Тонкая Структура Изображений Мазерных Источников

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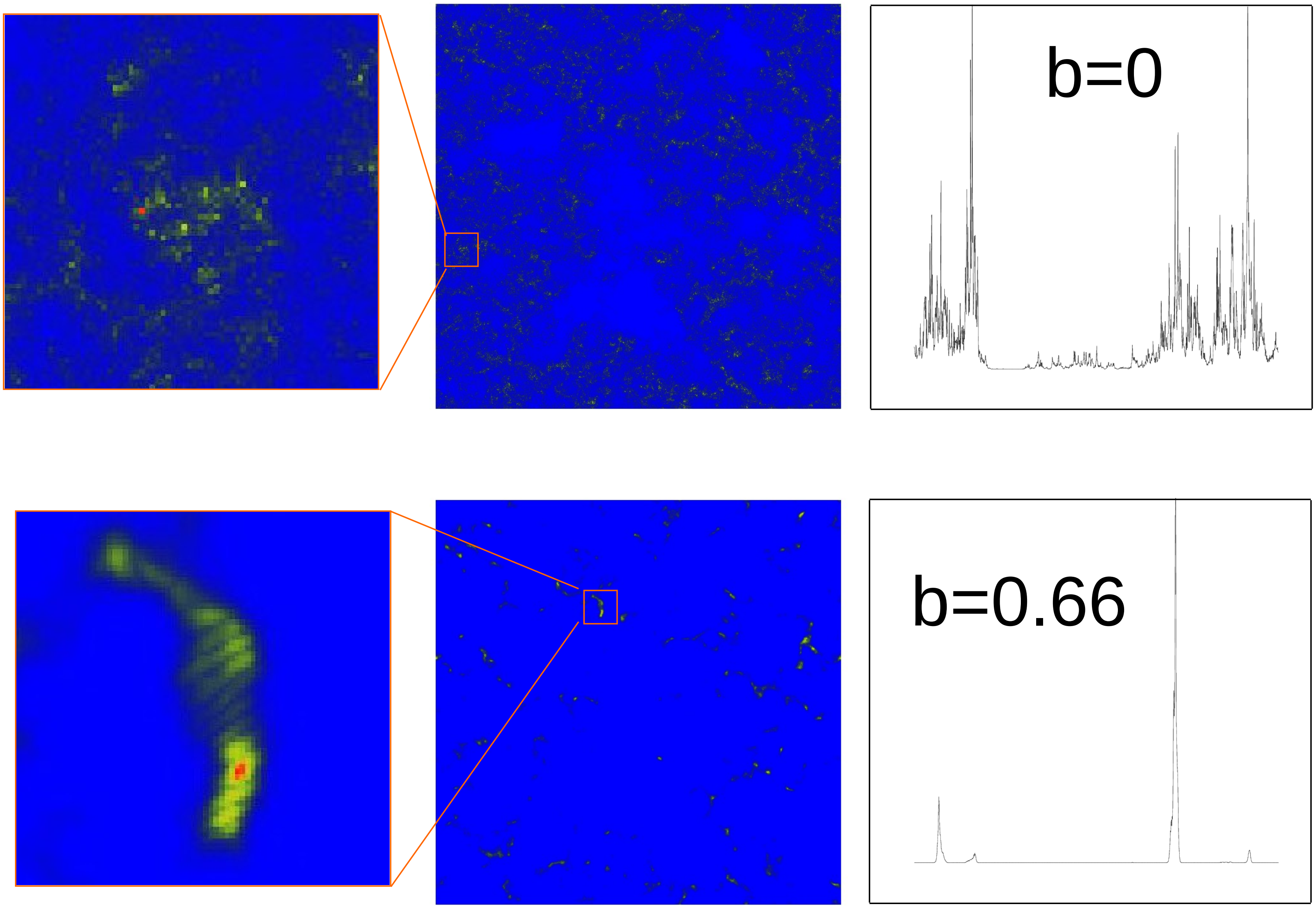
САО 2010

