CAMBRIDGE
Cambridge University Press & Assessment
978-0-521-83476-6 — Astrophysical Jets and Beams
Michael D. Smith
Index
More Information

Index

3C 31, 53, 55, 194
3C 47, 61, 62
3C 48, 7
3C 75, 55, 56
3C 83.1B, 59
3C 109, 61
3C 120, 70
3C 130, 57, 58
3C 196, 7
3C 200, 61, 62
3C 219, 52
3C 273, 7, 74–77, 78
3C 275.1, 61
3C 279, 7, 8, 71–73, 84, 86, 87
3C 296, 54, 55
3C 310, 63
3C 334, 61–63
3C 345, 70
3C 348, 65
3C 401, 63
3C 405, 3
3C 465, 57
4U 1755-33, 133

acceleration, 203
accretion disc, 9, 11, 15, 35, 36, 48, 60, 71, 73, 74, 78, 87, 91, 94, 95, 98–101, 103, 113, 114, 119, 121, 124, 126, 127, 129, 131, 132, 135–137, 140–143, 162, 163, 172–180, 182–184, 200, 205, 208
accretion rate, 99, 103, 104, 108
active galactic nuclei, 1, 7, 15, 69–71, 89, 157, 172, 206, 207
ADAF jet, 183
adiabatic jet, 33, 158
AE Aqr, 131
afterglow, 140, 143
AGN, 1
Alfvén number, 29, 34, 175
Alfvén radius, 174, 175, 200
Alfvén speed, 34, 48, 155, 169, 174
Alfvén waves, 34, 45, 48, 154, 155, 169, 170
alignment effect, 69
ambipolar diffusion, 47, 48, 111, 117, 205
angular momentum, 2, 5, 12, 15, 34, 36, 91, 92, 99, 103, 113, 114, 119, 175–177, 179, 180, 205
asymptotic giant branch, 9, 121, 122, 124
atomic processes, 24

B2 0738+313, 84
B2 0844+31, 53, 54
B2 1308+326, 84
ballistic, 5, 9, 92, 95, 103, 109, 120, 166
beam, 3, 4, 7, 10
bending, 58, 75, 94
Bernoulli equation, 36, 37, 39, 191
Bernoulli integral, 35
Bernoulli's constant, 35, 39
binary system, 95, 108, 109, 112, 114, 122–124, 126–134, 136, 143, 200
bipolar episodic rotating jets, 123
bipolar nebula, 9
bipolar outflow, 8, 15, 91, 92, 96, 97, 103, 104, 109, 114, 117, 118, 125, 130
BL Lac object, 54, 84–88, 206
black box model, 7
black hole, 1, 9, 10, 56, 60, 69–71, 73–75, 78, 80, 81, 84, 88, 89, 121, 128, 131–137, 140–142, 157, 159, 162, 179, 180, 183, 184, 195, 205
Blandford–Znajek mechanism, 179
blazar, 70, 71, 73, 74, 78, 81, 84–90, 180, 195, 204
BL Lacertae, 74, 85
Bologna catalogue, 53
boundary layer, 32
bow shock, 5, 66, 91, 92, 95, 101, 104–106, 109, 111, 112, 115–117, 120, 122, 123, 188, 196, 201
bremsstrahlung, 23, 65, 100, 133
brightness temperature, 22, 87, 88
bullets, 5, 8, 109, 115
buoyancy, 3

C-type shock, 48
candle-flame model, 161
carbon monoxide, 8, 25, 26

© in this web service Cambridge University Press & Assessment www.cambridge.org

CAMBRIDGE
Cambridge University Press & Assessment
978-0-521-83476-6 — Astrophysical Jets and Beams
Michael D. Smith
Index
More Information

