

Subject Index

AAVSO, 310

accretion, 14, 18, 22, 27, 35, 55, 96,
105, 159, 286, 344, 352, 381,
400, see also star formation,
disks

active galactic nuclei, 381, 392, 396,
400, 404, 408, 413, 426, 430,
438, 464, 497, 506

black holes, 381, 396, 400, 404,
408, 413, 438, 501, 506

megamasers, 400, 408, 413, 426,
430

seferts, 248, 381, 392, 400, 408,
430, 434, 438

quasars, 327, 381

radio galaxies, 413, 501

AGB stars, see stars

Alfvén waves, 43, 452

ALMA, 63, 226, 352, 359, 413

Ammonia, see NH₃

amplification, 43, 96, 179, 183, 199,
204, 212, 226, 274, 306, 323,
359, 413, 430, 438, 452, 464,
479, 482, 487, 506

of background radiation, 413, 430,
464

of spontaneous emission, 443, 452,
479

arcs, 125, 199, 426

Arecibo, 253, 413

astrometry, 18, 171, 327, 404, 434,
501

ATCA, 1, 112, 125, 151, 204, 234,
253, 294, 331, 352, 359

beaming, 179, 381, 413, 452, 464

Bear Lakes telescope, 105

BIMA, 14, 100, 171, 179, 199, 340

Bremsstrahlung, 234

brightness distributions, 282, 298

brightness temperatures, 55, 96, 105,
163, 179, 183, 195, 199, 204,
217, 340, 344, 359, 400, 413,
430, 438, 443, 506

Bristol observatory, 27

CH₃CN, 171

CH₃OH, 1, 14, 18, 112, 125, 127,
131, 135, 139, 143, 147, 151,
155, 159, 163, 167, 171, 175,
179, 183, 187, 191, 195, 199,
443, 452, 464, 506

Class I, 1, 125, 191, 195, 199,
506

Class II, 1, 125, 127, 139, 147,
155, 167, 179, 183, 187, 191,
506

7-mm lines, 199

3-mm lines, 195

class 0 sources, 22, 27, 35, 100

CMVA, 290

CO, 22, 35, 68, 100, 112, 139, 179,
204, 212, 221, 248, 253, 266,
290, 298, 340, 344, 352, 392,
426, 430, 434

CS, 171

comets, 443, 506

core-halo structure, 147, 217

CSO, 22, 63

disks,

accretion, 18, 27, 55, 96, 105,
344, 352, 381, 464, 506

circumnuclear, 381, 434, 464

circumstellar, 18, 51, 68, 84, 125,
131, 147, 163, 187, 226

galactic, 105, 294, 381

keplerian, 72, 125, 147, 163, 226,
404, 438, 464

protoevaporated, 226

protoplanetary, 105

protostellar, 35, 76, 155, 506

torus, 253, 331, 344, 392, 408,
413, 430, 434, 438

distances, 18, 27, 116, 167, 204, 217,
277, 253, 274, 310, 352, 371,
375, 381, 413, 443, 506