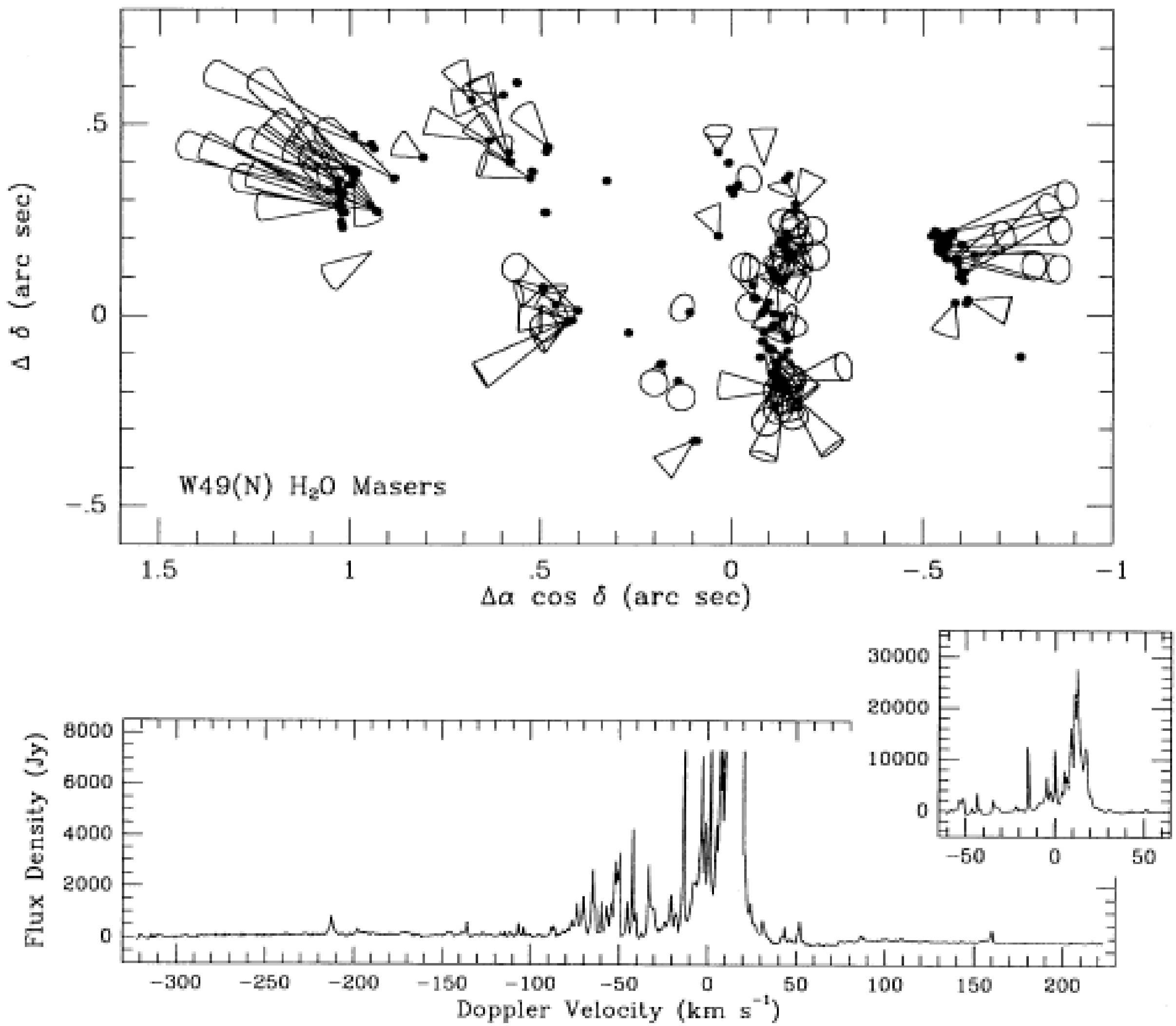
Структура и тонкая структура



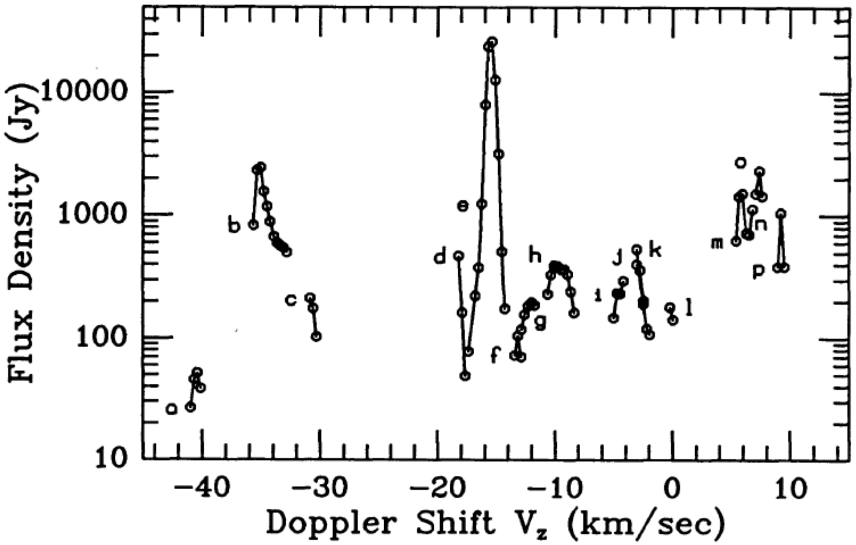
THE ASTROPHYSICAL JOURNAL, 429:241–252, 1994 July 1

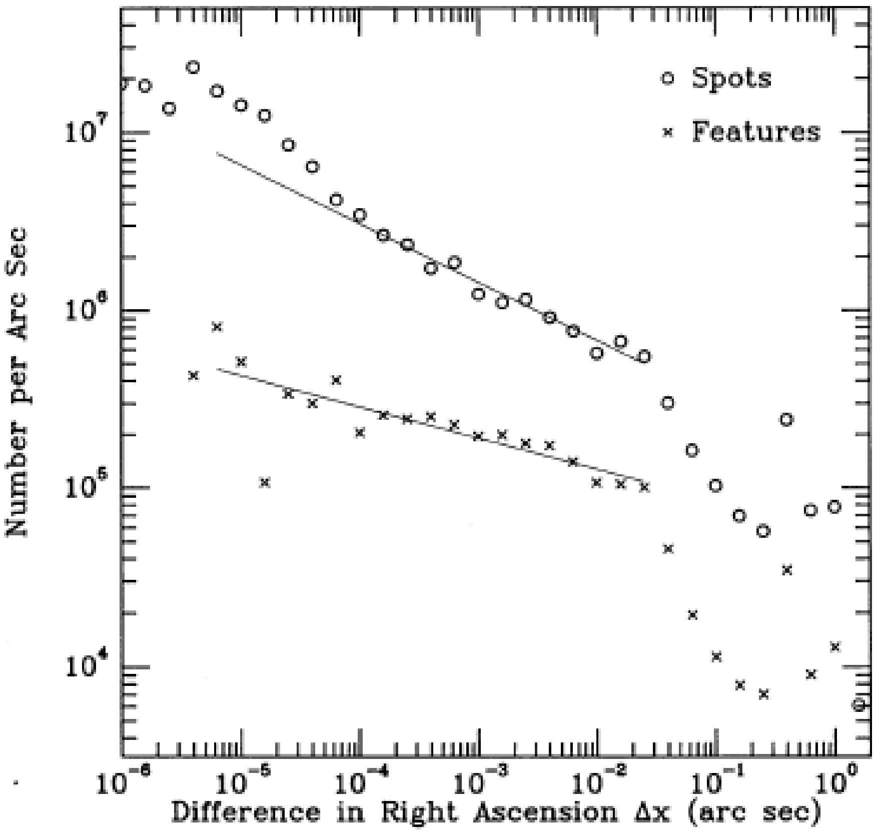
HYPERSONIC ACCELERATION AND TURBULENCE OF H_2O MASERS IN W49N

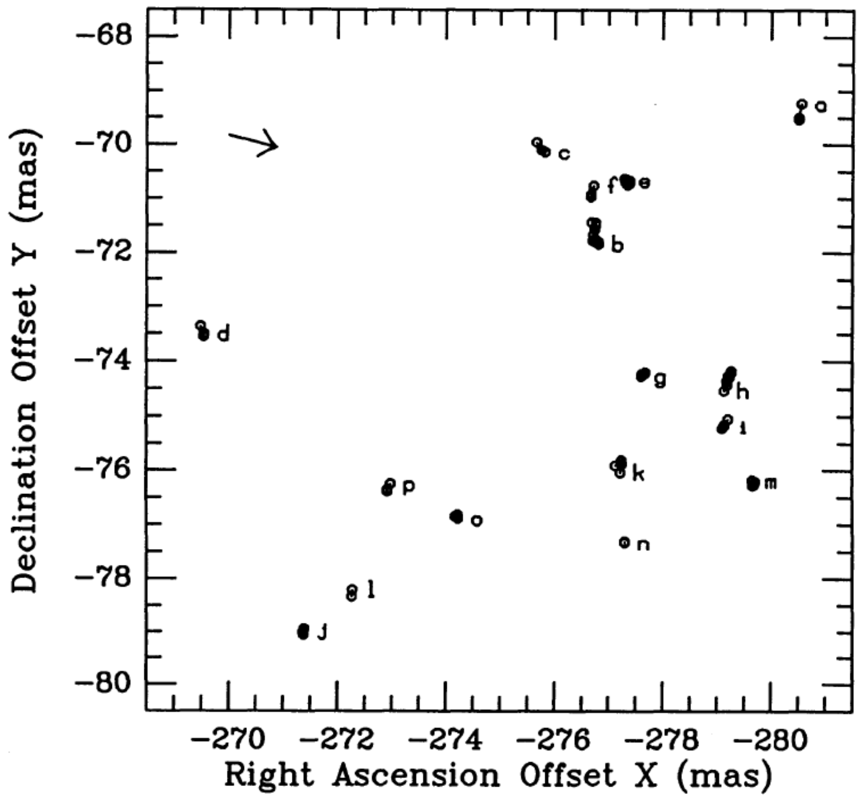
C. R. GWINN



0.013”x0.013”(140 а.е.) Спектр, расположение пятен и 2-точечная корреляционная функция