Cassini spacecraft, 151
cataclysmic variable, 131, 163
Cepheus A, 114
CH Cyg, 124, 125
champagne flow, 161
chimney, 157, 161, 184
chromospheric jets, 154, 155
Circinus X-1, 133
circumstellar disc, 92–94, 103
circumstellar envelope, 91, 110, 113, 114, 116, 118, 123
classical doubles, 61, 65
co-rotation radius, 113, 177
cocoon, 115, 187, 189, 190, 193, 195, 197, 198
Cold Faithful model, 168
collapsars, 10, 121, 140, 141
collimation, 12, 29, 92, 93, 95, 102, 108, 114, 120, 143, 162, 164, 165, 178, 181, 203
collisions, 194
comet, 1, 5, 6, 13, 16, 32, 144–151, 156, 158, 163–167
Comet b, 1881, 6
Comet Borrelly, 146–148
Comet Hale-Bopp, 1, 2, 145
Comet Halley, 5, 145, 146, 148, 164
Comet Hartley 2, 150, 151
Comet Hyakutake, 144, 145
Comet Kohoutek, 144
Comet Machholz, 149
Comet Tempel 1, 149, 150
Comet Wild 2, 148
compact flat-spectrum source, 21, 22, 50, 51
compact symmetric objects, 207
Compton catastrophe, 22, 86, 87
content, 203, 205
coronal jet, 153, 155, 169, 171
cosmic microwave background, 68
counterjet, 8, 68, 94, 100, 102, 106, 138
Crab Nebula, 7, 10
Crab pulsar, 10, 138–140
critical density, 24
CRL 618, 123
CRL 2688, 123
cross-wind, 201
cryovolcanic processes, 168
current-carrying jets, 181
current density, 32
current sheet, 170
current-driven instability, 199, 200
Cygnus A, 3, 7, 51, 61, 65–67
Cygnus X-1, 9, 133
Cygnus X-3, 134

de Laval nozzle, 34, 158–161, 164, 167, 170, 181
Deep Impact, 149–151
Deep Space 1, 146
deflection, 194, 195, 201, 202
DG Tau, 92, 98–101
DG Tau B, 92
disc, 14
disc wind, 107
disruption of jet, 193, 194, 197
Doppler effect, 70, 74, 84, 87
Doppler factor, 77, 80, 82, 83, 85–88
Doppler favouritism, 84
DR 21, 114
dust jet, 147, 148, 151, 152, 164, 166, 167

eclipsing binary, 9, 130
Eddington limit, 137
Egg Nebula, 123
electron–positron jet, 60, 203, 204
electron–proton jet, 205
emission lines, 23–25
Enceladus, 151, 152, 167, 168
entrainment, 104, 197
equipartition, 20, 30
Eskimo nebula, 10
Euler equation, 30, 35, 36, 38
external Compton model, 73, 86, 87
extragalactic jets, 19, 28, 32, 34, 50, 69, 157, 160, 172, 197, 203
extragalactic medium, 1

Fanaroff–Riley Type I, 51–56, 61, 65, 68, 85, 206
Fanaroff–Riley Type II, 51, 53, 56, 58, 61, 62, 68, 69, 85, 206
Faraday rotation, 22
feedback, 14, 15, 91, 120, 203, 206
Fermi process, 82
fibrils, 154, 169
fireball, 141, 142
flare point, 58
flat spectrum radio quasar, 71, 86
FLIERS, 10
forbidden emission line, 93, 97, 100, 105, 178
Fornax A, 63, 65
fountain, 1
free expansion, 108
free-free emission, 23, 178
Frigid Faithful model, 168
Frothy Faithful model, 168
FSRQ, 71
funnel, 157, 177–181, 183
funnel flow, 35
FU Orionis-type outbursts, 101

gamma-ray burst (GRB), 10, 121, 122, 140–143, 180, 205
gamma-ray jets, 68, 73, 81
geyser, 1, 165, 167
Grad–Shafranov equation, 35–37, 176, 179
GRB, 10
GRB 030329, 140–142
GRB 990123, 10
GRS 1915+105, 135, 136, 183, 196

© in this web service Cambridge University Press & Assessment www.cambridge.org

CAMBRIDGE
Cambridge University Press & Assessment
978-0-521-83476-6 — Astrophysical Jets and Beams
Michael D. Smith
Index
More Information

