SOBOLEV Andrei (UrSU, Russia)

Masers and
star formation

shocks

turbulence

physical parameters

dust parameters

magnetic field

Masing Molecules

H_2O masers + thermal HDO

CH_3OH masers + thermal

OH polarizat., thermal (em+abs)

SiO masers + thermal

NH_3 masers + thermal

etc.

High Density and Shock Tracing Molecules

CS

HCO^+

CH_3CN

HNCO

N_2H^+

Grain Chemistry Tracers

CH_3OD, etc.

complex molecules

Highly excited molecules

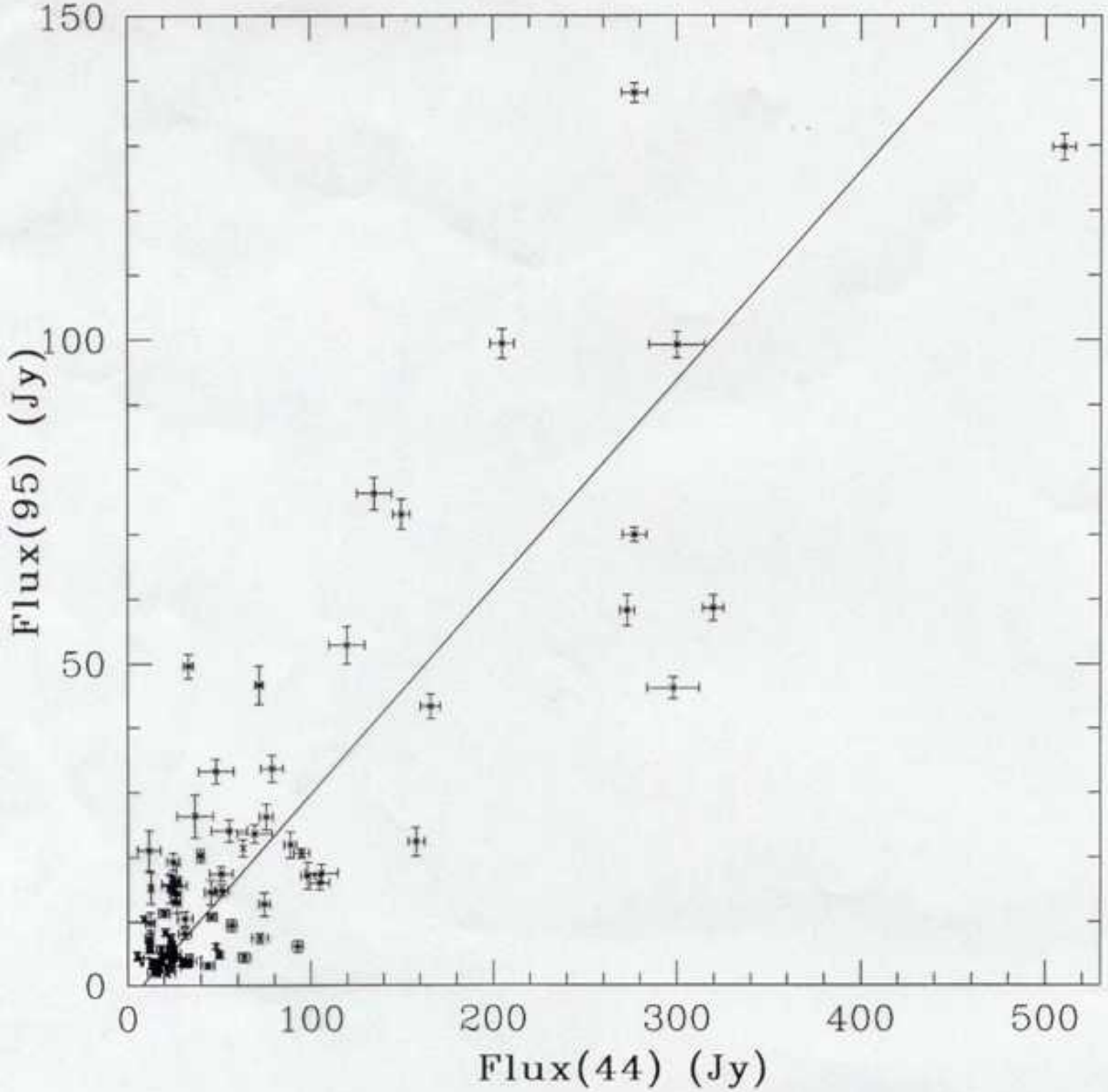


Figure 11. A correlation between 95 GHz and 44 GHz peak flux density. Straight line is a best fit: $y=(0.32\pm0.08)x-(8.1\pm2.7)$, correlation coefficient - $r=0.73$.

95 GHz

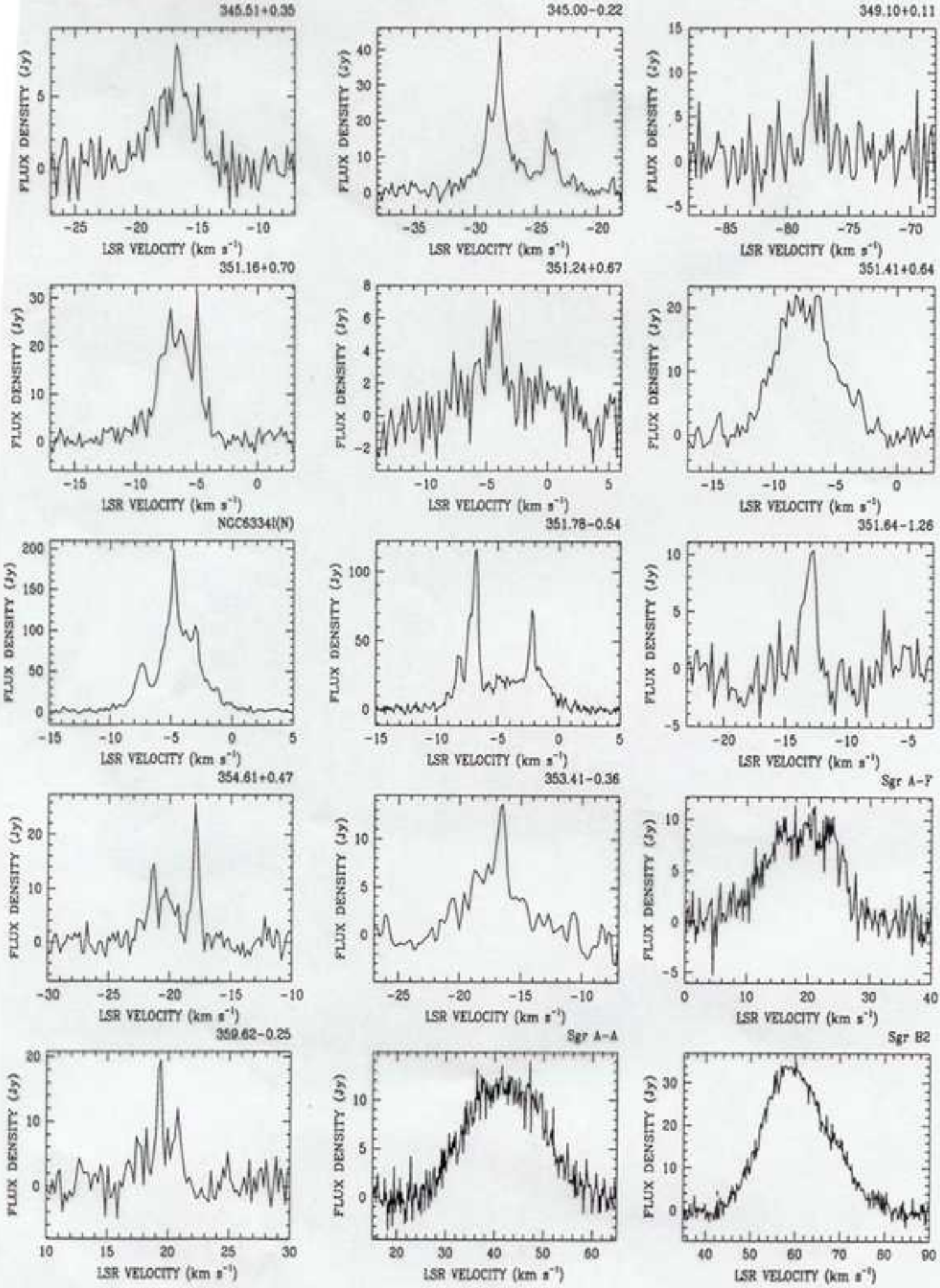
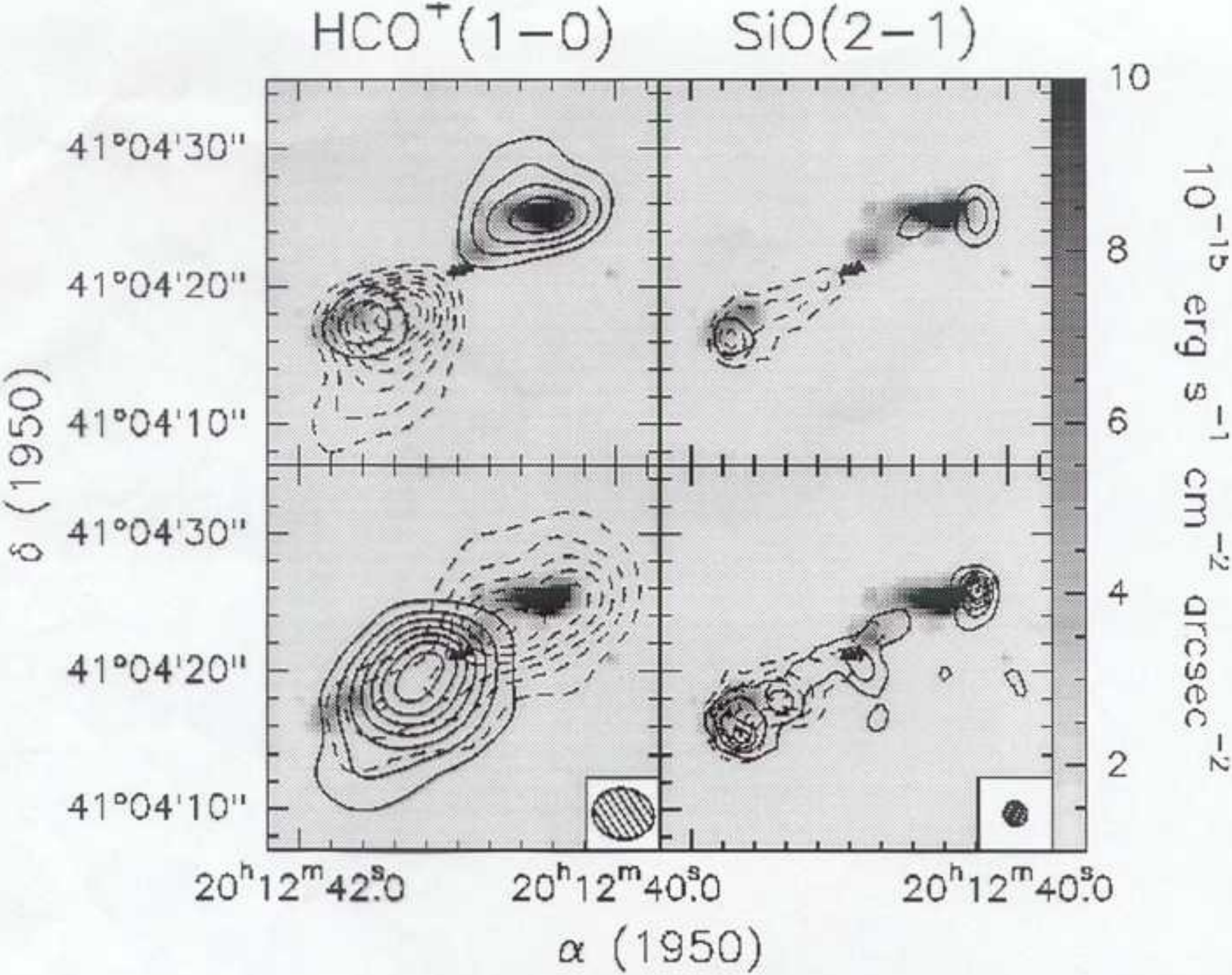
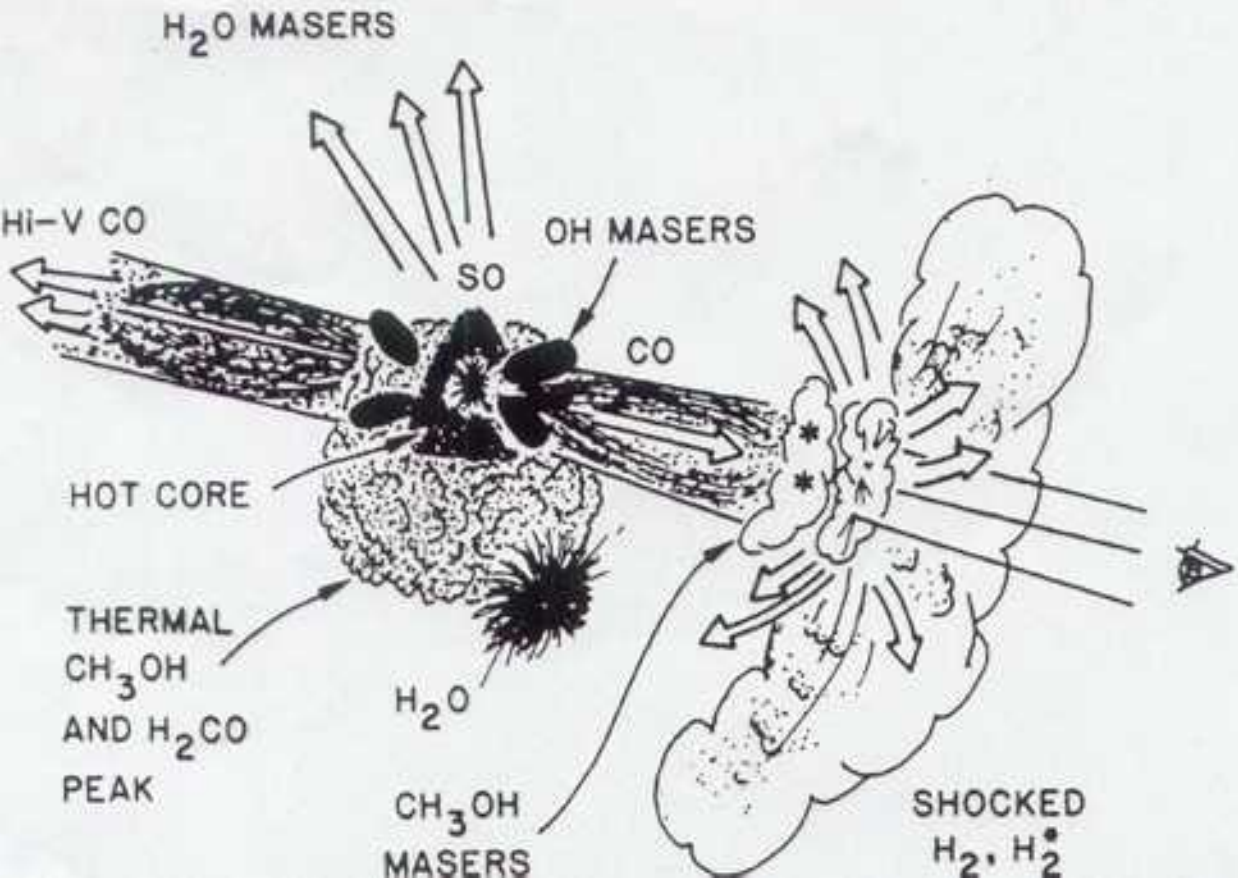