- dust, 1, 14, 18, 22, 27, 55, 63, 68, 72, 76, 96, 105, 112, 139, 155, 159, 171, 179, 183, 191, 199, 204, 234, 248, 253, 266, 274, 298, 306, 319, 352, 408, 413, 426, 434, 438, 443, 464, 482, 487, 506
 grains, 63, 175, 183, 199, 274, 306, 352, 408, 464, 482, 506
 evaporation, 1, 125, 199, 400
 radiation, 18, 155, 191, 204, 306, 464, 482, 506
- Dwingeloo, 116, 430, 487, 497
- Effelsberg (Bonn, MPIfR), 27, 139, 159, 163, 310, 359, 381, 392, 396, 404, 434, 443, 497
- EVN, 1, 125, 139, 147, 159, 163, 171, 253, 306, 359, 413, 426, 430, 497
- evolution, 1, 14, 22, 27, 35, 39, 55, 59, 80, 84, 143, 147, 155, 159, 171, 175, 204, 217, 221, 226, 234, 240, 248, 253, 286, 298, 306, 319, 331, 344, 352, 359, 381, 413, 434, 438, 452, 479, 506
- extragalactic masers, 396, 464, 506
- Faraday rotation, 138, 359, 452, 464, 506
- filaments, 63, 199, 290, 413
- formaldehyde, see H₂CO
- gain, see amplification
- Galaxy, 282, 371, 487
 bulge, 236, 282, 294, 335, 501
 center, 139, 212, 282, 294, 371
 disk, 39, 105, 294, 381, 501
 plane, 1, 27, 39, 116, 139, 143, 147, 212, 253, 282, 331, 335, 371, 443, 501
 structure, 253, 266, 282, 294, 371
- galaxies,
 CO emission, 248
 megamasers, 381, 408, 426, 430
 seyferts, see active galactic nuclei
 spiral, 248
 starburst, 248, 413, 426, 430
- GBT, 396, 413
- Greenbank 143-ft, 204
- H₂ emission (2 μ m), 18, 68, 147, 175, 212
- H₂CO, 1, 14, 112, 195, 413
- H₂O masers, 1, 27, 35, 39, 43, 55, 59, 63, 68, 72, 84, 100, 143, 147, 195, 199, 310, 348, 352, 359, 413
 extragalactic, 375, 381, 392, 396, 400, 408, 434, 464, 501
 interstellar, 1, 14, 22, 43, 55, 63, 76, 80, 84, 88, 92, 100, 159, 204
 stellar, 27, 35, 51, 253, 274, 298, 306, 310, 319, 323, 348, 375
 mm wavelength lines, 14, 195, 314
- HALCA, see VSOP
- Hartebeesthoek, 105, 120, 127, 131, 497
- Haystack Observatory, 27
- HCO⁺, 171
- HCN masers, 171, 340
- HC₃N, 171
- Herbig-Haro (HH) objects, 27, 59, 63, 100, 348, 506
- HII regions, 1, 14, 88, 135, 204, 226, 272, 506
 cometary, 18, 105, 155, 159, 175
 compact, 1, 14, 18, 27, 105, 116, 135, 139, 143, 147, 179, 244
 giant, 244
 ultracompact, 1, 14, 100, 112, 125, 126, 135, 139, 147, 159, 171, 226, 244, 381, 487
- Hipparcos, 274, 298, 327
- Hobart, 105
- Hot molecular cores, 1, 18, 125, 147, 159, 171, 175, 506
- HST, 253, 352, 426, 430
- Hydrogen Cyanide, see HCN masers
- Hydroxyl, see OH masers
- infall, see star formation regions
- infrared, 18, 22, 27, 39, 50, 68, 72, 76, 80, 100, 105, 116, 125, 139, 147, 155, 159, 163, 199, 204, 248, 266, 282, 331, 335, 340, 348, 381, 408, 413, 426, 430, 443, 464, 479, 482, 506

- interstellar material, 125, 127, 131,
 155, 183, 199, 204, 221, 226,
 306, 335, 367, 413, 464, 506
 masers, 1, 14, 43, 159, 253, 371,
 443, 506
 scattering, 105, 217
 IRAM, 191, 248, 282, 359
 Pico Valeta 30-m, 191, 282
 Plateau de Bure Interferometer,
 253
 IRAS, 1, 27, 35, 39, 63, 72, 80, 100,
 112, 116, 135, 139, 143, 147,
 171, 175, 195, 244, 253, 282,
 294, 331, 352, 381, 408, 413,
 430, 443, 487
 ISO, 226, 282, 310, 335, 413, 443
 Itapetinga, 240, 244
 JCMT, 22, 63
 jets, see star formation regions
 JIVE, 430, 497
 J-NET, 76, 88
 Kashima, 253
 La Silla, 234, 248
 lifetimes, 14, 22, 226, 100, 155, 266,
 298, 310, 400, 443, 506
 line profile, 14, 163, 179, 226, 234,
 248, 266, 274, 282, 340, 359,
 375, 381, 413, 434
 narrowing, 43, 171, 195, 204, 234,
 266, 375, 381, 413, 434, 464
 widths, 1, 43, 55, 183, 212, 234,
 240, 244, 359, 381, 430, 452,
 464, 506
 Lovell telescope, 116, 443, 497
 magnetic fields, 43, 92, 204, 217,
 266, 306, 352, 359, 367, 371,
 375, 464, 506, see also polar-
 ization
 mass loss, 234, 278, 282, 294, 298,
 306, 310, 319, 323, 340, 352
 Medicina 32-m, 27, 39, 51, 72, 163,
 310
 megamasers,
 OH, 359, 413, 426, 430, 497
 H₂O, 392, 400, 404, 408, 434
 MERLIN, 105, 120, 217, 253, 298,
 306, 352, 359, 413, 426, 430,
 438, 497, 506
 methanol, see CH₃OH
 Milky Way, see Galaxy
 Mizusawa, 92, 501
 modelling, 340
 CH₃OH, 191
 OH, 112, 443
 SiO, 266
 molecular clouds, 20, 65, 125, 146,
 155, 157, 261
 cores of, 125, 217
 molecular gas, 27, 100, 204, 212,
 217, 221, 248, 381, 400, 408,
 413, 430, 482
 cold, 63, 175, 487
 bubbles, 155
 molecular mass distribution, 14, 348,
 452
 monitoring, 27, 59, 88, 92, 120, 127,
 131, 135, 226, 253, 266, 278,
 310, 319, 323, 327, 392, 396,
 400, 404, 434
 Mopra telescope, 105, 294
 MSX, 139, 171, 331
 Nançay, 120, 319, 323, 340, 359, 443
 NH₃, 1, 14, 18, 112, 147, 195, 240,
 244
 Nobeyama, 22, 35, 76, 253, 278, 340,
 392, 400
 Noto, 105
 NRAO 12-m, 195, 221
 ODIN, 443
 OH/IR stars, see stars: OH/IR
 OH masers, 1, 116, 127, 204, 359,
 413, 426, 430, 443, 487, 497,
 506
 extragalactic, 413, 426, 430, 443,
 464, 482, 487, 497, 506
 interstellar, 1, 18, 80, 105, 112,
 120, 135, 139, 143, 147, 159,
 204, 212, 217
 stellar, 253, 282, 294, 306, 319,
 323, 327, 331, 335, 348, 352,
 359, 367, 371, 375
 Onsala observatory, 1, 55, 139, 147,
 159, 171, 179, 195, 248, 266,
 274, 306, 314, 426
 outflows, 1, 18, 22, 27, 35, 51, 55,
 59, 63, 68, 72, 76, 80, 96,
 100, 105, 125, 131, 147, 159,
 163, 171, 175, 195, 199