Spots and features

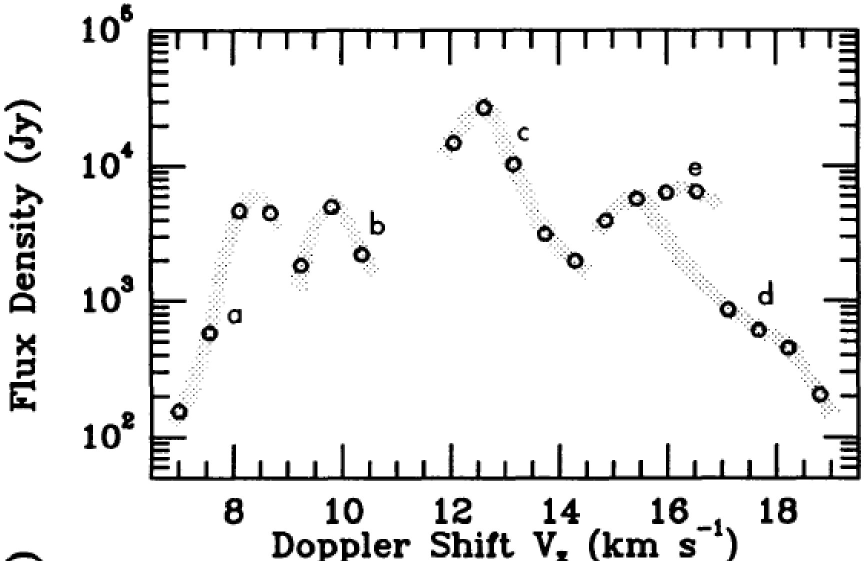
In this paper the quantities of position, Doppler velocity, angular size, and flux density, measured at locations of detected maser emission, are termed "spots." Spots thus reflect instrumental factors. The physical entities producing the observed emission are termed "features." If observations have sufficient accuracy and resolution, one feature will be observed as several spots. These spots can be combined into physical maser features, if the characteristic scales of features are known.

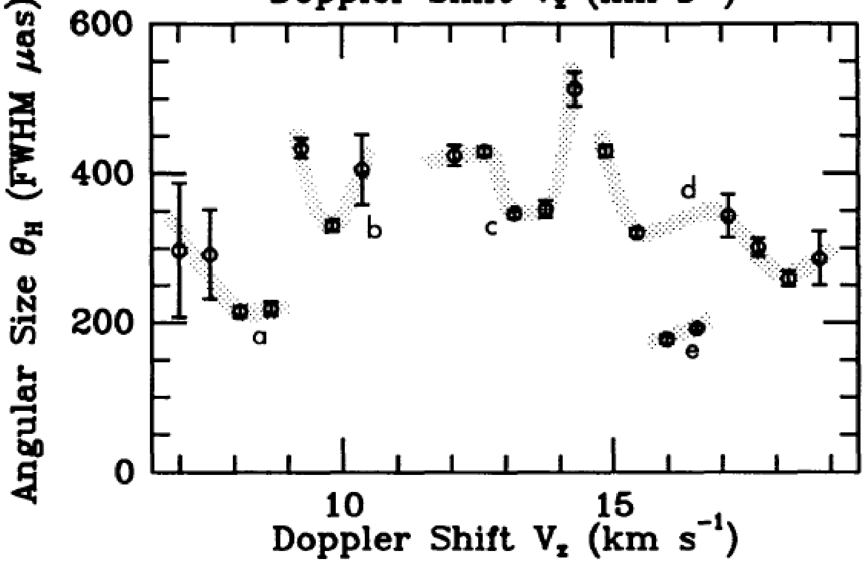
THE ASTROPHYSICAL JOURNAL, 429:253–267, 1994 July 1

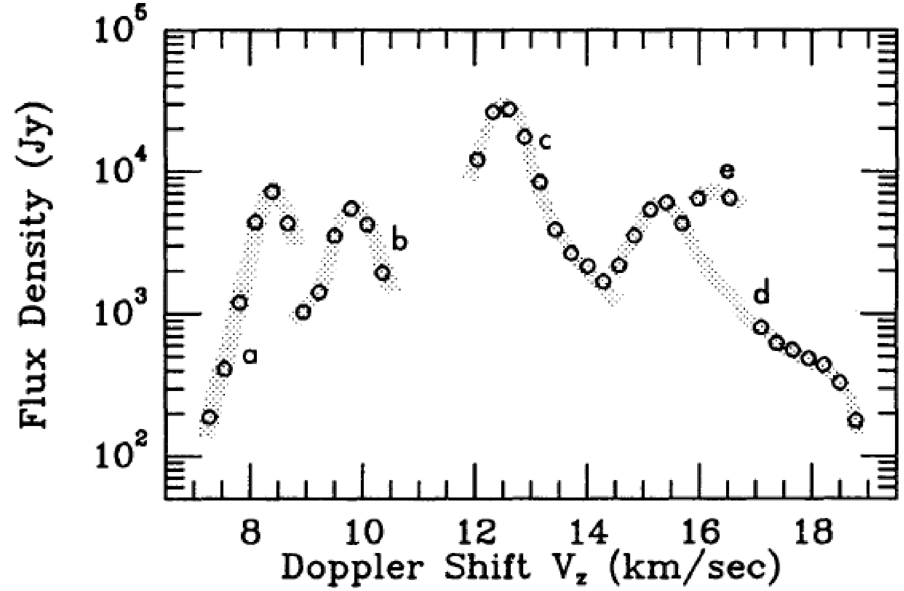
PHYSICAL STRUCTURE OF H_2O MASERS IN W49N