Figure 1 – *continued*

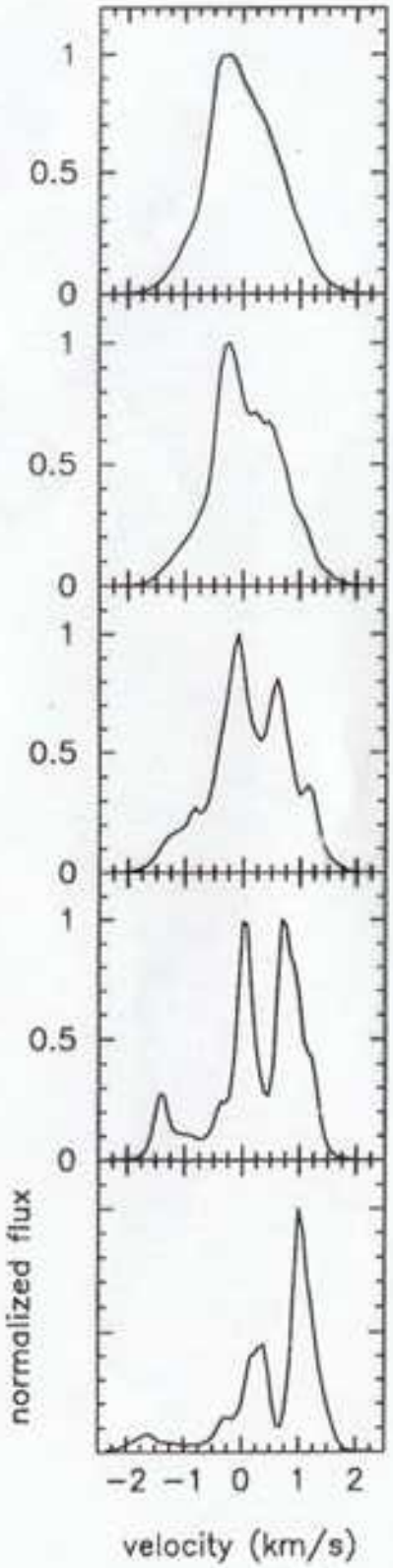

HCO+(1−0)
SiO(2−1)
41°04'30"
41°04'20"
41°04'10"
δ (1950)
20h12m42.s0
20h12m40.s0
20h12m40.s0
α (1950)
10
8
6
4
2
10−15 erg s−1 cm−2 arcsec−2