GRS J1655-40, 136
Gum Nebula, 9

hadronic model, 205
head-tail galaxy, 59–61, 68
helical structure, 77, 100
Henize 2-36, 10
Henize 3-1475, 122
Henize 401, 123
Herbig–Haro object, 5, 8, 9, 92, 101, 105, 114, 118, 161
Hercules A, 63, 65
HH 7, 115
HH 30, 92, 94, 95, 96, 98, 102
HH 34, 103, 105–109, 115, 116
HH 47, 9, 115
HH 111, 103, 104, 108, 109, 110, 116
HH 121, 108
HH 158, 98
HH 211, 112, 113, 114
HH 212, 4, 9, 110, 111, 112, 178
HH 229, 96
HH 240, 115
HH 241, 115
HH 702, 101
Hinode, 154, 155
HL Tau, 92
hot spot, 5, 14, 50, 52, 53, 58, 61–63, 65–68, 138, 188–190
Hubble constant, 51
HYMORS, hybrids, 53
hypernovae, 10, 121

induction equation, 33, 36
interstellar medium, 1, 9, 24, 47, 50, 61, 69, 133, 207
intracluster medium, 58, 60, 61, 63, 65, 189, 206
inverse Compton process, 22, 23, 61, 68, 77, 81, 86, 88, 133, 195, 196, 205
inviscid flow, 30–32, 159
ion-supported torus, 183
ionisation fraction, 98, 99, 102
IRAS 16342-3814, 123
IRAS 16547-4247, 119
irradiation, 14, 94

Kelvin–Helmholtz instability, 75, 102, 159, 194, 195, 197–199
Kruskal–Shafranov criterion, 200

L 1448, 105
L 1630, 4
laminar flow, 31, 191
Large Magellanic Cloud, 129
Larmor frequency, 18, 19
Larmor radius, 32, 160
launch, 5, 10, 11, 84, 92, 103, 119, 120, 140, 141, 158, 159, 161, 162, 164, 170, 172, 174, 176–178, 180, 181, 183–185, 200, 203, 205
Lorentz factor, 18, 37, 39, 43, 75, 77, 84–88, 132, 140, 142, 160, 181, 189, 191, 192, 202
Lorentz factor crisis, 88
Lorentz force, 33, 47
low-mass star, 91, 94, 98, 104, 114, 118, 121
Lyman-alpha jets, 154

M1-16, 123
M 87, 6, 7, 67, 78–81, 195, 196, 204
Mach disc, 115, 116
Mach number, 29, 34, 38, 44, 56, 75, 102, 158, 159, 164, 190, 191, 193, 194, 197, 199, 202
magnetic field, 1, 13, 16–22, 32–34, 36, 43, 44, 47, 48, 52, 53, 55, 61, 62, 68, 72, 73, 77, 81, 89, 90, 100–103, 114, 117, 120, 124, 125, 131, 137, 143, 154–157, 160–162, 169–177, 179–184, 192, 193, 196, 198–200, 203, 208
magnetic hoop stress, 174, 193
magnetic reconnection, 5, 13, 47, 48, 154–156, 168–172, 174, 178, 179, 182, 196
magnetic Reynolds number, 32
magnetic tension, 33
magnetic tower, 182, 183
magnetised accretion-ejection structures, 205
magnetocentrifugal model, 13, 48, 95, 98, 99, 103, 120, 157, 173, 174, 176, 177, 181, 182, 193, 205
magnetohydrodynamics, 11, 32–36, 42, 45, 47, 107, 154, 172, 175, 179, 182, 193
magnetosphere, 35, 92, 141, 177, 179, 193, 206
Mars, 152
masers, 26, 27, 111, 118, 119, 123
massive star, 91, 94, 103, 110, 114, 118
Maxwell's equations, 33
microjet, 92, 93, 99, 101, 104
microquasar, 1, 9, 32, 121, 135–138
molecular cloud, 2–4, 91, 101, 120, 206
molecular hydrogen, 4, 25, 26, 46, 104, 111
molecular jet, 92, 104, 111, 112, 203, 206
molecular processes, 25, 26, 46, 48
mottles, 153, 154, 169
MSH 15-52, 138
MWC 560, 124, 126, 128
MyCn18, 124

naked jets, 55
narrow-angle tail, 59, 60, 201
Navier–Stokes equation, 31
neutron star, 1, 9, 10, 121, 131–133, 136, 177
NGC 315, 52
NGC 612, 54
NGC 1128, 56
NGC 1265, 59
NGC 1316, 64