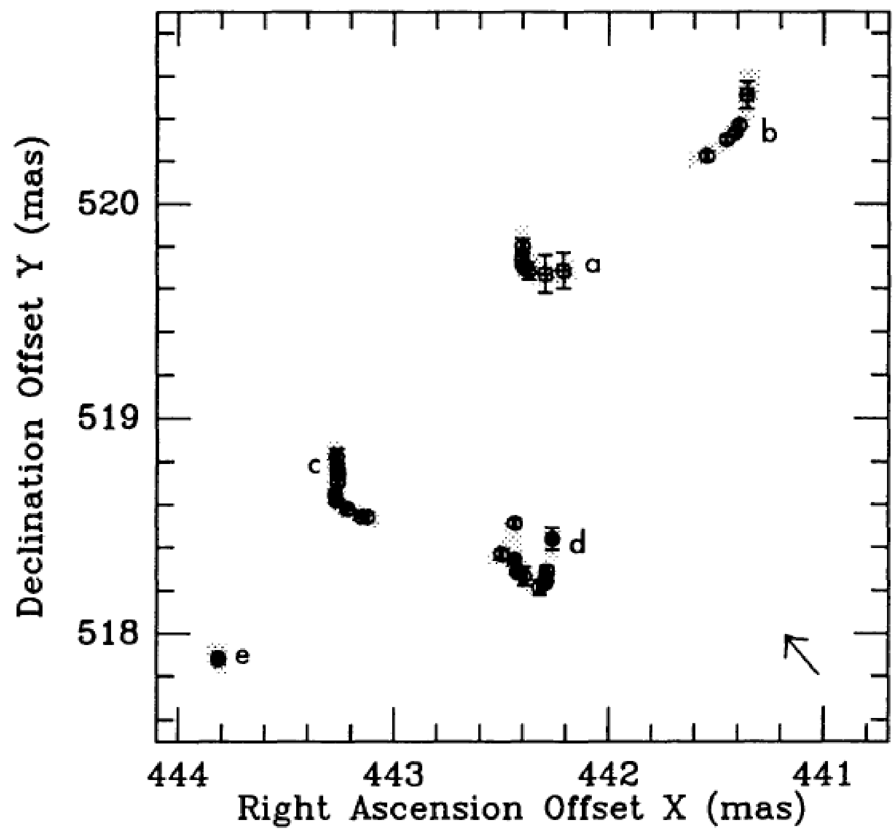
C. R. GWINN

Группа 5 мазерных деталей









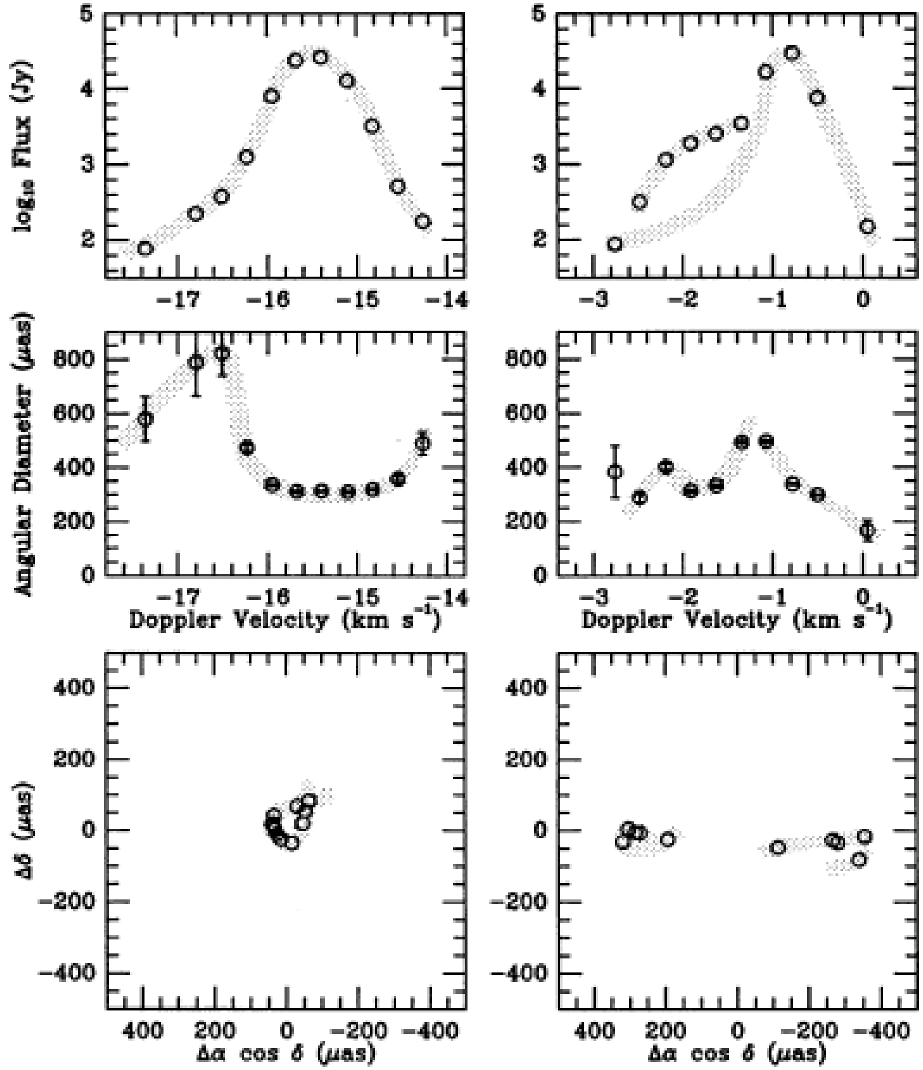
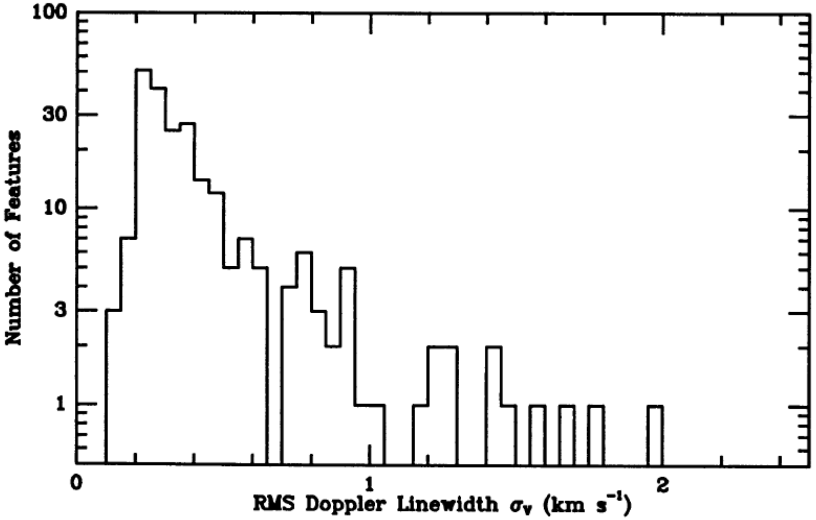


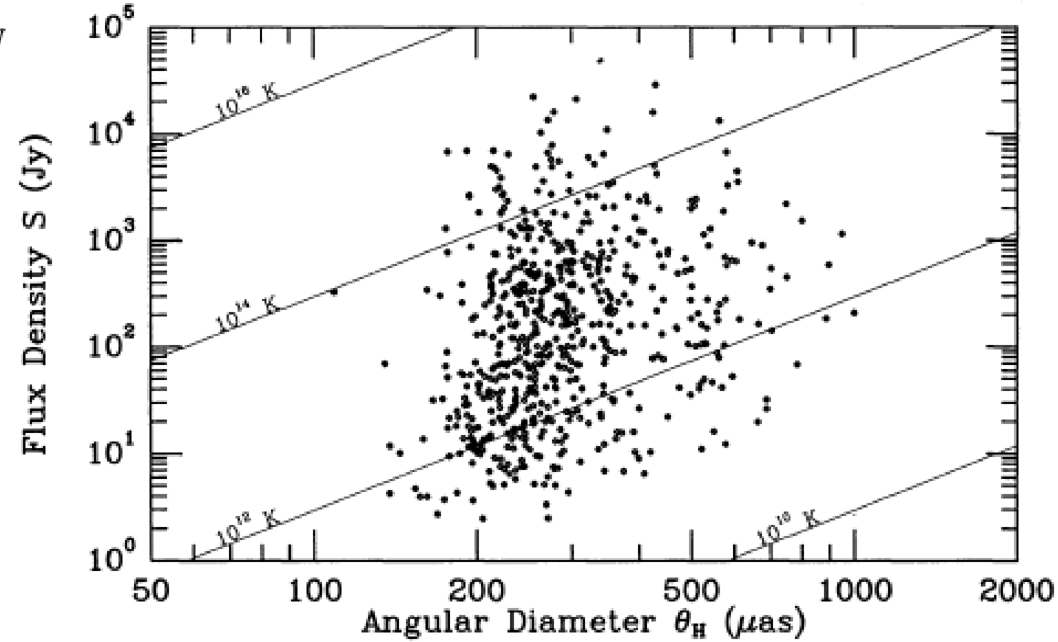
FIG. 13.—Angular diameter (*upper*), flux density (*middle*), and position on the sky (*lower*) plotted for the two brightest features in W49N at 1982 March 6.