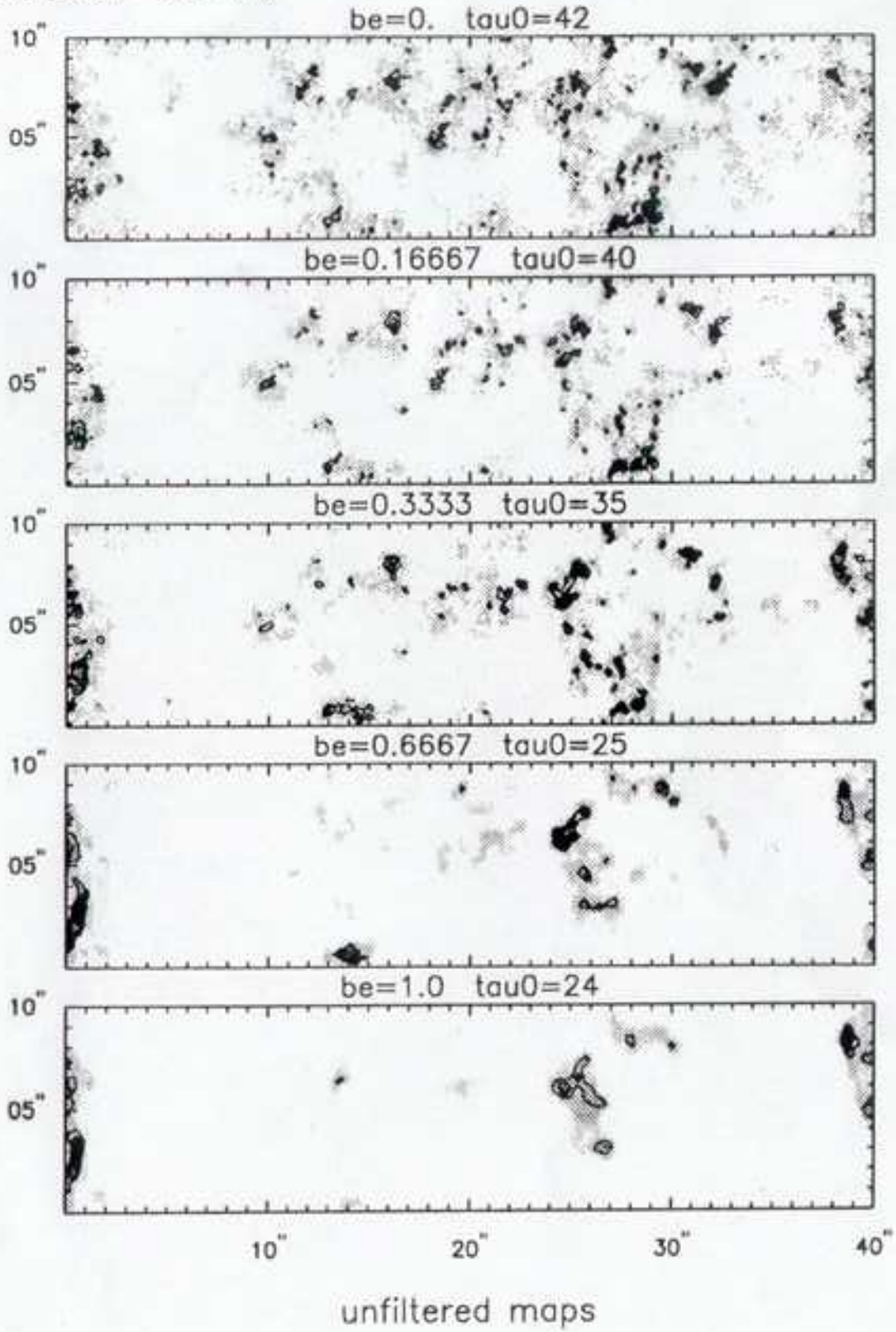
METHANOL MASER DISTRIBUTION IN OMC-1

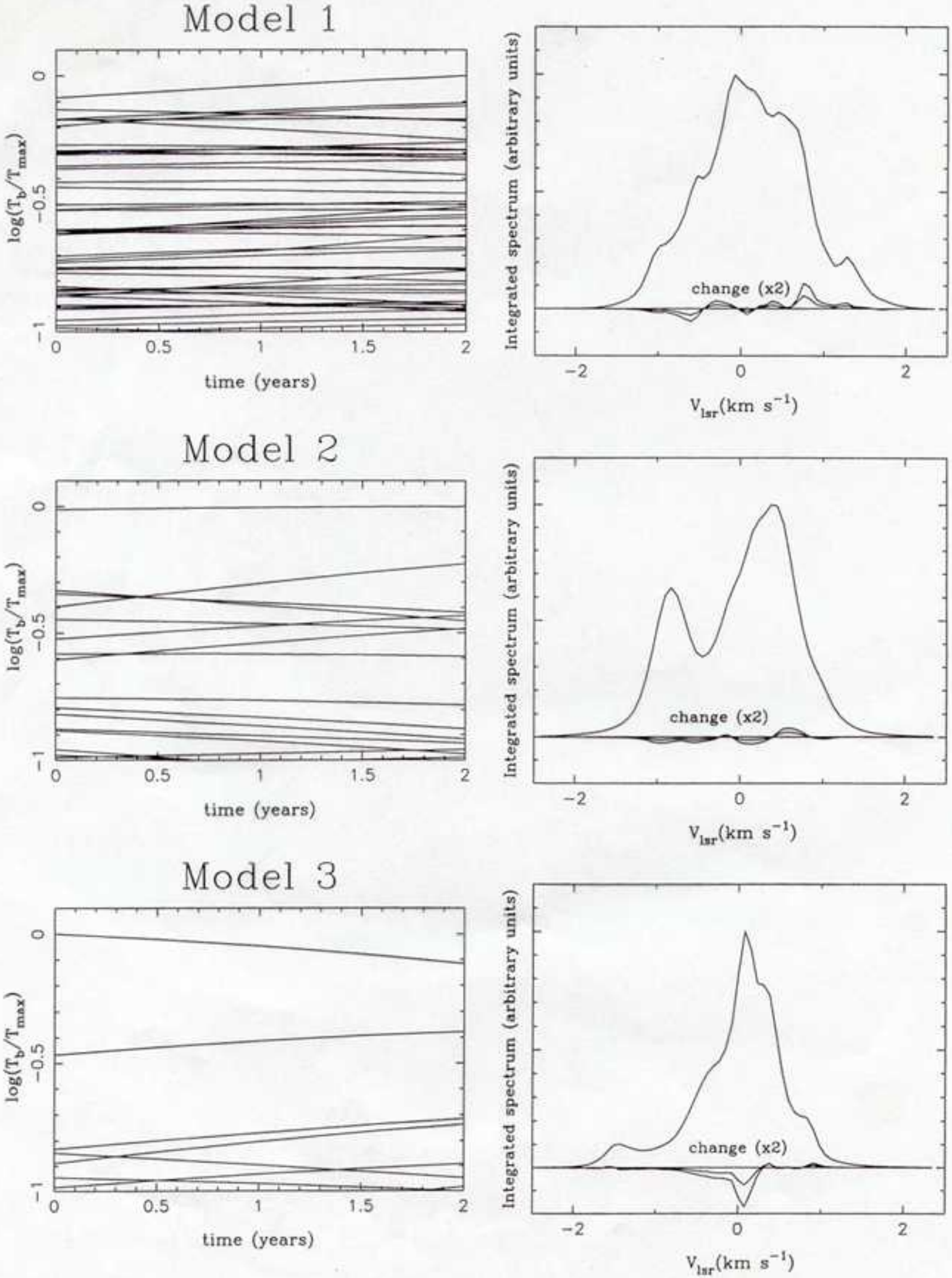


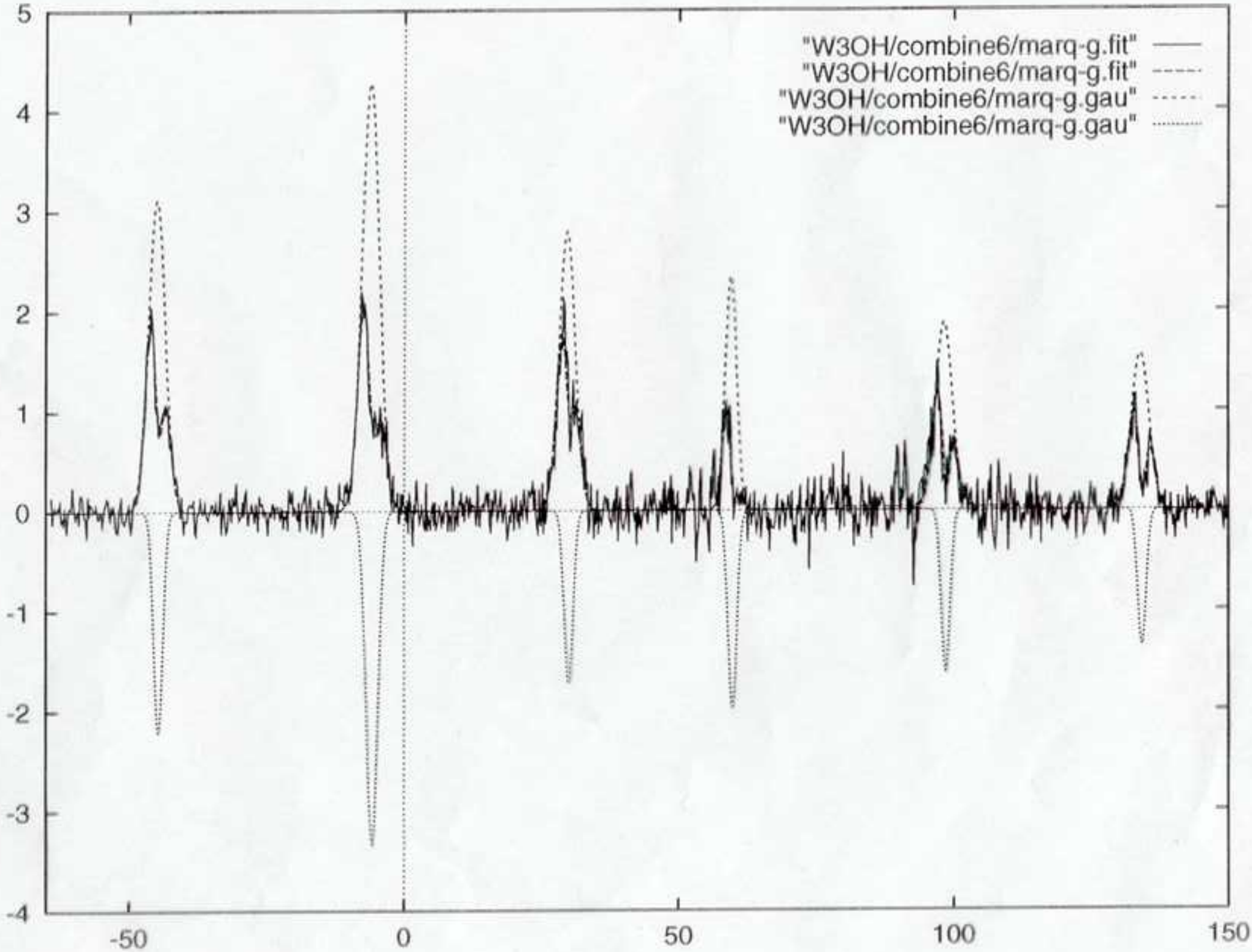
Models with Ta of the strongest peak about 1.5e5/Tbg

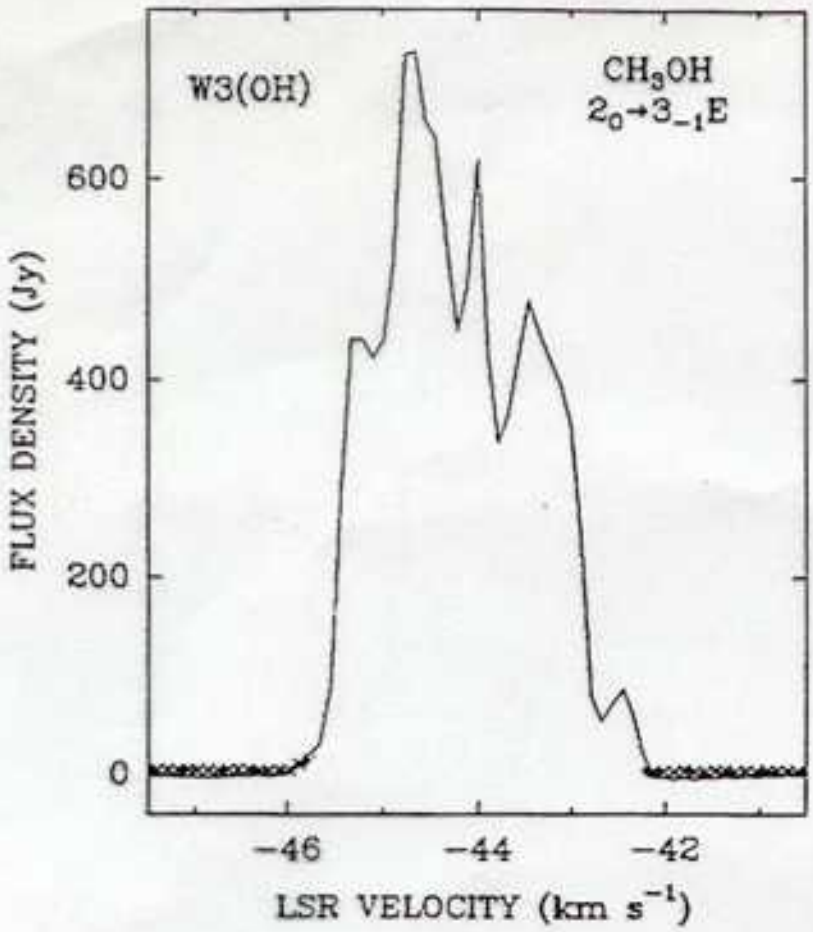
Wide profiles (seed=−597807)

