Index

aberration, 253, 254, 271
accretion, 179
accretion-induced collapse, 195
accretion-powered pulsar, 170
ages of pulsars, 110
AGILE, 2, 30
Alfvén surface, 179
Alfvén waves, 275
Allan variance, 74, 102
angular diameter, 57, 206
anomalous dispersion, 37
Anomalous X-ray Pulsars (AXPs), 186
astrometric reference frames, 66
Baade’s star, 1, 201, 204, 205
Baade, W., 1, 192, 200
barycentre, 63, 76
barycentric arrival times, 64
barycentric correction, 65
beam geometry, 209, 216
beam factor, 211
beamshape, 216, 227
beamwidth, 209, 211, 226, 248
frequency dependence, 211, 250
MSPs, 252
Bell, Jocelyn, 3, 307
binary disruption, 151
binary orbit parameters, 76
binary orbit, evolution, 80
binary orbits, 6, 76, 155, 173
binary pulsars, 39
black widow, 162
eccentricity, 156
eclipsing, 163
evolution, 153
main sequence, 163
white dwarf, 56, 156, 160, 162
binary stars, 16, 151
birthrate, 114
black hole, 16, 178, 194
black widows, 162, 164
bow shock, 147
braking index, 72, 92, 144
brightness temperature, 274
Cas A, 197
cascade process, 267
Cassiopeia A, 198, 206
Centaurus X-3, 2
Cerenkov airshower telescopes, 32
CGRO, 2, 30
Chandra X-ray telescope, 29
Chandrasekhar limit, 17, 195
class age, 72, 134
classic frequency, 260
circular polarisation, 222, 224, 261, 277
coherence, 265, 273
core and cone components, 213, 230, 251
COS-B, 2
Crab Nebula, 1, 8, 9, 11, 118, 146, 192, 200, 201
Crab Pulsar, 9, 117, 256
discovery, 10, 118
giant pulses, 118, 125, 243, 256
glitches, 88, 89, 93, 94
optical pulses, 10, 121, 127
polarisation, 123
precursor, 121
pulse profile, 119
scattering, 295
scintillation, 297
spectrum, 121
X-ray pulses, 2, 11
critical frequency, 262
crust, 96, 99
crust, of neutron star, 18, 22
curvature radiation, 258, 262, 269
circular polarisation, 263
spectrum, 263, 264
cyclotron absorption lines, 23
cyclotron frequency, 258
cyclotron radiation, 258
circular polarisation, 258
cyclotron resonance, 187
absorption, 179
dispersal, 37
deepest, 37
death line, 113, 232
degeneracy, 17
dispersion constant \(D\), 36
dispersion measure, 36, 49, 302
changes, 299
double neutron star binaries, 83, 155
Double Pulsar J0737−3039A/B, 85, 155
drifting, 234
drift rates, 238
dynamical distances, 49
Index

