

Subject Index

- ^4He abundance, 112
- RHESSI*
- design and capabilities, 4
 - dynamic range, 17, 42, 59, 62, 87, 201
 - imaging algorithms, 11
 - CLEAN, 26, 57, 58, 88, 189, 191
 - PIXON, 13, 18, 36, 40, 94, 189, 192
 - visibility forward-fitting, 39
 - imaging spectroscopy, 11, 27, 42, 59, 189, 190, 195, *see* X-rays, spectroscopy for results
 - background, 190
 - data analysis flow chart, 187
 - detector selection, 190
 - energy bins, 11
 - error/uncertainties, 191
 - integration time, 11
 - pulse pileup, 198
 - pulse pileup, 9, 30, 59, 60, 62, 86, 92, 196
 - detector livetime, 194, 197, 199
 - simulation tools, 200
 - spatial resolution, 29, 36, 57, 88, 190
 - spectroscopy, 192, *see* X-rays, spectroscopy for results
 - spectral fitting, 27, 42, 59, 97, 194
 - spectra, 13, 31, 43, 44, 60, 99, 106, 189, 194
 - photon spectrum, 131, 136
 - relativistic beaming, 80
 - thermal, 46–49, 78, 95, 98, 108, 132, 150, 151, 154, 177, 206
 - emissivity, 151
 - spatial distribution (profile), 176, 177
 - spectra, 13, 27, 43, 44, 60, 99, 106, 189, 190, 194, 196
 - thick-target, 76, 117, 205
 - equivalent electron flux, 115
 - thin-target, 116
 - yield, 98, 100, 139, 148
- Chromospheric evaporation, 2, 37, 49, 60, 85, 139, 144, 147, *see also* Flare (individual), 2003-11-13 M1.7
- dependence on electron spectrum, 148
 - Doppler shifts, 86
 - driven by
 - collisional heating, 110, 123
 - conduction, 127, 145
 - evaporation front, 123, 125, 127, 130, 132
 - hydrodynamic simulation, 85, 109
 - imaging, 86, 93, 96, 97
 - loop density resulting from, 107, 131
 - Neupert effect, *see* Neupert effect
 - upflow velocity, 93, 103, 139, 144
- Chromospheric oscillation, 171
- Column density/depth, 47, 70, 75, 79, 121
- asymmetry, 75, 78, 83
 - dimensionless, 76, 104, 204
 - effective, 75, 79
- Conduction, 46, 48, 49
- electron conductivity, 117
 - ion conductivity, 117
 - Spitzer, 119
 - suppression of, 100, 166
 - simulation model, 167, 173
 - simulation results, 168, 175, 179
- Coronal mass ejections (CMEs), 1, 24, 56
- Coulomb collision, 52, 74, 75, 78, 80, 109, 167, 204
- energy diffusion, 115, 210
 - energy loss, 2, 4, 8, 111, 115, 119, 120, 130
 - effective Coulomb loss rate, 211, 212
- Acceleration of particles, 1
- DC electric field, 2, 52, 72
 - shock, 2, 52
 - stochastic, viii, 2, 4, 8, 18, 30, 31, 46, 48–52, 72, 82, 100, 108, 110, 111, 180, 205
 - schematic of, 3
- Acceleration region, 3, 48, 54, 67, 74, 111, 114, 119, 120, 125, 148, 205, 206
- spatial extent, 51
- Auroras, 186
- numerical simulation, 148, 186
 - on extrasolar planet, 186
- Bremsstrahlung, 132, *see* X-rays for diagnostics
- angle-dependent, 185
 - cross-section, 116
 - nonthermal, 46–49, 78, 95, 98, 104, 108, 116, 132
 - spatial distribution (profile), 104, 105, 133, 137, 204, 206, 207