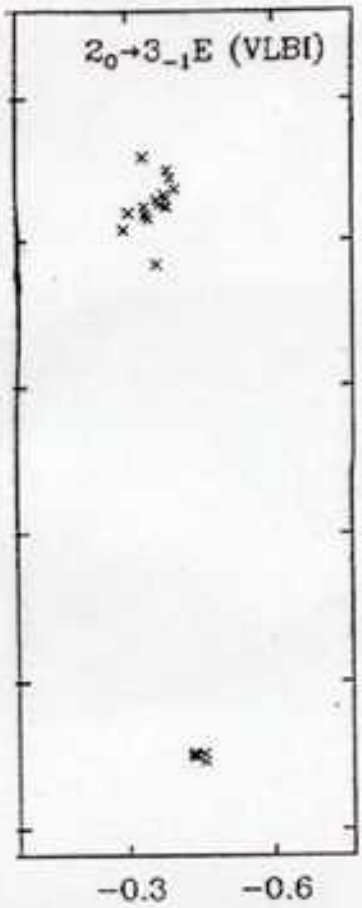


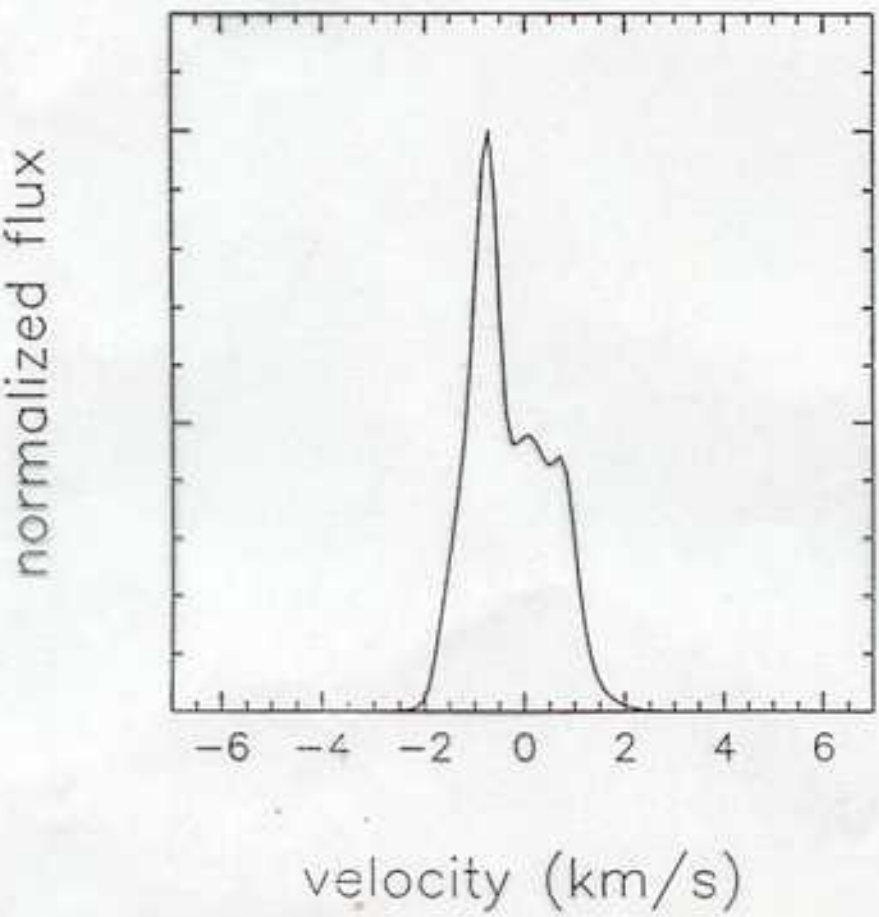



Model 1
log(T_b/T_max)
0
−0.5
−1
0
0.5
1
1.5
2
time (years)
Integrated spectrum (arbitrary units)
change (x2)
−2
0
2
V_lsr(km s^−1)
Model 2
log(T_b/T_max)
0
−0.5
−1
0
0.5
1
1.5
2
time (years)
Integrated spectrum (arbitrary units)
change (x2)
−2
0
2
V_lsr(km s^−1)
Model 3
log(T_b/T_max)
0
−0.5
−1
0
0.5
1
1.5
2
time (years)
Integrated spectrum (arbitrary units)
change (x2)
−2
0
2
V_lsr(km s^−1)


"W3OH/combine6/marq-g.fit"
"W3OH/combine6/marq-g.fit"
"W3OH/combine6/marq-g.gau"
"W3OH/combine6/marq-g.gau"
5
4
3
2
1
0
-1
-2
-3
-4
-50
0
50
100
150

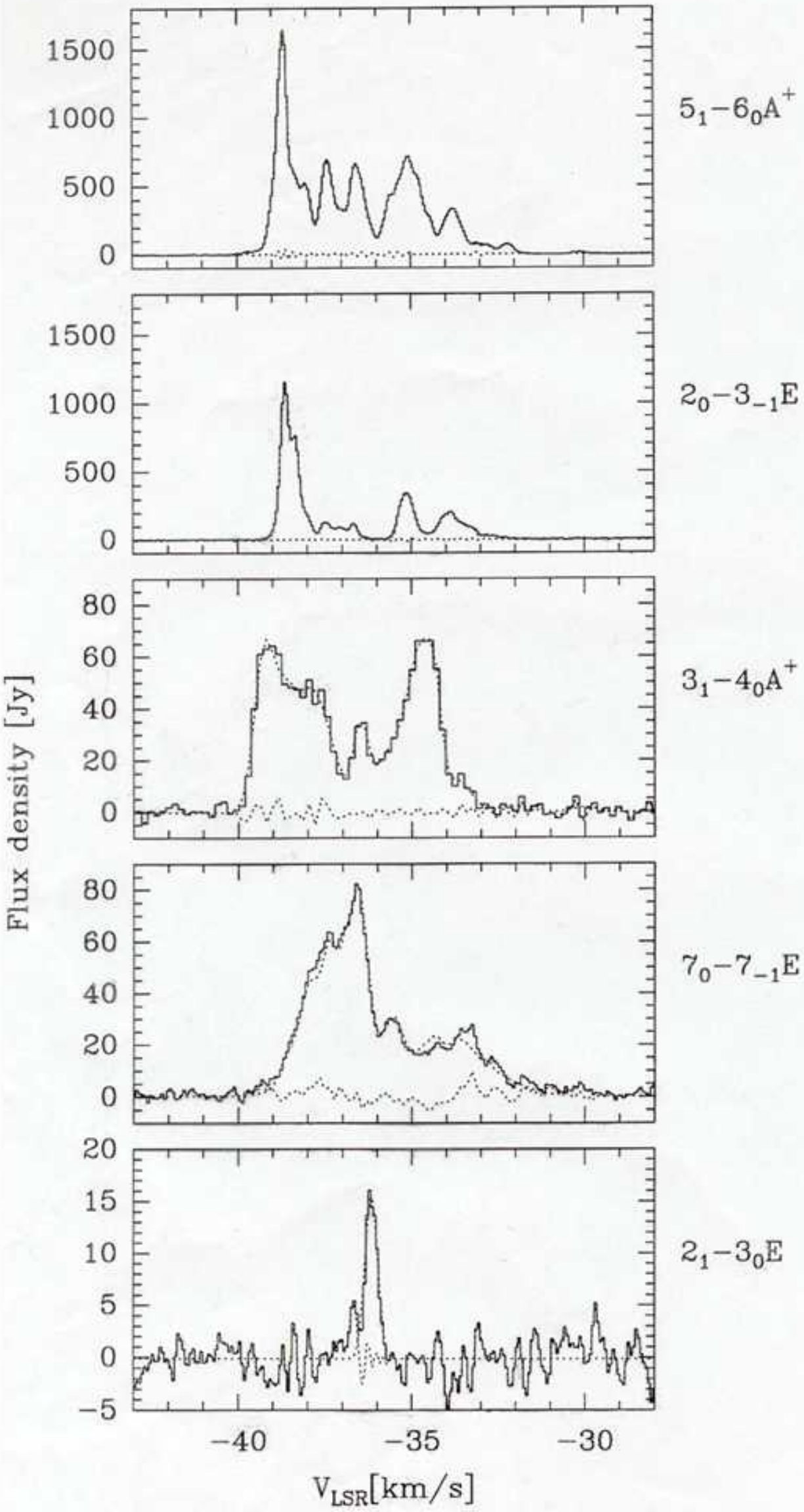

W3(OH)
CH3OH
2₀→3₋₁E
FLUX DENSITY (Jy)
600
400
200
0
−46
−44
−42
LSR VELOCITY (km s⁻¹)


2₀→3₋₁E (VLBI)
−0.3
−0.6


normalized flux
−6
−4
−2
0
2
4
6
velocity (km/s)


0
32
64
96
128
0
64
128
192
256
320
384
448
512

G339.88-1.26


1500
1000
500
0
$5_1-6_0A^+$
1500
1000
500
0
$2_0-3_{-1}E$
80
60
40
20
0
$3_1-4_0A^+$
80
60
40
20
0
$7_0-7_{-1}E$
20
15
10
5
0
−5
2_1-3_0E
Flux density [Jy]
−40
−35
−30
V_{LSR}[km/s]

Wilner et al. (1999)