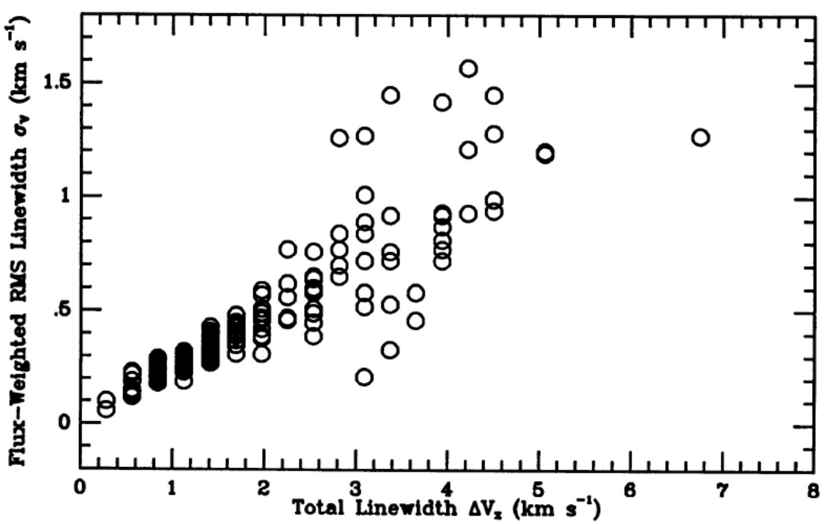
THE ASTROPHYSICAL JOURNAL, 429:253–267, 1994 July 1

