndrome 173, 175, 177, 196, 275
- Wood's metal 502, 504
- working memory 237
  
- x**
- XMR unit 418