- circumstellar, 253, 266, 278, 286, 290, 294, 298, 310, 323, 331, 344, 348, 352
- OVRO millimeter-wave interferometer, 381
- Parkes observatory, 1, 151, 199, 204, 359
- PDR, 175, 482
 - photo-dissociation, 175, 340, 443, 506
- phase-lag, 131, 266
- phase-referencing technique, 27, 63, 327, 367, 404, 430, 438, 497, 501
- photo-dissociation/photon dominated region, see PDR
- planetary nebulae (PNe), 253, 286, 294, 331, 344, 348, 352, 506
 - post-AGB stars, 253, 286, 331, 335, 344, 348, 352, 487, 506
 - proto-planetary nebulae (PPN), 286, 344, 352, 506
- polarization, 63, 135, 217, 253, 323, 367, 392, 430, 443
 - circular, 1, 43, 80, 100, 105, 112, 116, 120, 125, 135, 143, 151, 212, 240, 253, 266, 274, 282, 306, 319, 323, 344, 359, 367, 371, 375, 452, 464
 - elliptical, 105, 367
 - linear, 92, 96, 120, 125, 151, 195, 204, 212, 266, 274, 278, 344, 359, 367, 375, 452, 464, 506
 - non-Zeeman, 266, 359, 464, 506
 - tangential, 266
 - Zeeman effect, 1, 105, 204, 212, 217, 226, 266, 306, 359, 367, 371, 375, 452, 464, 506
- proper motions, 22, 27, 43, 55, 63, 76, 84, 100, 199, 253, 266, 298, 327, 352, 359, 381, 404, 501, 506
 - acceleration, 298, 306, 359, 381, 396, 400, 464, 482, 506
 - rotation, 1, 212, 266, 286, 306, 344, 381
- protostars, see star forming regions
- pumps, 1, 92, 120, 131, 199, 204, 278, 290, 294, 310, 426
 - collisional, 179, 217, 266, 274, 286, 331, 408, 413, 487, 506
 - excitation, 112, 331, 340
 - inversions, 294, 443
 - radiative, 96, 112, 139, 167, 179, 183, 191, 253, 266, 286, 331, 359, 413, 464, 479, 506
- quasi-thermal emission, 116, 120, 191, 195
- quenching, 131, 204, 443, 464, 506
 - collisional, 204, 443
- radiative transfer, 14, 43, 226, 234, 240, 244, 266, 340, 375, 452, 464, 506
- recombination lines, 226, 234, 359, 479, 506
- rings, 96, 187, 266, 274, 371, 506
 - rotation, 187, 426
- Robledo, 105
- San Basilio, 497
- saturation, 43, 92, 120, 127, 147, 179, 226, 335, 359, 452, 464, 479, 482
- scattering, 43, 105, 127, 147, 204, 217, 381, 452, 506
- scintillation, 127, 131, 413
- SCUBA, 63
- SEST, 1, 234, 248, 314
- Shanghai, 105
- shocks,
 - late-type stars, 253, 266, 274, 286, 290, 298, 306, 314, 331, 348, 352
 - modelling, 204, 434, 438, 464, 482
 - star forming regions, 1, 14, 18, 22, 27, 43, 63, 72, 84, 88, 131, 147, 171, 175, 195, 199, 359, 408, 413, 506
 - supernovae, 204, 217, 221, 506
- SiO, 1, 100, 171, 253, 266, 274, 278, 282, 286, 290, 294, 314, 344, 348, 352, 359, 375, 452, 464, 501, 506
- SKA, 413
- SMA, 63, 226
- spectral energy distribution (SED), 22, 35, 80, 100, 175, 306