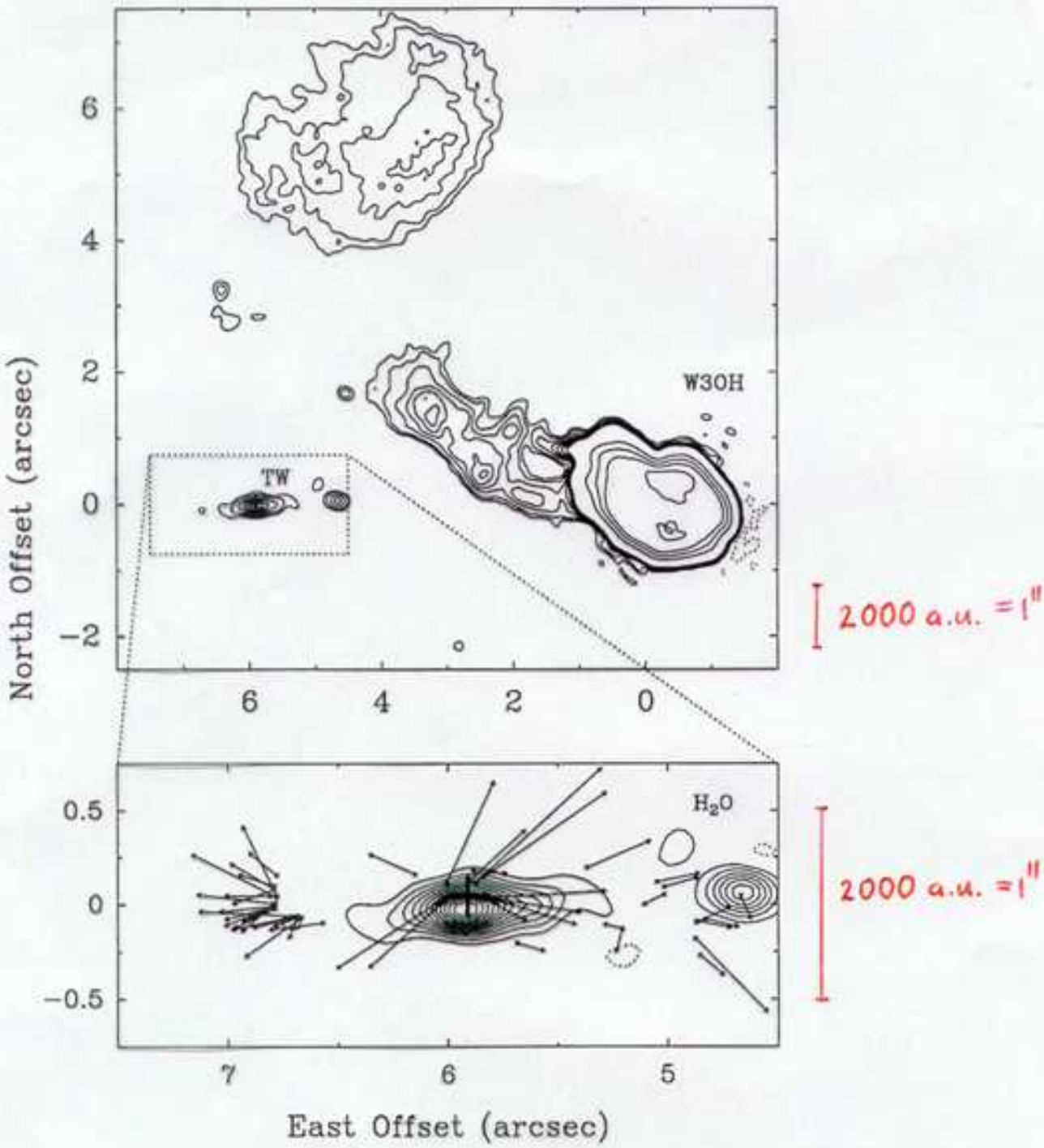
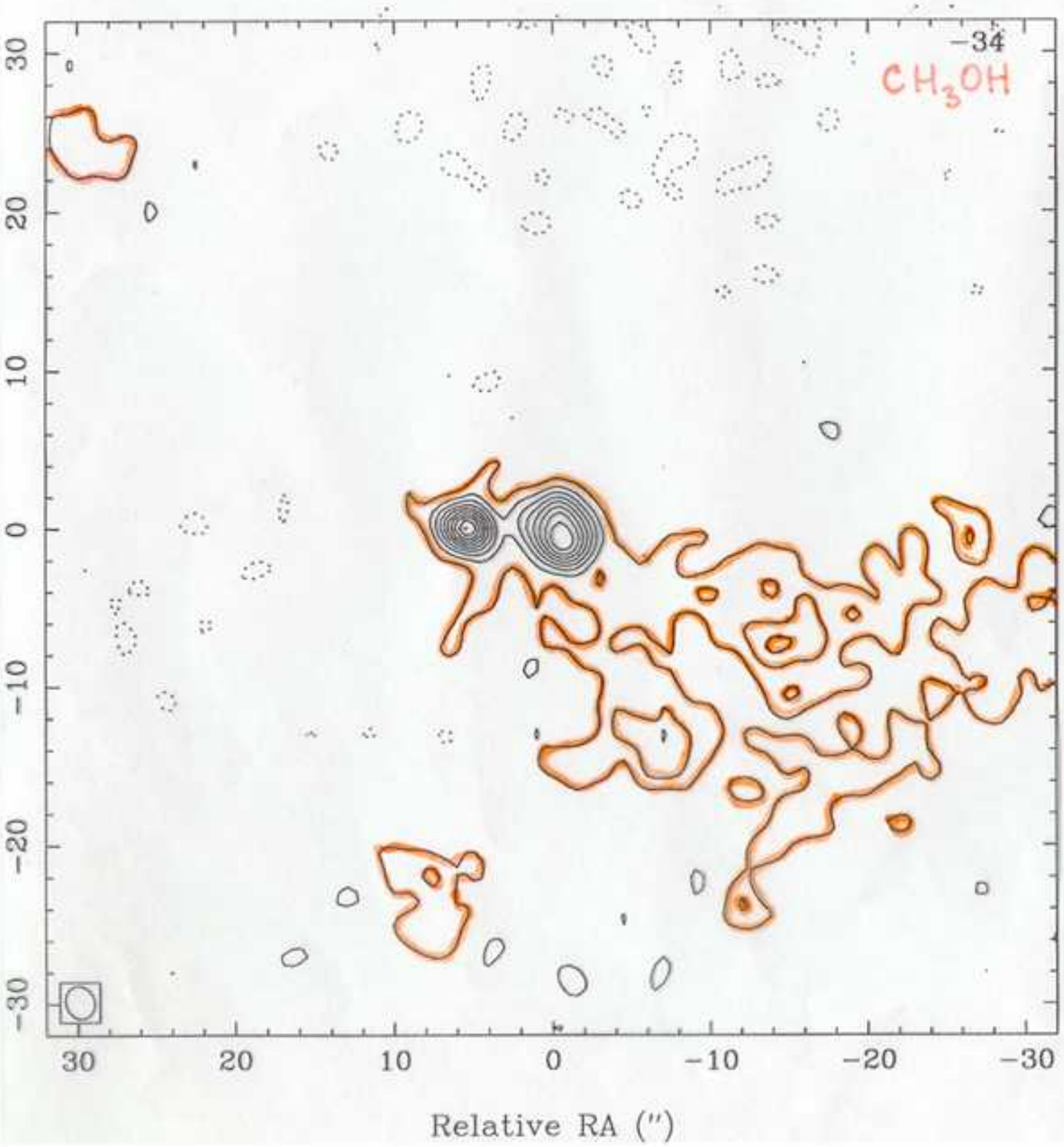


Fig. 1.— *Upper panel:* Continuum emission from the W3(OH) region at 8.44 GHz for 1995. The lowest contour levels are 30 and 60 μJy beam^{-1}, then the levels increase in steps of 60 to 360 μJy beam^{-1} followed by the four highest levels of 5, 10, 15, and 20 mJy beam^{-1}. The synthesized beam is $0\farcs21 \times 0\farcs19$ (460 × 420 AU) at p.a. 68°. The origin is located at R.A. = $02^h27^m03\farcs876$ and Dec. = $61°52''24\farcs63$ (J2000). *Lower panel:* Expanded view of the jet-like emission from the TW object. The positions and proper motions of the H_2O masers from the VLBI study of Alcolea et al. (1992) are indicated by arrows.

W3OH CH_3OH 2_K-1_K



2:27:03.870 61:52:24.600

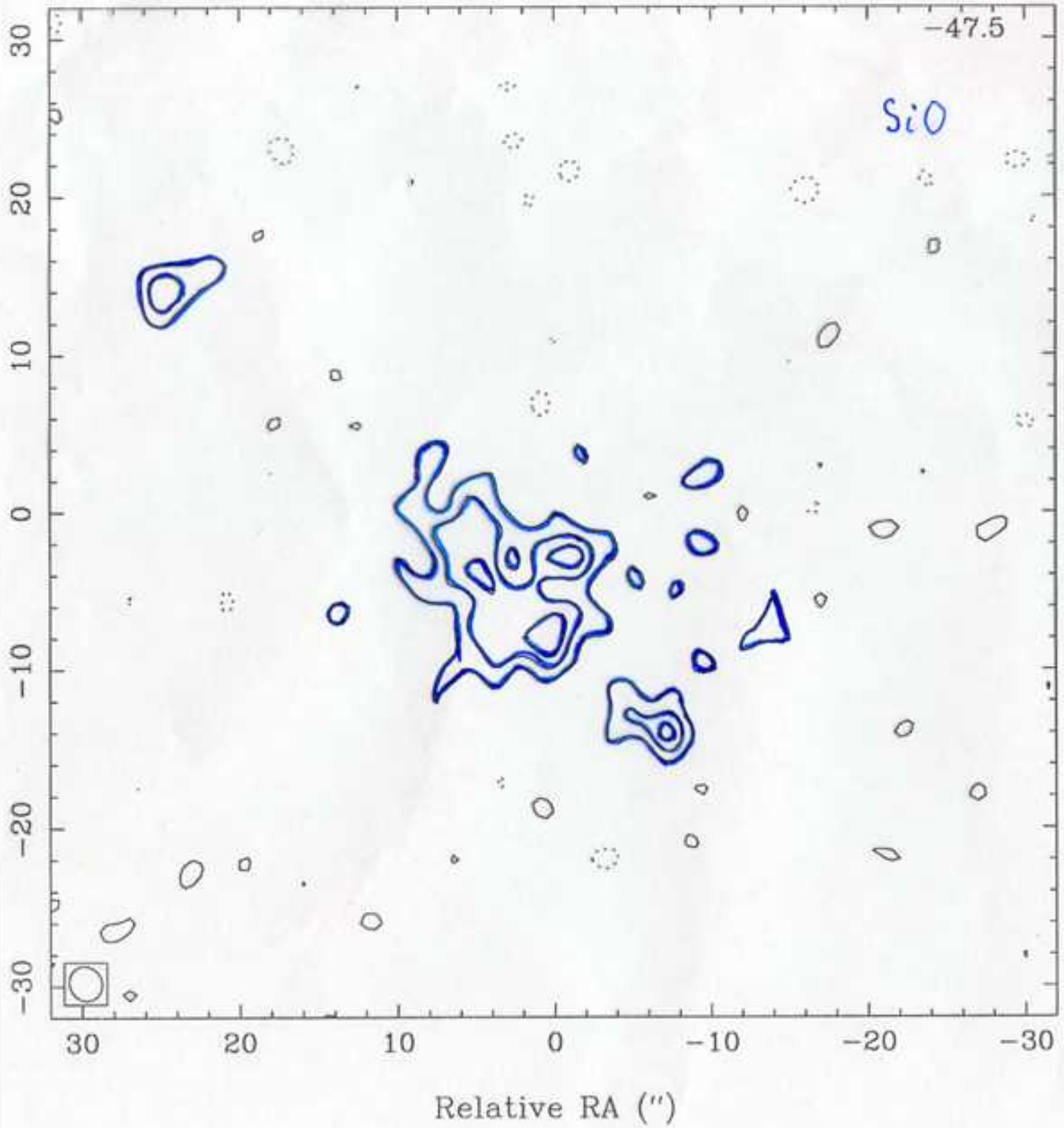
File: w2.sc.lin.mom3
Freq: 96.744553 (GHz)
Crval3: −34.000 km/s
Max: 0.504850
Min: −0.822812E−01
Units: JY/BEAM
Beam: 2.1 x 1.8

Axes: 256 x 256 x 1
−0.50 x 0.50 x 17.00

Contours: 10

0.050	0.100
0.150	0.200
0.250	0.300
0.350	0.400
0.450	0.500

W3OH SiO(2-1)