Earth's orbit, 62, 66
eccentric anomaly, 78
eccentricity, 76, 155, 156
eclipsing binaries, 163, 164
Eddington limit, 178
efficiency, 142
electron distribution, Galactic, 57, 58
electron lifetime, 203, 261
electron-capture supernova, 196
eccentric anomaly, 78
eccentricity, 76, 155, 156
eclipsing binaries, 163, 164
Eddington limit, 178
efficiency, 142
electron distribution, Galactic, 57, 58
electron lifetime, 203, 261
electron-capture supernova, 196
eccentric anomaly, 78
eccentricity, 76, 155, 156
eclipsing binaries, 163, 164
Eddington limit, 178
efficiency, 142
electron distribution, Galactic, 57, 58
electron lifetime, 203, 261
electron-capture supernova, 196
eccentric anomaly, 78
eccentricity, 76, 155, 156
eclipsing binaries, 163, 164
Eddington limit, 178
efficiency, 142
electron distribution, Galactic, 57, 58
electron lifetime, 203, 261
electron-capture supernova, 196
Faraday rotation, 14, 300, 302
fast Fourier transform FFT, 39
FAST reflector telescope, 311
Fermi gamma-ray telescope, 30
Fermi LAT, 12, 311
Fermi Observatory, 2, 12
frequency dispersion, 35
Fresnel distance, 283
Galactic centre, 112
Galactic electron distribution, 58
Galactic population, 106, 110
gamma-ray bursts (GRBs), 184
gamma-ray spectrum, 139, 246, 271
gamma-ray telescopes, 29
Geminga Pulsar, 11, 137, 245
general relativity (GR), 65
giant pulses, 118, 125, 132, 231, 243, 256, 278
  location, 278
glitch, 15, 23, 88, 89
  recovery, 93
globular clusters, 14, 17, 42, 56, 166
  47 Tuc, 14, 41, 70, 167
  M15, 299
  Ter 5, 167
  Gold.T., 8, 9
Goldreich & Julian magnetosphere, 24
Goldreich-Julian current, 142
Goldreich-Julian model, 247, 267
gravitational acceleration, 69
  gravitational radiation, 7, 13, 81, 162
  gravitational redshift, 21, 65
  gravitational waves, 85, 104
  group velocity, 35
  Guitar Nebula, 147
  gyrofrequency, 259
H II regions, 57, 306
H I line absorption, 53
harmonic addition, 34
HEAO-2, 29
height of emission, 249, 251, 253, 276
Hercules X-1, 2, 174
HESS, 32
Hewish, A., 3
HMXBs, 170, 174
Hulse-Taylor binary, 76, 153, 162
HZ Her, 178
integrated pulse profiles
  high energy, 207, 227
  MSPs, 216
  radio, 208
  interpulse, 208, 216
interstellar magnetic field, 300, 303
  random component, 305, 306
interstellar medium, 13
interstellar scattering, 57
inverse Compton effect, 187, 264, 269
ionised hydrogen H II, 57
isolated X-ray neutron stars (XDINSs), 187
kinematic distances, 49, 60
kinetic ages, 112
Kolmogorov turbulence, 284
Large Magellanic Cloud (LMC), 136, 308
Larmor frequency, 258
LAT, 12
LMXBs, 170, 174, 176
Local Bubble, 138
LOFAR, 28, 311
luminosity, 142
  distribution, 107
  evolution, 113
  spin-down, 271
Magellanic Clouds, 15, 136, 308
magnetars, 171, 184, 310
  origin, 189
  magnetic field
    alignment, 208
    decay, 112
    interstellar, 300
    magnetars, 180
    millisecond pulsars, 168
    quantum limit, 180
    sweep-back, 253
    magnetic field strength, 71
    magnetobremsstrahlung, 202, 260
    magnetosphere, 15, 24, 144, 248
    structure, 278
Magnus force, 98
main-sequence companions, 163
maser amplification, 264
mass function, 78, 158
mass transfer in binaries, 151
massive binary companions, 163
micropulses, 243
microstructure, 230, 243
millisecond pulsars, 14, 151
discovery, 153
  magnetic fields, 168
  ages, 116
  discovery, 12
  glitch, 88
  polarisation, 226
  population, 115
  solitary, 163
  surveys, 42
  X-ray, 172
Index

mode changing, 232
mode switching, 104, 218, 225, 276
modulation of pulse power, 235
multipath propagation, 57, 128
MWA, 28
nanoshots, 126
neutral hydrogen absorption, 53
neutron star, 1, 6, 9, 16
crystalline crust, 22, 96
density, 18, 22
diameter, 20
magnetic field, 15
magnetic field, flux tubes, 23
magnetic field, strength, 23
mass, 15, 19, 78, 156
moment of inertia, 19
redshift at surface, 21
solid core, 23
superfluid interior, 22, 96
neutron superfluid, 97
notch, in profile, 217, 252, 263
nulling, 104, 232, 240
occultation, 164
optical identifications, 54
orbital inclination, 157, 174
orthogonally polarised modes, 225, 275
oscillation, of stars, 6
outer gap, 245, 254, 267, 269
Outer Gap model, 246
P −˙P diagram, 151
Pacini,F., 1, 8, 9
pair creation, 268, 270
parallax, 50
Parkes Multibeam Survey, 48, 113
periastron advance, 81
period, lower limit, 8
periodogram analysis, 33
pinned vortices, 97
planetary orbits, 6
planetary pulsar systems, 86
plasma frequency, 35, 274
plasma instability, 277
plasma waves, 274
plerion, 146, 198
polar cap, 247, 248, 267, 274
diameter, 248
polarisation
angle swing, 133, 210, 219, 221, 226
curvature radiation, 263
cyclotron radiation, 258
limiting radius, 277
synchrotron radiation, 261
polarisation geometry, 219
population, Galactic, 14, 106, 156, 309
precession, 70, 81
precursor, 121, 122, 133, 216
propagation
magnetospheric, 275
proper motion, 68, 110, 135, 169, 290
PSR B0355+54, 272
PSR B0525+21, 220
Index