- to cold targets, 208
 - to warm targets, 184, 208–210
- pitch-angle scattering/diffusion, *see* Electron, pitch angle
- Coulomb logarithm, 98, 111, 115, 204
- Current helicity, 56, 72
- Current sheet, 2, 33, 34, 82
- Currents, vertical, 72
- Electron
 - classical radius, 111
 - energy distribution, 76, 126, 135, 204, 207
 - high-energy cutoff, 72, 194
 - low-energy cutoff, 45, 80, 98, 99, 102, 110, 126, 127, 144, 145, 183, 194
 - nonthermal, 36, 46, 49, 67, 94, 104, 110, 118, 126, 144, 202, 203, 208
 - thermal (Maxwellian), 50, 110, 112, 144, 167, 214
 - energy flux, 103, 144
 - gyrofrequency, 72, 112
 - number flux, 115, 119
 - angle-integrated, 116, 126
 - equivalent thick-target flux, 115, 130
 - escaping from acceleration region, 115, 127, 139, 146, 147
 - precipitating to footpoints, 74, 80
 - spatial distribution, 129, 134
 - spectrum, *see* energy distribution
 - pitch angle
 - distribution, 74–76, 80, 112, 114, 115, 204
 - scattering/diffusion, 4, 74, 75, 77–79, 109, 204
 - plasma frequency, 72, 112
 - power, 103
 - runaway, 51
 - stopping distance/column density, 75, 104
- Energy contents, 149, 151, 152
 - conversion of, 171
 - gravitational, 149, 170, 171
 - kinetic, 149, 153, 164, 171, 172
 - thermal, 149, 151, 153, 154, 165, 168, 170, 171
 - Neupert effect, *see* Neupert effect
 - variation rate, 155, 162, 165, 175
- Flare
 - gamma-ray, 56
 - microflares, 23
 - phases
 - decay, 12, 20, 22, 34, 44, 87, 100, 101, 103, 119, 123, 154, 166, 175–177
 - impulsive, 4, 5, 12, 31, 35, 44, 48, 54, 66, 86, 100, 101, 107–109, 111, 119, 123, 166, 181, 197
 - statistics, 18
 - correction for selection biases, 20
 - imaging spectroscopy, 18
 - size distribution, 20
 - two-ribbon, 2, 56
 - white-light, 1, 2, 56, 62, 70
- Flare (individual)
 - 2002-04-30 M1.4, 33
 - double coronal source, 34
 - magnetic reconnection site, 47
 - 2002-08-03 X1.0 (multiple loops), 14, 16, 17
 - 2002-09-20 M1.8 (single loop), 12
 - imaging spectroscopy, 13
 - 2003-10-29 X10, 53
 - footpoint unshearing motions, correlations, asymmetries, *see* Footpoint sources
 - 2003-11-03 X3.9, 23
 - correlated motions of loop-top and footpoint sources, 25
 - 2003-11-13 M1.7, 85
 - chromospheric evaporation, 91, 93, 96, 97, 106
 - Neupert effect, 98
- Fokker-Planck
 - equation, 4, 111, 211
 - equation coefficients, 114
 - acceleration, 114
 - diffusion, 114
 - numerical code, 6, 110, 111
- Footpoint sources, 8, 12, 13, 89, 202
 - asymmetries, 73
 - acceleration-induced anisotropy, 80
 - column density, 75
 - energy dependence, 82
 - magnetic mirroring, 74
 - non-uniform target ionization, 79
 - photospheric albedo, 80
 - relativistic beaming, 80
 - correlations, 66
 - images, 26, 29, 57
 - magnetic field, 70, 202
 - motion, 26, 65
 - approaching, 64
 - relative, 25, 64
 - separation, 25, 64

- unshearing, 62, 65
 - pulse pileup, 200
 - shear angle, 64
 - spectra, 13, 60, 76
 - spectral index, 13, 18, 28, 60, 67, 68, 77
 - thick-target, *see* Bremsstrahlung
- Gamma-rays, 2, 23, 70, 100
- H α emission, 2, 53, 63, 86, 204
- Helioseismic (Sunquake) signals, 56, 62, 123
- Hydrodynamics
 - equations, 117
 - simulation, 85, 108
 - collisional heating rate, 119, 121
 - temporal evolution, 127
- Iron
 - abundance, 59, 194, 196
 - X-ray line emission, 60, 194
- Loop-top sources, 8, 12, 13, 52
 - altitude
 - ascent, 25, 28, 40
 - descent, 25, 28, 40, 66
 - energy dependence, 28, 29, 38
 - emission measure, 45, 49, 61
 - images, 26, 29, 57, 89
 - motion, 26, 40, 65
 - pulse pileup, 200
 - spectra, 13, 43, 60
 - spectral index, 18, 28, 43
 - temperature, 13, 45, 49, 61
 - thin-target, *see* Bremsstrahlung
- Magnetic field
 - chromospheric, 56
 - coronal, 72
 - extrapolation
 - force-free, 72
 - potential, 56
 - magnetogram
 - line-of-sight, 56
 - photospheric, 56
 - vector, 56, 72
 - shear, 64
- Magnetic free energy, 56, 66
- Magnetic mirroring, 4, 13, 74, 78, 109
 - asymmetric, 74, 78, 79, 83
 - pitch-angle distribution asymmetry, 80
 - return current asymmetry, 80
 - loss cone, 74
 - trapping, *see* Trapping of particles
- Magnetic reconnection, 1, 51, 56
 - geometry, 1, 23
 - model of solar flares, 1, 23
 - outflow, 2, 33, 34
 - rate, 27, 71, 72, 101
 - schematic of, 3
 - site/region, 2, 32, 33, 46–48, 50, 75
 - motion, 2, 25, 66, 87
- Neupert effect, 2, 36, 85, 98, 165
 - energy budget, *see* Energy contents
 - temporal correlation, 104
 - test of, 98, 100, 108, 149, 153
- Non-uniform target ionization, 79
- Opacity minimum, 56
- Plasma waves, 94, *see also* Turbulence
 - dispersion relation, 112
 - modes, 112
 - wave-particle resonance interaction, 3, 112
- Proton
 - acceleration, 185
 - momentum, 185
- Radiative loss, 48, 117, 123, 150, 152, 158, 166, 170, 171, 179
 - spatial distribution, 124, 127
 - wavelength dependence, 165
- Radio emission, 1, 24
 - double coronal source, 34
 - footpoint asymmetry, 54
 - microwave images, 56
 - zebra pattern, 94
- Return current, 80, 115
- Separatrix, 72
- Shearing flows, photospheric, 56, 66
- Software packages
 - CHIANTI, 59, 179, 194
 - OSPEX, 22, 59, 192–196
 - Solar SoftWare (SSW), x, 187, 192, 194, 203
 - SPEX, 190
- Solar energetic particles (SEPs), 56, 70
 - ³He rich events, 3
- Space instruments
 - ACE, 3, 56
 - CGRO, 4
 - GOES, 24, 35, 55, 56, 86, 87, 97, 99, 100, 102, 151, 154