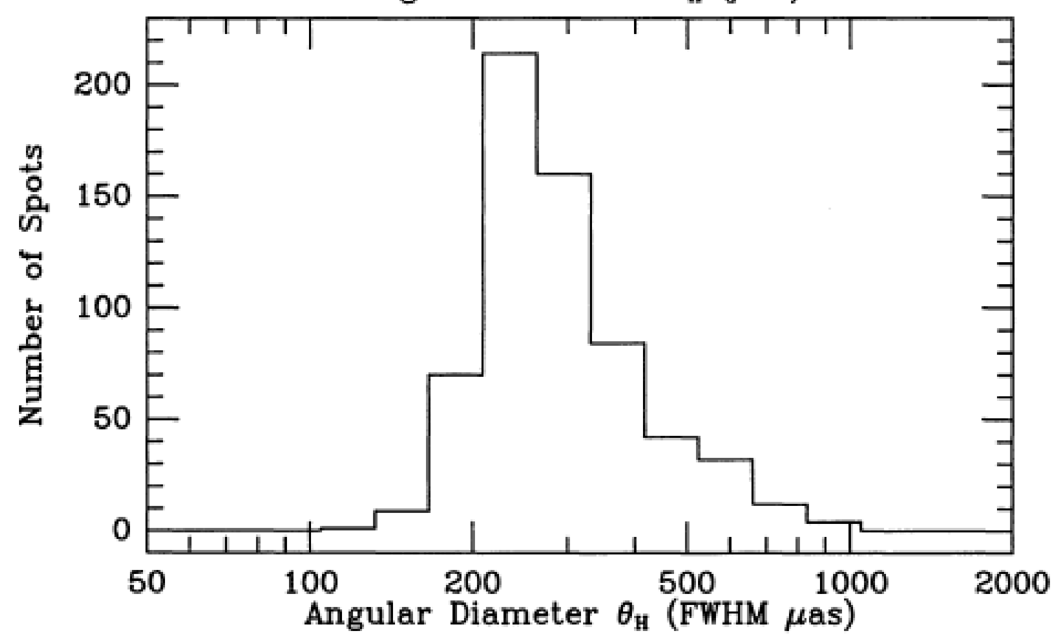
PHYSICAL STRUCTURE OF H_2O MASERS IN W

C. R. GWINN





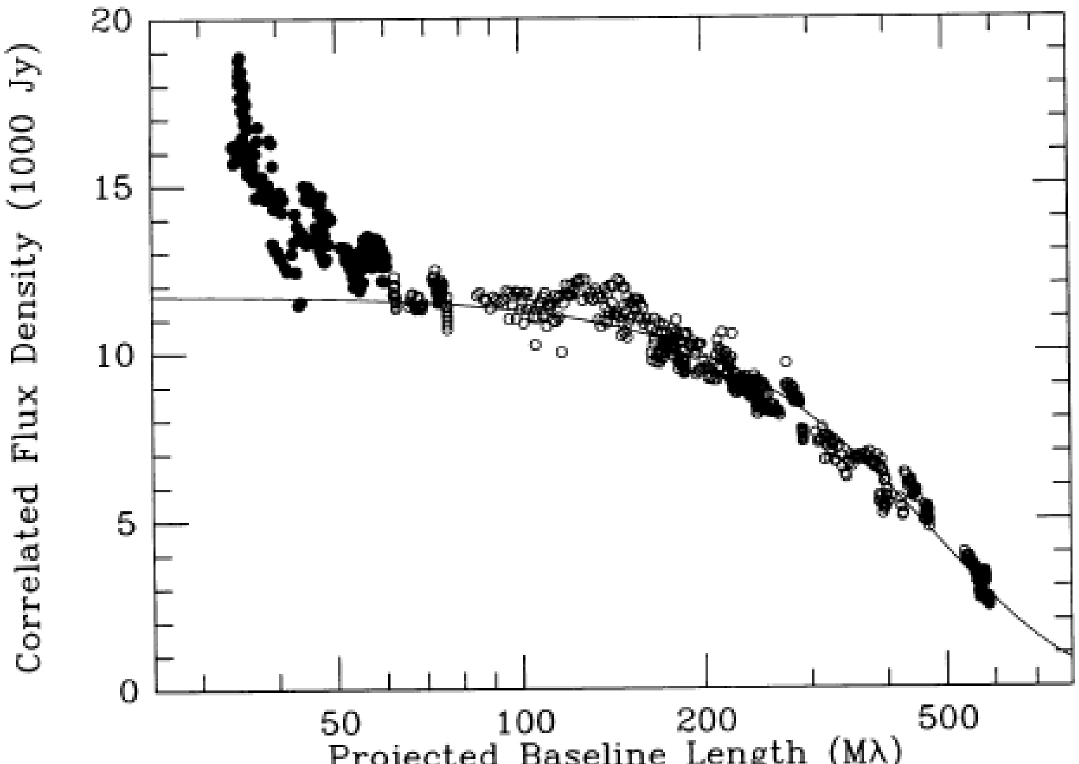


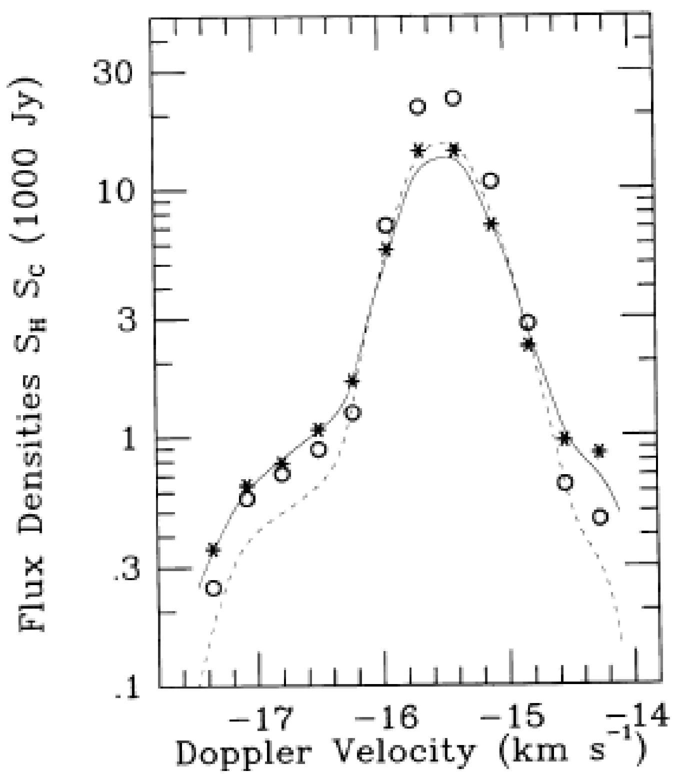


THE ASTROPHYSICAL JOURNAL, 431: L123–L126, 1994 August 20

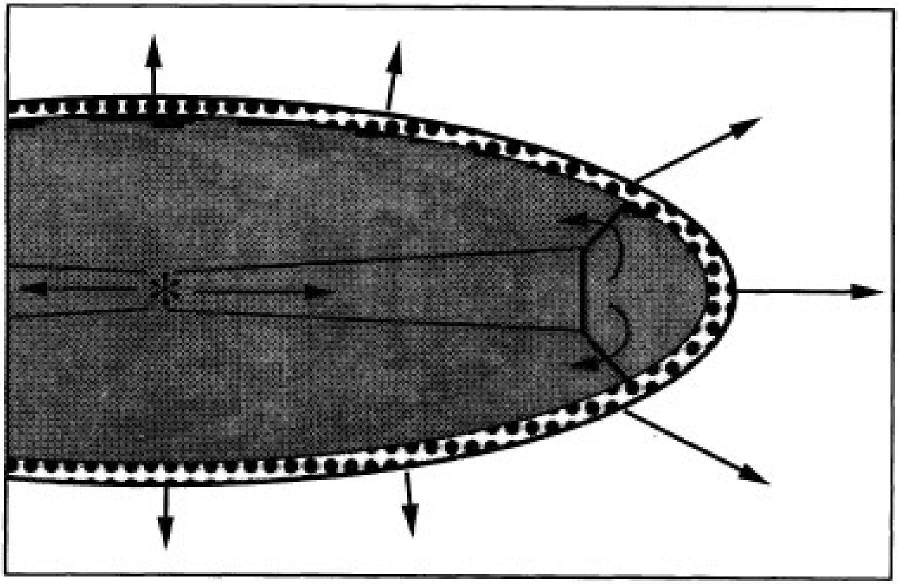
SCATTERED HALOS AROUND H_2O MASERS

C. R. GWINN

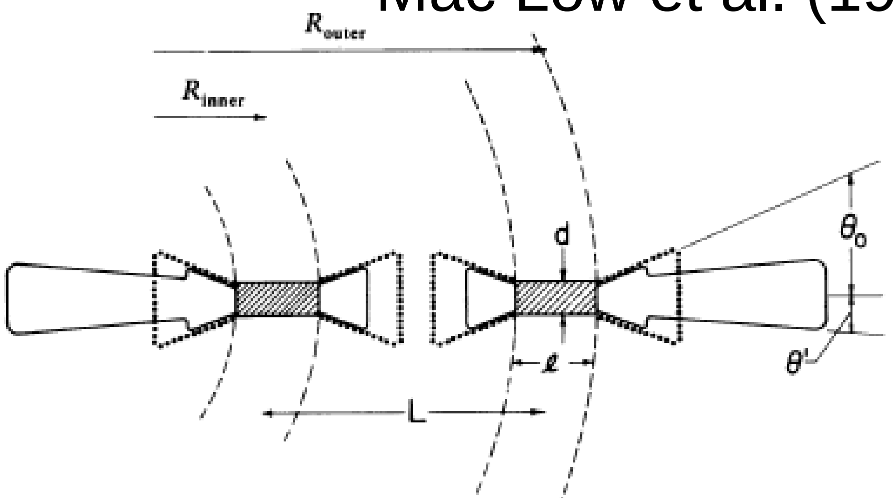




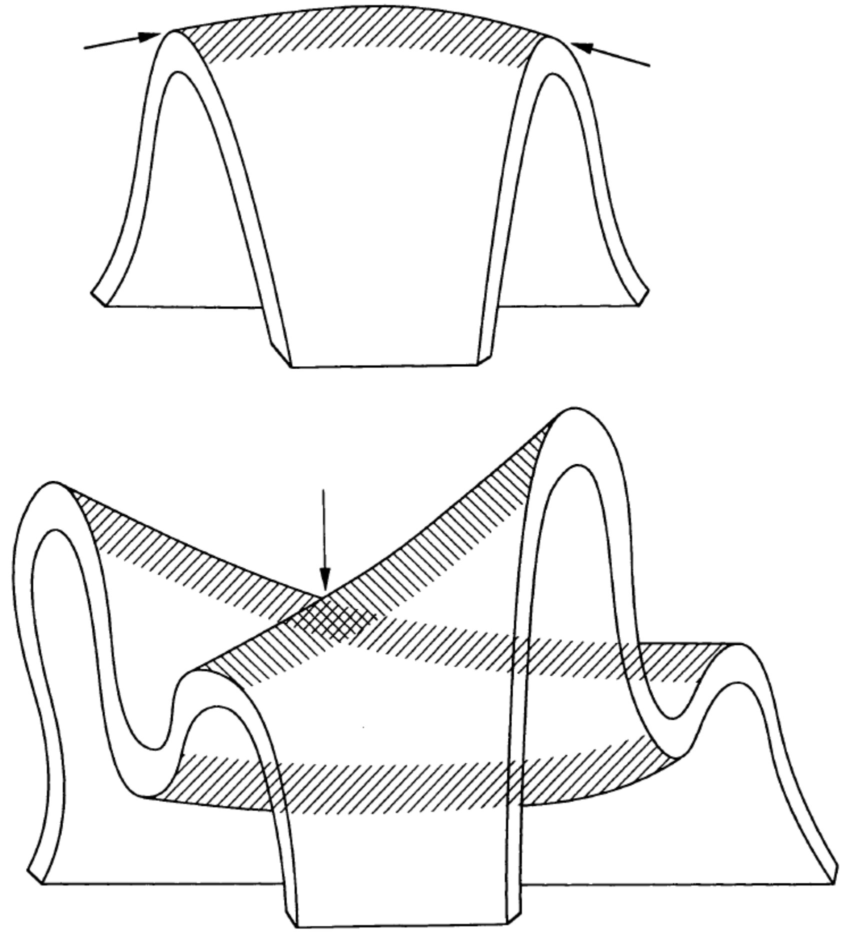
модели



Mac Low et al. (1994)



Deguchi, Watson (1989)



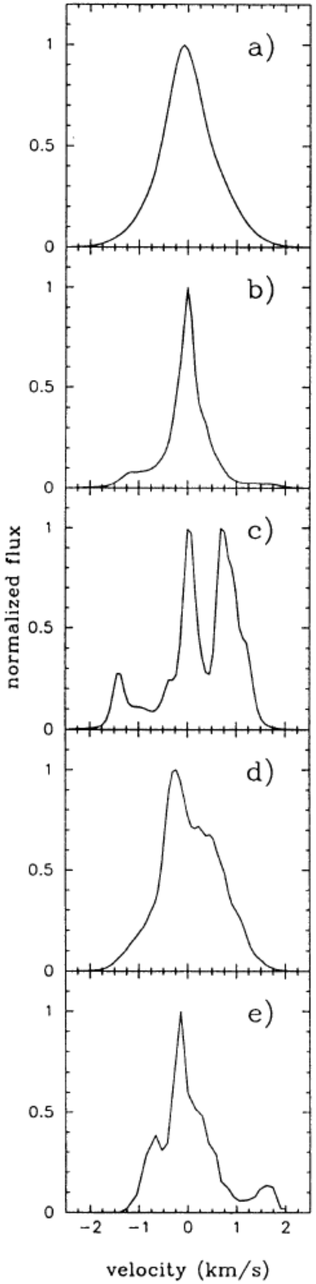
-Curved sheets of masing gas. *Upper*: curved sheet, showing enhanced amplification where sheet is tangent to the line of sight. *Lower*: part of a corrugated sheet, showing particularly high brightness temperature where two tangent sheets overlap. Both the increased amplification along the line of sight and the narrower beaming angle, as described by Deguchi & Watson (1989), contribute to the increased brightness temperature.