relativity in binary orbits, 79, 158
retardation, 253, 271
Roche lobe, 174
ROSAT, 29, 172
Rotating Radio Transients (RRATs), 187, 188, 234
rotating vector model (RVM), 219
rotation measure, 301
rotation slowdown, 7, 9, 71, 72, 142, 145
rotational energy, 117
RXTE, 29
SAS-2, 2
scale height, in Galaxy, 58, 109, 116, 169
scattering coefficient, 282
scintillation, 3, 57, 128, 279
apparent source diameter, 297
arcs, 288
bandwidth, 284
coherece scale, 283
diffraction theory, 281
dynamic spectrum, 284, 287
frequency drifting, 286
pattern, 281
refractive, 298
slow, 298
spectrum, 284
strong and weak, 283
thick screen, 282
time scale, 284
Sco X-1, 2, 170
search techniques, 33
secular acceleration, 52
self-absorption, 264
self-organised criticality, 92
Shapiro delay, 63, 66, 79, 160
Shklovsky effect, 52, 69, 79, 82
Shklovsky, I. 202
signal averaging, 45
slow scintillation, 128, 298
Soft Gamma-ray Repeaters (SGRs), 184
spark discharge, 240
spatial distribution, 107
spectral index, 121, 251, 263, 271, 272
spin-down luminosity, 142, 271, 273
spin-orbit coupling, 84
Square Kilometre Array (SKA), 28, 48, 307, 311
standard clocks, 73
stellar evolution, 194
stellar oscillations, 6
Strömgren sphere, 57
strange matter star, 20
Strong Equivalence Principle, 84
sub-pulses, 207, 230, 234
polarisation, 230, 240
width, 234
superfluid vortices, 22
superfluid rotation, 97
supernova, 192
light curve, 193, 196
precursors, 194
progenitors, 16, 195
rate, 115, 196, 197
types, 192
supernova rate, 115
supernova remnants (SNR), 42, 54, 134, 197
3C58, 134, 206
composite, 206
Crab, 200
CTB 80, 135
Cygnus Loop, 198
IC443, 198
Kepler, 199
Kes 23, 136
Kes 75, 137
S147, 135
Tycho, 199
supernovae in binaries, 195
surveys, 43, 105, 112
sensitivity limits, 45, 107
synchrotron radiation, 202, 258, 300
polarisation, 202, 261
spectrum, 260, 263
telescopes, 27
TEMPO analysis system, 61
temperature radiation, optical, 28
thermal X-ray sources, 21, 170, 206
timing noise, 68, 88, 100, 102
activity parameter, 101
timing residuals, 67
transient X-ray sources, 178
transverse Doppler effect, 79
transverse motion, 52, 69
transverse velocity, 290
tree anomaly, 78
Two Pole Caustic model, 246, 254, 271
UHURU X-ray satellite, 2, 170
Universal Time (UTC), 73
Vela Nebula, 128, 146
Vela Pulsar, 8, 9, 117, 128, 219, 256, 294
discovery, 129
giant pulses, 132
glitches, 88, 89, 95, 99
polarisation, 133
pulse profile, 129, 132
spectrum, 129
velocities of pulsars, 110, 116, 146, 169
velocity-of-light cylinder, 24, 247, 248
velocity of scintillation, 289
vorticity, 15, 97
white dwarf, 6, 17, 162, 167, 195
mass, 16
wind nebula, 129
X-ray absorption lines, 21
X-ray binaries, 1, 14, 24
X-ray flares, 21
X-ray pulsars, 135, 136
## Index

<table>
<thead>
<tr>
<th>X-ray sources</th>
<th>X-ray telescopes, 28, 172</th>
</tr>
</thead>
<tbody>
<tr>
<td>bursters, 180, 182</td>
<td>XDINs, 188</td>
</tr>
<tr>
<td>companion masses, 173</td>
<td>XMM-Newton, 29</td>
</tr>
<tr>
<td>discovery, 2</td>
<td>Zeeman effect, 301</td>
</tr>
<tr>
<td>extragalactic, 174</td>
<td>Zwicky, F., 1, 192</td>
</tr>
<tr>
<td>rotation powered, 170</td>
<td></td>
</tr>
<tr>
<td>transients, 178</td>
<td></td>
</tr>
</tbody>
</table>