- spots, 1, 59, 68, 92, 100, 105, 120, 125, 127, 131, 147, 159, 187, 199, 204, 212, 217, 226, 253, 274, 286, 290, 306, 310, 327, 344, 352, 371, 392, 400, 413, 434
- sizes, 1, 105, 163, 179, 187, 199, 217, 266, 413, 506
- motions, see proper motions
- stars,
 - AGB stars, 226, 253, 266, 282, 286, 290, 298, 327, 331, 335, 340, 344, 348, 352, 359, 487, 506
 - evolved, 204, 226, 234, 253, 266, 274, 278, 282, 286, 294, 323, 331, 335, 340, 344, 348, 352, 400, 487
 - late-type, 1, 39, 55, 112, 266, 278, 282, 310, 314, 319, 327, 359, 375, 381, 506
 - Mira variables, 253, 282, 310, 319, 323, 501, 506
 - OH/IR, 1, 80, 116, 253, 266, 282, 294, 310, 319, 323, 331, 335, 506
 - outflows, 286, 290, 344
 - post-AGB stars, 253, 286, 331, 335, 344, 348, 352, 487, 506
 - proto-planetary nebulae (PPN), 286, 344, 352, 506
- star forming regions, 1, 14, 18, 27, 39, 59, 63, 72, 105, 116, 125, 127, 131, 143, 147, 155, 204, 248, 331, 359, 381, 408, 413, 482, 487, 501, 506
- disks, 35, 76, 506
- infall, 14, 27, 55, 76, 266, 286, 314, 344, 438, 506
- jets, 14, 22, 27, 35, 68, 76, 80, 84, 96, 159, 286, 344, 352, 381, 392, 404, 430, 434, 438, 443, 506
- low-mass, 51, 68, 76, 84
- massive, 14, 84, 88, 92, 120, 135, 147, 163, 167, 175, 191, 226, 240, 367
- protostars, 18, 35, 76, 159, 163, 290, 381
- supergiants, 253, 266, 278, 298, 306, 310, 352, 375, 506
- winds, 43
- young stellar objects (YSO), 1, 18, 27, 35, 39, 43, 51, 55, 59, 63, 72, 84, 105, 147, 187, 195, 226, 290, 331, 413, 426, 430, 482, 506
- supernovae, 1, 112, 204, 212, 217, 221, 413, 426, 506
- surveys, 1, 18, 27, 35, 72, 116, 135, 139, 143, 155, 163, 171, 175, 191, 195, 199, 204, 217, 221, 240, 244, 248, 253, 266, 278, 282, 294, 314, 331, 335, 340, 352, 359, 371, 381, 392, 396, 408, 413, 501, 506
- SWAS, 443
- Tasmania, 1, 105
- thermal emission, 1, 112, 191, 226, 278
- Tidbindilla, 105, 151
- Torun, 1, 135, 143, 159
- torus, see disks
- turbulence, 43, 105, 147, 187, 306, 310, 413, 464
- Usuda, 105
- variability, 1, 27, 39, 43, 51, 72, 131, 135, 226, 253, 266, 274, 306, 310, 319, 323, 327, 335, 348, 396, 408, 413, 443, 492
- VERA, 501
- vibrational excitation, 55, 274, 314, 359
- VLA, 14, 22, 27, 35, 59, 68, 76, 84, 100, 105, 125, 199, 204, 212, 217, 253, 290, 298, 310, 331, 348, 352, 371, 381, 392, 396, 400, 404, 413, 443
- VLBA, 1, 22, 27, 59, 63, 72, 76, 80, 84, 92, 100, 105, 217, 253, 266, 274, 286, 290, 327, 344, 348, 352, 359, 367, 371, 375, 381, 400, 404, 426, 434, 438, 497, 506

- VLBI, 1, 27, 35, 43, 76, 80, 84, 88,
92, 105, 139, 147, 151, 159,
171, 179, 234, 253, 266, 274,
286, 290, 294, 306, 327, 344,
359, 371, 375, 381, 392, 396,
400, 404, 413, 426, 430, 434,
497, 501, 506
VLBI instrumentation, 413, 497
VSOP, 88, 92, 105, 497, 501
- water, see H₂O
Westerbork, 497
winds, 43, 84, 96, 155, 226, 253,
290, 298, 306, 310, 331, 344,
352, 381, 396, 413
ionization, 72, 482, 506
- Yebees, 497
YSO, see star forming regions
Zeeman effect, see polarization: Zeeman effect