2:27:03.870 61:52:24.600

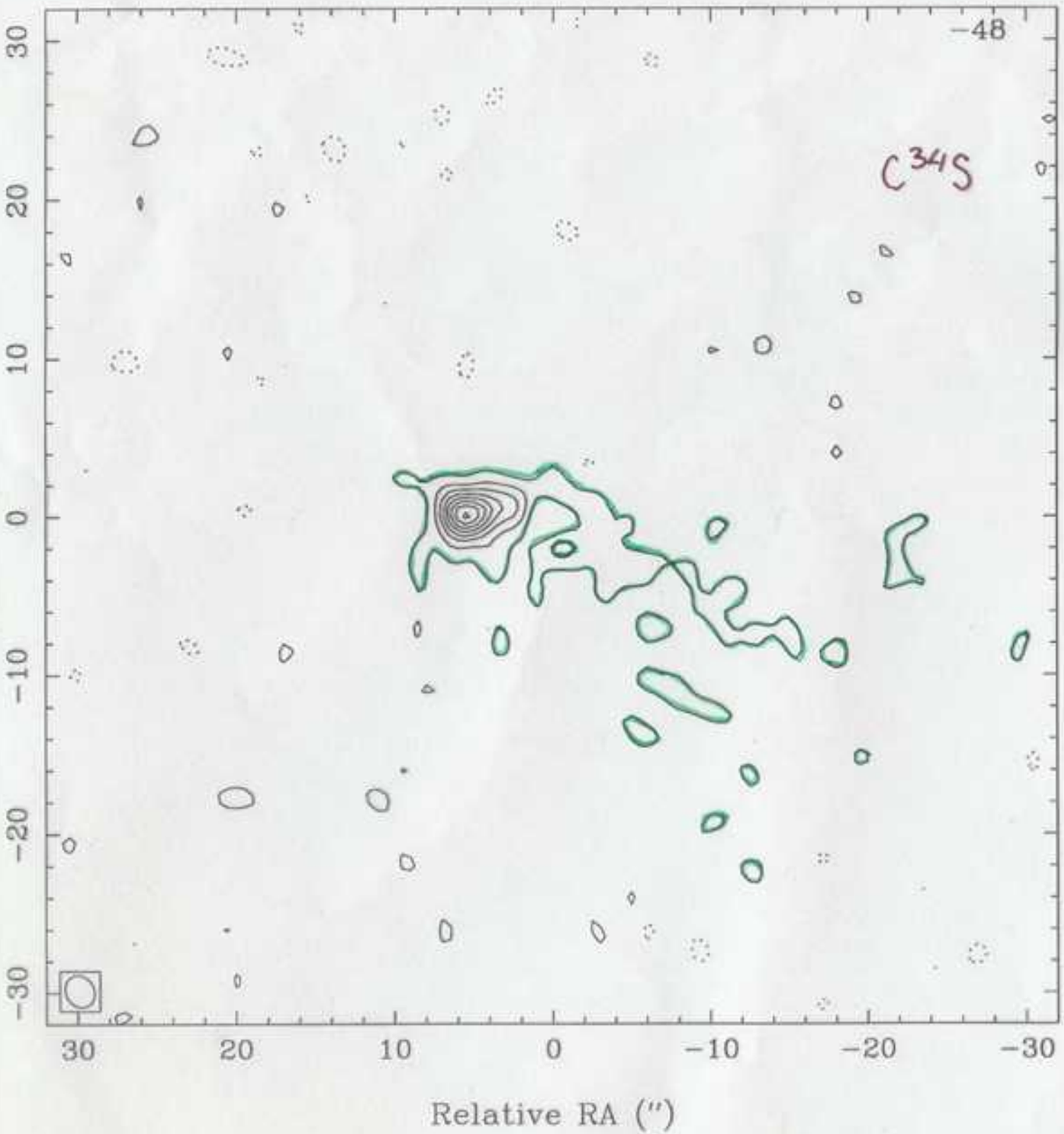
File: w6.sc.lin.mom
Freq: 86.847000 (GHz)
Crval3: −47.500 km/s
Max: 0.199039
Min: −0.737518E−01
Units: JY/BEAM
Beam: 2.2 x 2.0

Axes: 256 x 256 x 1
−0.50 x 0.50 x 6.00

Contours: 4

0.050 0.100
0.150 0.200

W3OH $C^{34}S(2-1)$



2:27:03.870 61:52:24.600

File: w4.sc.lin.mom
Freq: 96.412979 (GHz)
Crval3: −48.000 km/s
Max: 0.411388
Min: −0.740307E−01
Units: JY/BEAM
Beam: 2.1 x 1.8

Axes: 256 x 256 x 1
−0.50 x 0.50 x 13.00

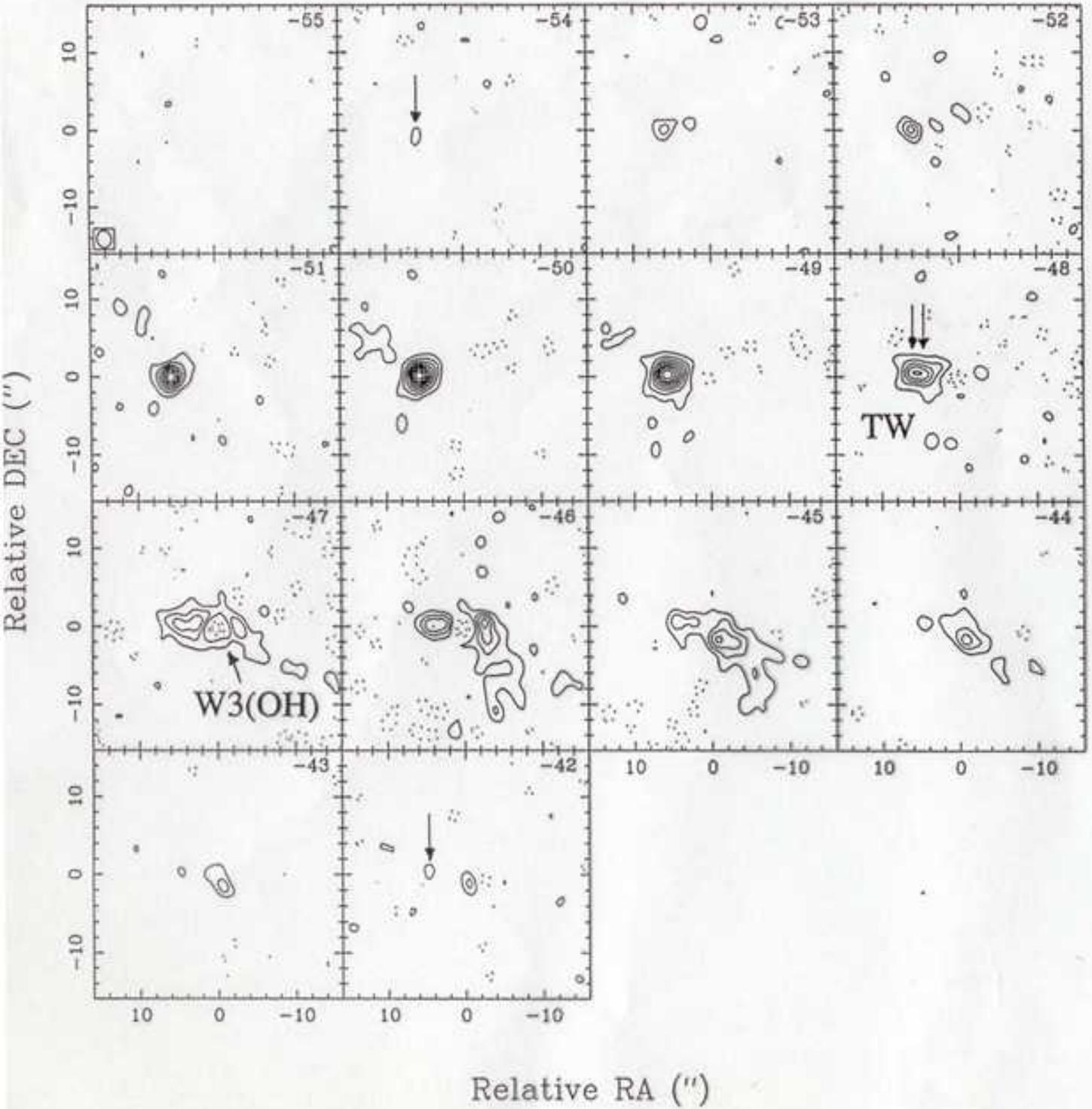
Contours: 10

0.050	0.100
0.150	0.200
0.250	0.300
0.350	0.400
0.450	0.500

B array

$C^{34}S$

W3OH



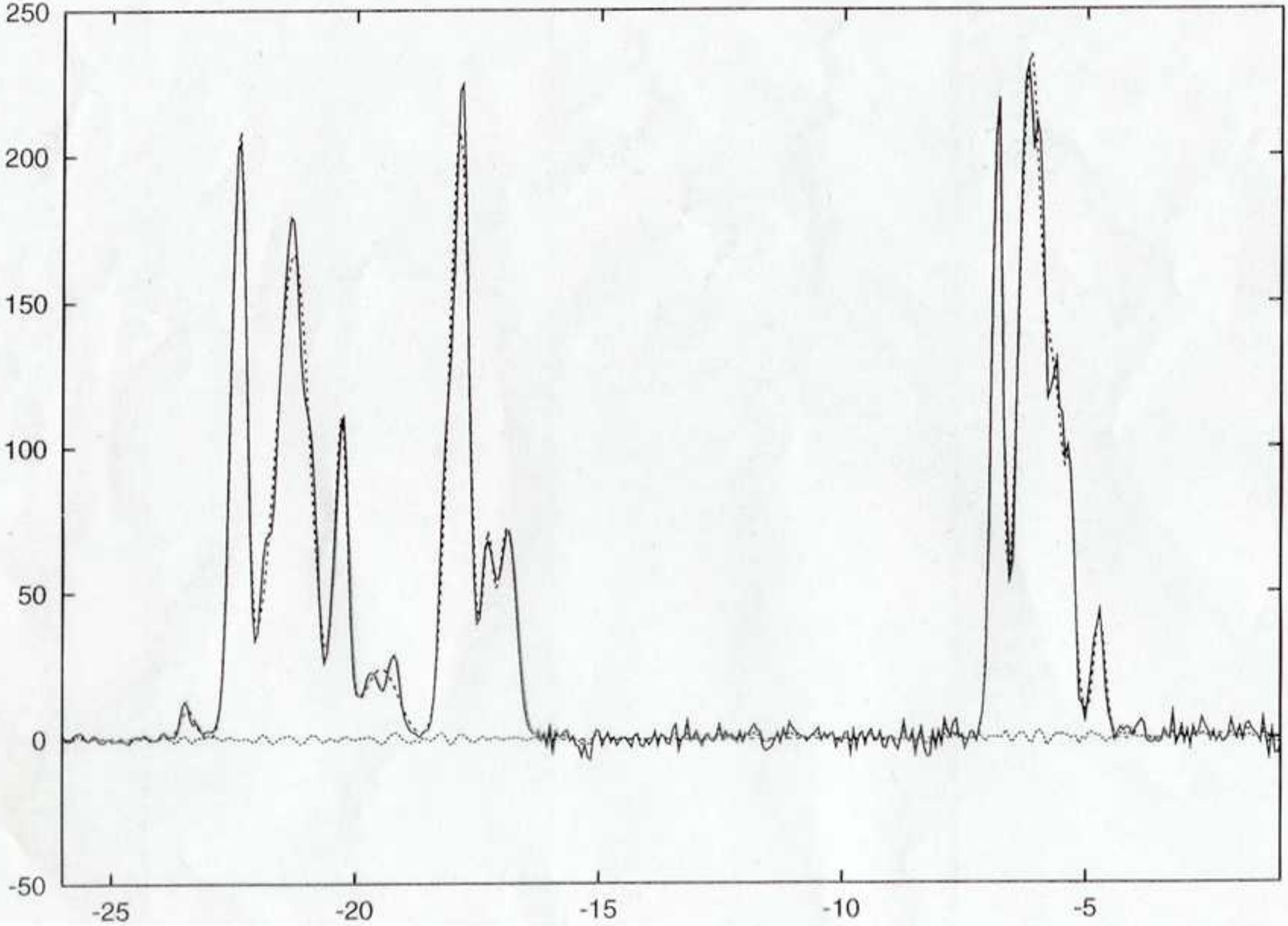
2:27:03.870 61:52:24.600

File: tton/w4.sc.lin.restor
Freq: 96.412979 (GHz)
Crval3: −55.000 km/s
Max: 0.975235
Min: −0.284870
Units: JY/BEAM
Beam: 2.2 x 1.8