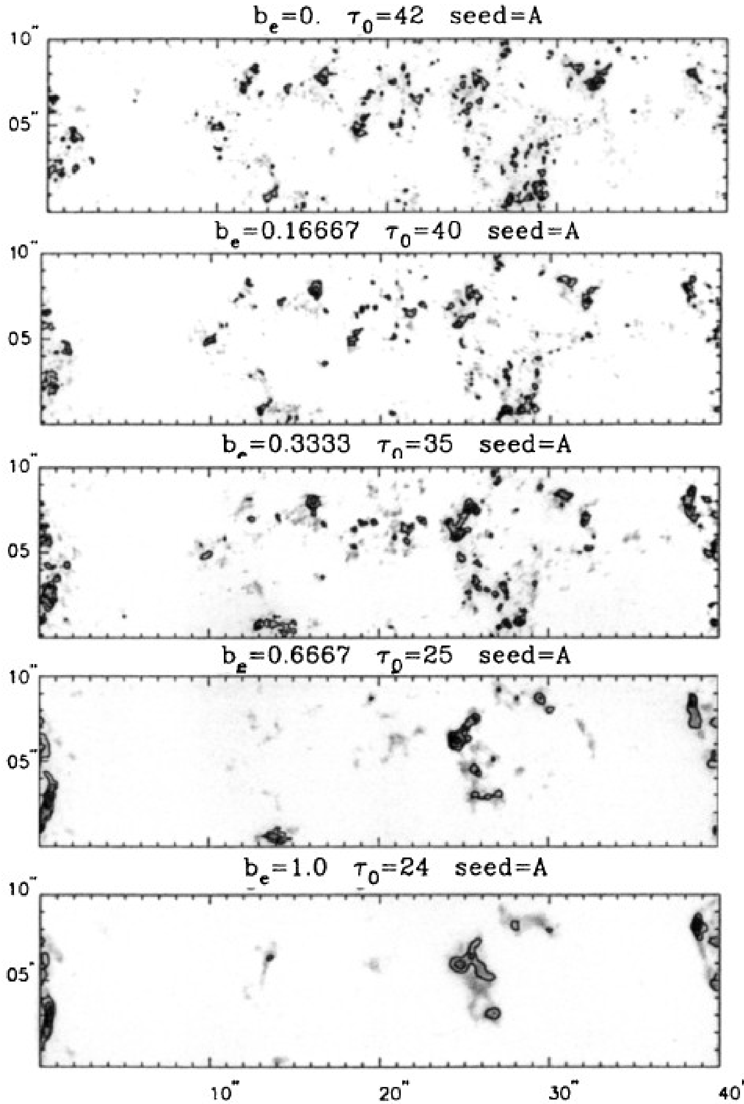
Gwinn (1994)

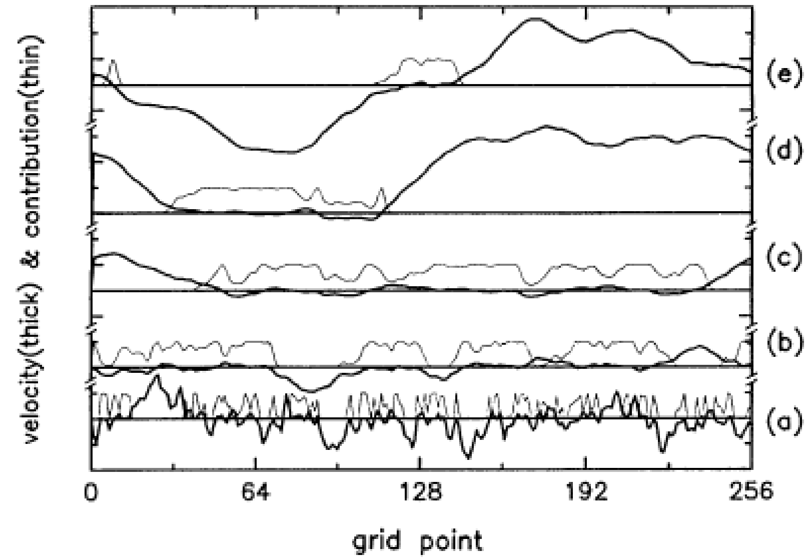
THE ASTROPHYSICAL JOURNAL, 498:763–772, 1998 May 10

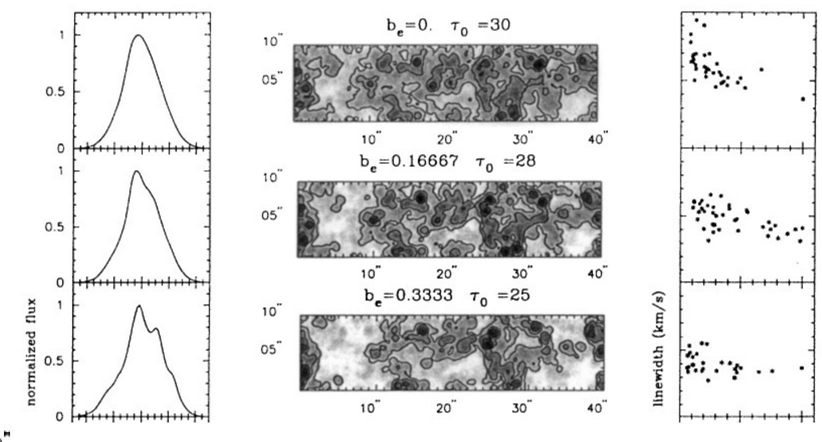
ASTROPHYSICAL MASER RADIATION FROM A TURBULENT MEDIUM: APPLICATION TO 25 GHz METHANOL MASERS