- SXI, 189
- Hinode*, 84
- Hinotori*, 4, 5, 85
- ISEE-3*, 4
- OSO-5 & -7*, 4
- RHESSI*, *see RHESSI*
- SDO*, 84
- SMM*, 4, 5, 86
- SOHO*, 24, 86, 189, 203
 - CDS, 104
 - EIT, 38, 90
 - LASCO, 24
 - MDI, 26, 38, 56, 63, 70, 90, 202
 - SUMER, 34
- TRACE*, 10, 11, 15, 16, 62–64, 177, 189, 203
- Yohkoh*, 3–5, 8, 19, 54, 85, 110, 116
 - BCS, 86
 - HXT, 54, 78, 82
 - SXT, 86
- Synchrotron
 - energy loss, 111
 - pitch-angle diffusion, 115
- Transition region, 2, 68, 75, 79, 84, 116, 120, 123, 127, 130, 132, 139, 149, 152, 170, 171, 179, 205, 207
- Trapping of particles, 206
 - by magnetic mirroring, 52, 53, 84
 - by turbulence, 3, 52, 148
- Turbulence, 2, 49, 100, 108, 125, 210, *see also*
 - Plasma waves
 - cascade, 3
 - level, 31, 46, 50, 51, 72, 147, 167
 - particle acceleration by, 109
 - particle scattering by, 80, 112
 - plasma heating by, 119, 165–167
 - resonance interaction, *see* Plasma waves
 - spatial distribution, 31, 48, 51
 - spectrum, 4, 49, 113
 - suppression of conduction by, *see* Conduction
 - trapping, *see* Trapping of particles
- X-ray sources (spatially resolved)
 - centroids
 - energy dependence, 28, 29, 38, 41, 96
 - temporal evolution, 26, 28, 40, 41, 65
 - light curves, 14, 17, 41, 68
 - spatial gradient of spectral hardness, 46
 - spectra, 43, *see also* Loop-top/Footpoint sources
 - nonthermal, *see* Bremsstrahlung
 - thermal, *see* Bremsstrahlung
 - types
 - coronal (above loop-top), 33, 36, 49
 - footpoint, *see* Footpoint sources
 - leg, 89, 90
 - loop-top, *see* Loop-top sources
- X-rays
 - albedo, 80
 - nonthermal, *see* Bremsstrahlung
 - observing instruments, 4
 - spectral evolution
 - soft-hard-hard(er) (SHH), 67, 79
 - soft-hard-soft (SHS), 20, 67, 69, 71, 79, 98, 104, 134, 159
 - spectroscopy
 - imaging, 13, 18, 28, 43, 60, *see RHESSI*,
 - imaging spectroscopy for technicalities
 - spatially integrated, 28, 43, 60, 99, 106, 199
 - thermal, *see* Bremsstrahlung
 - thick-target, *see* Bremsstrahlung
 - thin-target, *see* Bremsstrahlung