Axes: 512 x 512 x 14
−0.50 x 0.50 x 1.00

Contours: 9

0.100	0.200
0.300	0.400
0.500	0.600
0.700	0.800
0.900	


250
200
150
100
50
0
-50
-25
-20
-15
-10
-5

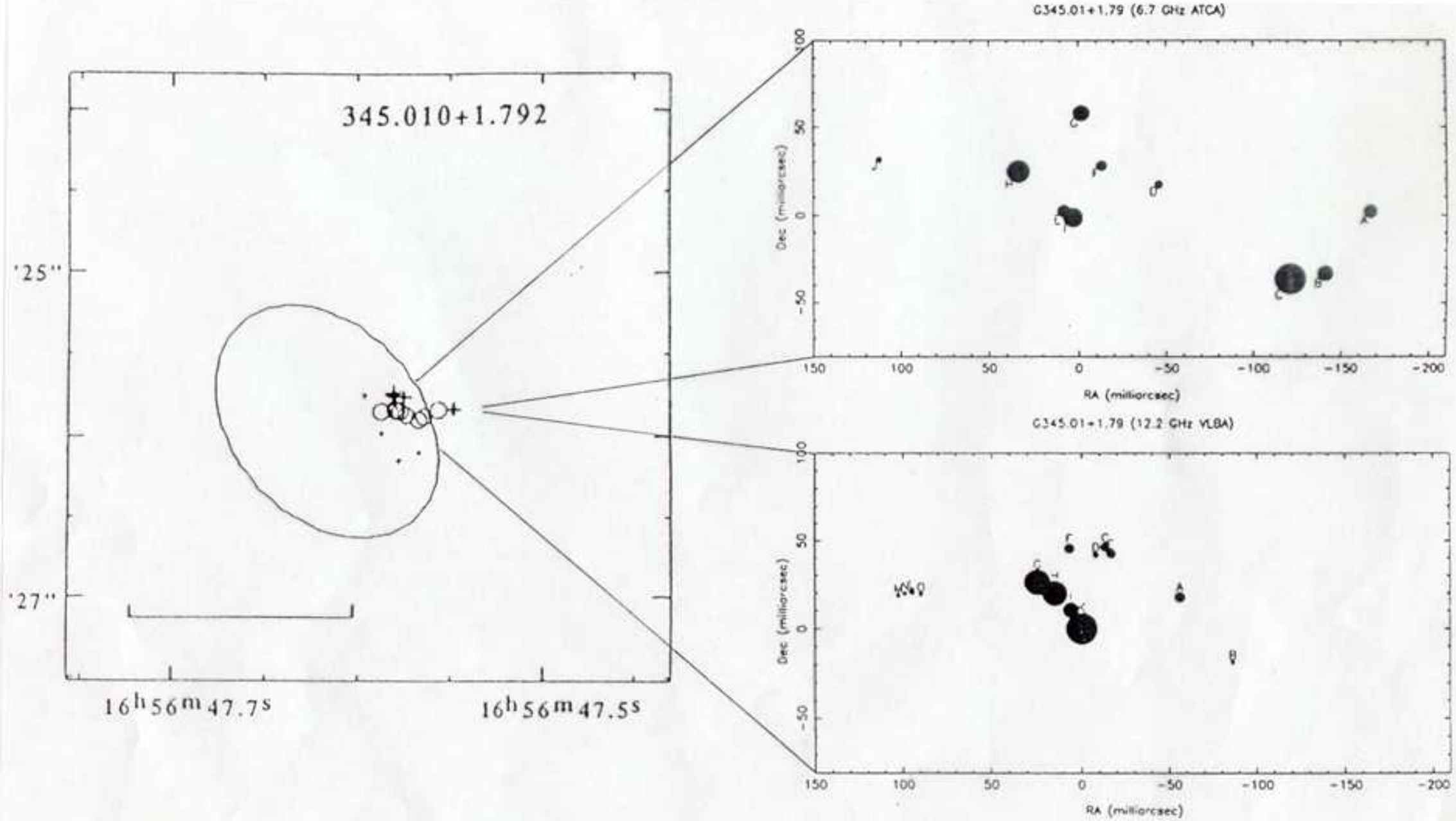
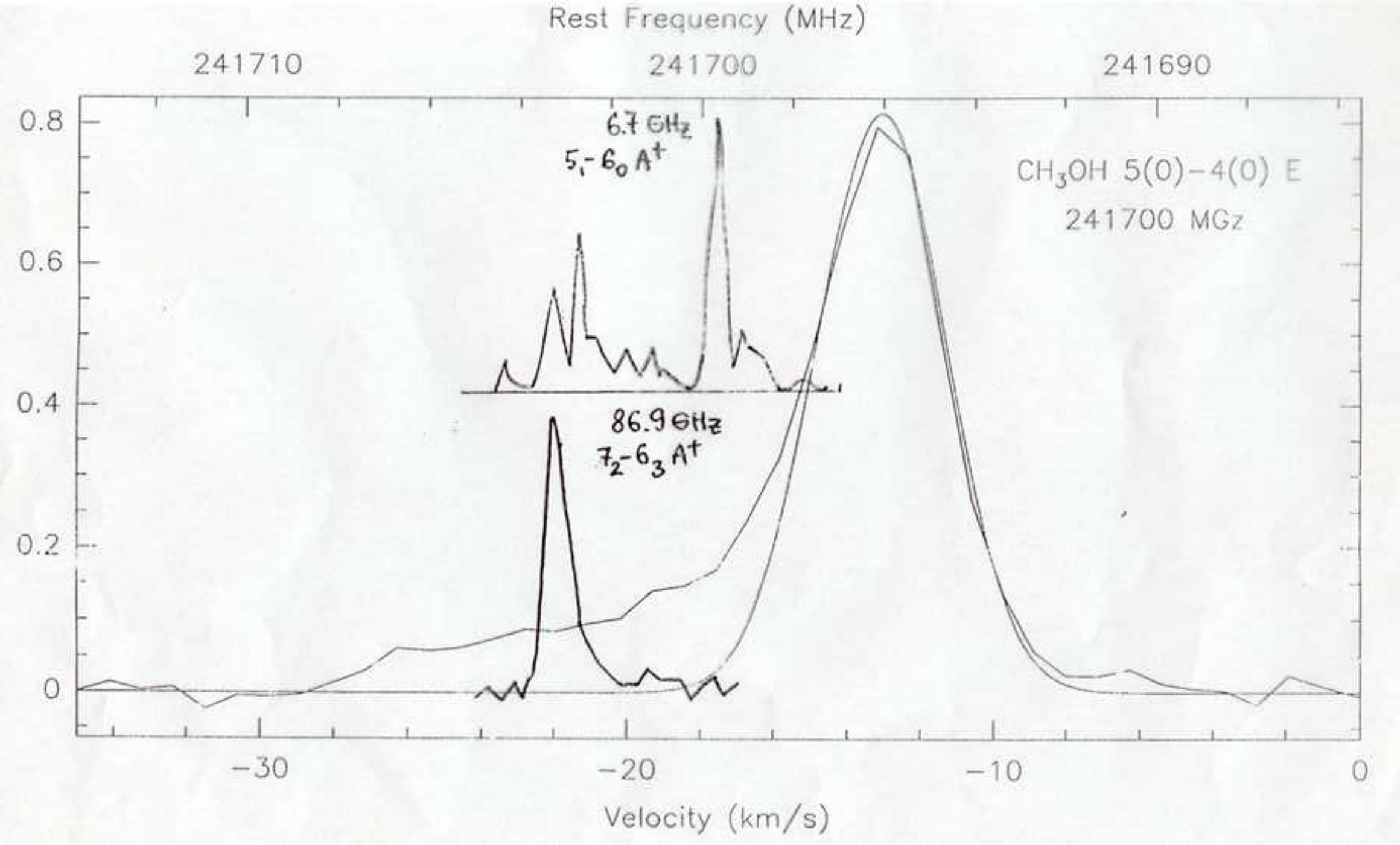
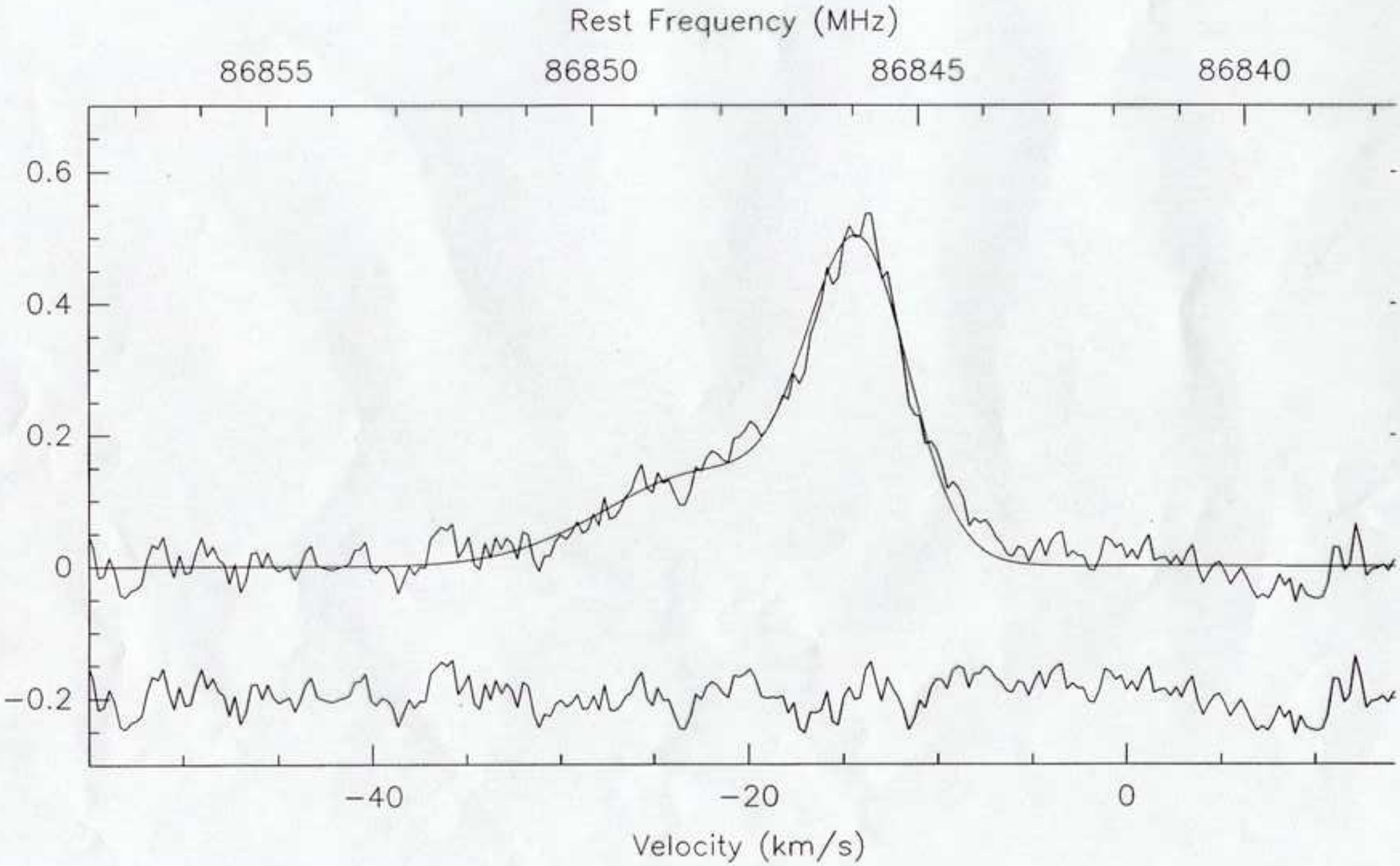
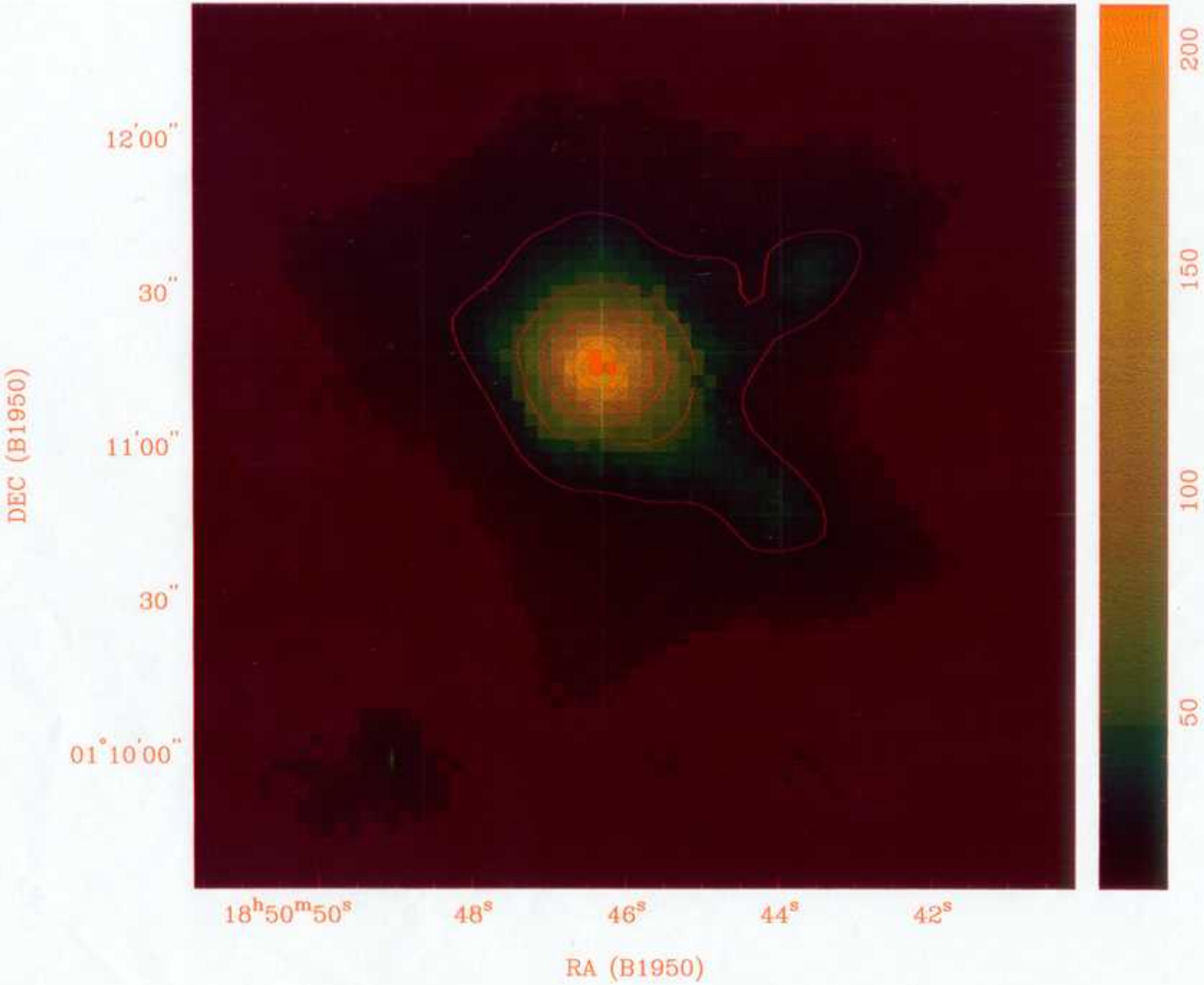