© in this web service Cambridge University Press & Assessment www.cambridge.org

CAMBRIDGE
Cambridge University Press & Assessment
978-0-521-83476-6 — Astrophysical Jets and Beams
Michael D. Smith
Index
More Information

NGC 1333, 119
NGC 2392, 10
NGC 4486, 6
NGC 6251, 7, 8, 52
NGC 7793, 137
nose cone, 193
nozzle, 1, 157–161, 164–167, 170, 181, 182, 192

O-wind model, 169
OH 231.8+4.2, 123
OMC 1, 114
one-sided system, 7, 10, 13, 53, 58, 61, 62, 70, 75, 79, 82, 84
opening angle, 93, 95, 102, 120, 129, 134, 142, 143, 167, 186, 192, 198
optically violent variable, 71
OVV, 71

pair production, 88
penetration, 1, 3
Pictor A, 67, 68
pinching instability, 82
PKS 0131-36, 54
PKS 1127-145, 67
Planck function, 20
planetary nebula, 9, 10, 25, 121–124, 128
plasmoids, 7
plasmons, 5, 7, 8, 82
plume, 3, 53, 55, 57, 58, 152, 168, 197
polarisation, 21, 22, 52, 57, 62, 73, 82, 85, 89, 143
positrons, 10
potential flow, 34, 35, 39
Poynting flux, 157, 179–182, 195, 205
precession, 9, 77, 95, 98, 123–125, 136, 137, 200, 201
propagation, 11, 190, 195, 196, 202
propeller effect, 177, 193
proper motion, 93, 95, 98, 102, 104, 108–111, 113, 115, 116, 119, 196
protostar, 1–4, 8, 9, 27, 91, 92, 101, 103, 104, 110, 111, 117–119, 169, 196, 202, 203, 206, 207
protostellar core, 92, 104
protostellar jet, 9, 16, 25, 26, 28, 34, 100, 104
PSR B0833-45, 138
PSR B1509-58, 138
pulsar, 10, 138–140, 172
pulsation, 101, 108, 112, 196, 197

QR And, 129
quasar, 4, 7, 8, 15, 22, 50, 54, 62, 63, 67, 70, 71, 74, 76, 77, 84–88, 121

R Aqr, 124, 126, 127
radiation-driven jet, 13, 184
radiative shock wave, 45–47
radio bridge, 61
radio core, 50, 61, 62, 70–73, 75, 77, 78, 80, 81, 84, 85, 88, 89
radio galaxy, 3, 5, 7, 15, 17, 19, 20, 27, 28, 50–53, 55, 56, 59, 61–66, 68–70, 85, 88, 158, 186, 207
radio lobe, 3, 7, 15, 50, 61, 65, 68, 69, 71, 77, 78, 189
Rankine–Hugoniot conditions, 44
recombination radiation, 24
reconfinement, 89, 194–196
recurrent nova, 124, 127, 130
red giant, 124, 128, 132
regulation, 203, 205, 206
relativistic beaming, 2, 14, 18, 51, 57, 58, 61, 74, 80, 82–85, 87, 88, 90, 143
relativistic electrons, 7, 10, 16, 19–22
relativistic flow, 37
relativistic particles, 1, 10, 19
relativistic shock waves, 42
relaxed double, 63–65
relic radio galaxy, 65, 207
Reynolds number, 29, 31, 32, 191
rotation measure, 22
rotation of jets, 98, 99, 103, 113, 119, 207
Rotten Egg Nebula, 123
RS Oph, 124, 127, 128
RW Aur, 96–98, 102
RX J0019.8+2156, 129
RX J0513.9-6951, 131