Figure 1. The distribution of the 6.7 and 12.2 GHz methanol masers in G345.01+1.79 shown on the same spatial scale. The area of the circles used to represent each spot is proportional to the flux density. The letters used to label the spots represent the velocity (with "A" being the most blue shifted).


Rest Frequency (MHz)
241710
241700
241690
0.8
0.6
0.4
0.2
0
6.7 GHz
5_1-6_0 A+
86.9 GHz
7_2-6_3 A+
CH_3OH 5(0)−4(0) E
241700 MGz
−30
−20
−10
0
Velocity (km/s)

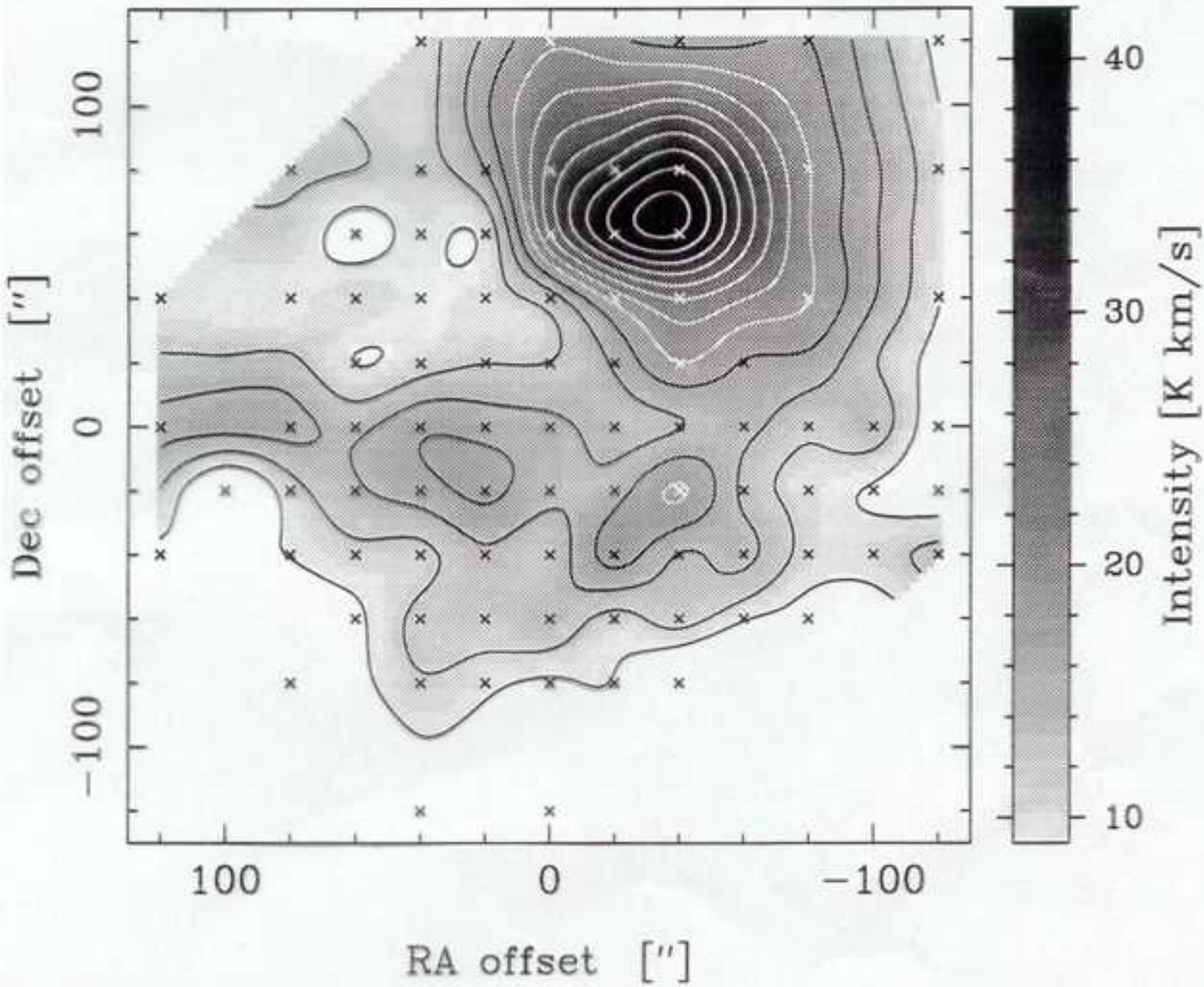
1187; 1 345.01+1.79 SIO(2−1) SEST 15M 0.0 0.0 Eq 1187




12′00″
30″
11′00″
30″
01°10′00″
DEC (B1950)
18h50m50s
48s
46s
44s
42s
RA (B1950)
200
150
100
50

CS(2-1)

G34.24


100
0
−100
Dec offset ["]
100
0
−100
RA offset ["]
40
30
20
10
Intensity [K km/s]