S 26, 137
Schwarzschild radius, 88, 195
Sco X-1, 9, 132
SED, 28
Seyfert galaxy, 52
shear, 12, 30, 52, 90, 162, 187, 188, 191, 192, 196, 198, 200
sheath, 5, 12, 57, 59, 67, 75, 80, 88, 108, 120, 187, 199, 200
shock wave, 3, 5, 8, 11, 14, 16, 25, 26, 29, 40–48, 58, 59, 67, 70, 71, 75, 82, 84, 89, 90, 92, 93, 97, 98, 100–102, 104–109, 111–119, 122, 123, 125, 127, 133, 138, 141, 154, 155, 159, 161, 162, 169, 170, 172, 178, 187–190, 193–199, 201, 202, 205
simulations, 182, 188–190, 194, 198
slingshot, 7
solar jets, 48, 153, 156
Solar System, 15
sound speed, 31
specific enthalpy, 38, 189
spectral energy distribution, 28, 73, 86, 87
spicules, 34, 153–156, 169, 170
spine, 12, 67, 75, 80, 88, 187, 199
SPLASH scenario, 163
SS 433, 9, 32, 136–138
SS Cyg, 131
star formation, 3, 5, 8, 9, 69, 92, 103, 118, 143

© in this web service Cambridge University Press & Assessment www.cambridge.org

CAMBRIDGE
Cambridge University Press & Assessment
978-0-521-83476-6 — Astrophysical Jets and Beams
Michael D. Smith
Index
More Information

Stardust, 148
streamline, 4, 34–36, 39, 192
sublimation, 163–167
superluminal motion, 8, 9, 62, 63, 70, 71, 75, 80, 82, 85, 88, 121, 135, 136
supernova, 10, 29, 138, 140, 141
supersoft X-ray source, 1, 121, 129, 131
supersonic, 11, 16
symbiotic system, 1, 121, 124–128
synchrotron radiation, 10, 16–22, 27, 50, 55, 61, 67, 70, 72–74, 77, 78, 81, 84, 86, 88, 89, 118, 125, 127, 131, 133, 172, 203
synchrotron self-absorption, 20, 22, 23, 204
synchrotron self Compton, 73, 86–88

T Tauri star, 8, 92, 93, 96, 98, 103, 108, 177
termination, 11, 15, 50, 190
thermal driven jet, 12
thermal jet, 100, 118, 127
thrust, 1, 186
turbulence, 3, 5, 30–32, 59, 61, 91, 120, 189, 191, 193, 206
turbulent entrainment, 60, 198
twin jets, 9, 10, 13, 53, 101
Twin-Exhaust Model, 159, 160, 190

U Sco, 130
ultra-relativistic gas, 37–40
unification, 203, 206, 207

V617 Sgr, 129, 130
V1223 Sgr, 131
V1494 Aql, 131
variability of blazars, 85, 86
Vela pulsar, 10, 139, 140
vent, 1, 2, 13, 32, 152, 157, 163, 166, 167
Venturi effect, 164
Venturi tube, 159
Virgo A, 7
viscosity, 30–32
VLA, 3, 4, 8, 54–56, 64, 118, 119, 127
VLBI, 4, 70, 74
volcano, 1
V Sagittae stars, 129

W 50, 9
Water Fountain Nebula, 123
white dwarf, 1, 9, 121, 124, 126, 127, 129–132, 163, 177
white-light jets, 156
wide-angle tail, 56–59
wiggles, 197
working surface, 66, 108, 115, 116, 189
WX Cen, 129

X-celerators, 35
X-ray binary, 1, 9, 121, 131, 132, 143, 172
  high-mass, 9, 132, 133
  low-mass, 132, 136
X-ray cavity, 65, 189, 206
X-ray jet, 67, 68, 77, 125, 138, 155, 171
X-ray transient, 122, 135
X-wind, 35, 107, 157, 177–179, 205

young star, 8, 25, 34, 35, 91, 92, 102, 161, 169, 196, 202, 203, 207
YSO, young stellar object, 1, 92, 118, 119, 163, 172

Z And, 124, 126

© in this web service Cambridge University Press & Assessment www.cambridge.org