A. M. SOBOLEV,[1,2] B. K. WALLIN,[2] AND W. D. WATSON[2]









The Astrophysical Journal, 590:333–339, 2003 June 10

IMAGES OF ASTROPHYSICAL MASERS AND THEIR VARIABILITY IN A TURBULENT MEDIUM: THE 25 GHz METHANOL MASERS

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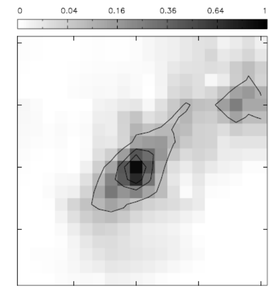
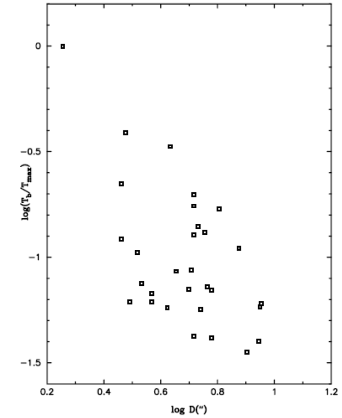
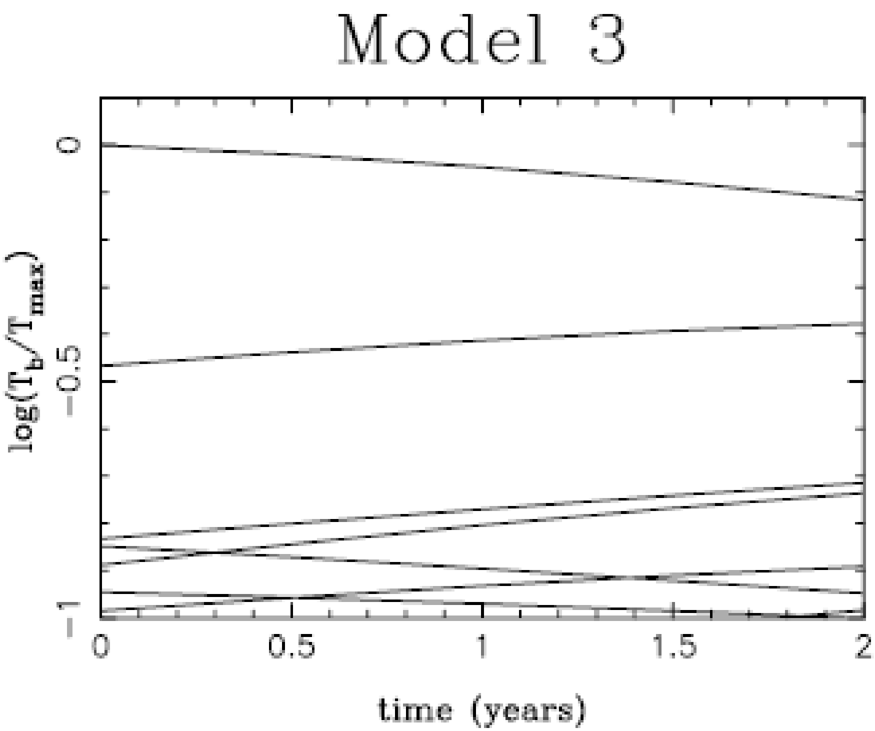
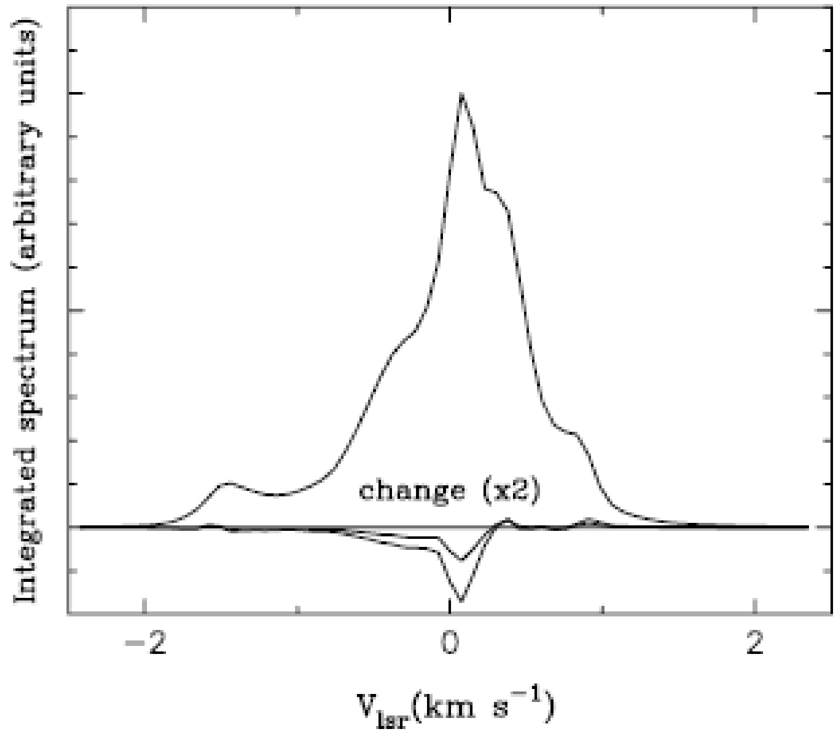
Received 2002 September 5; accepted 2003 February 25

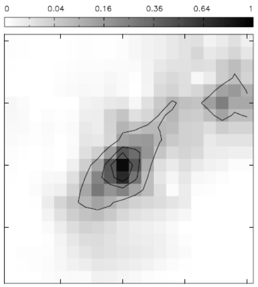








IMAGES OF ASTROPHYSICAL MASERS AND THEIR VARIABILITY IN A TURBULENT MEDIUM: THE 25 GHz METHANOL MASERS



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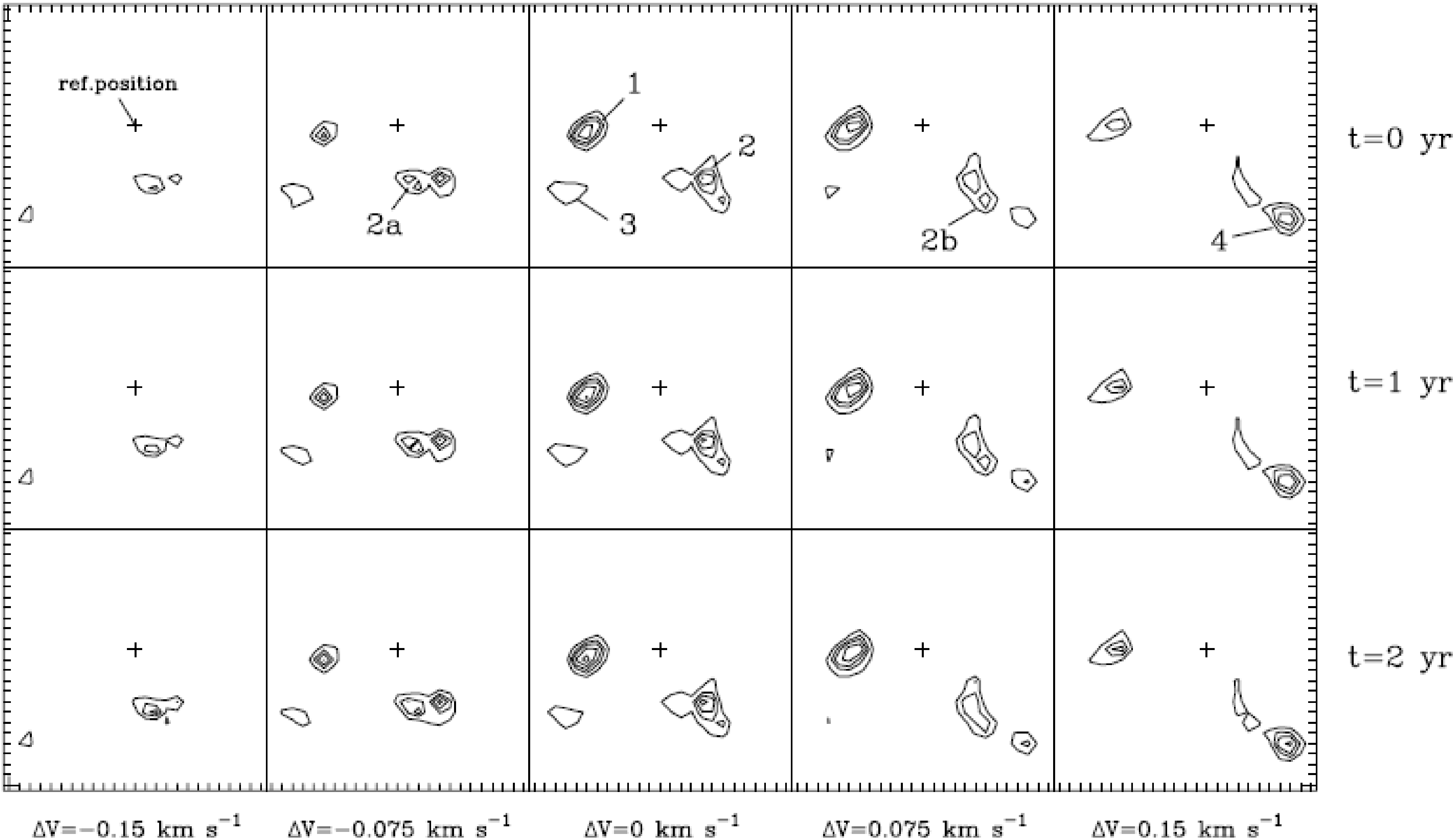
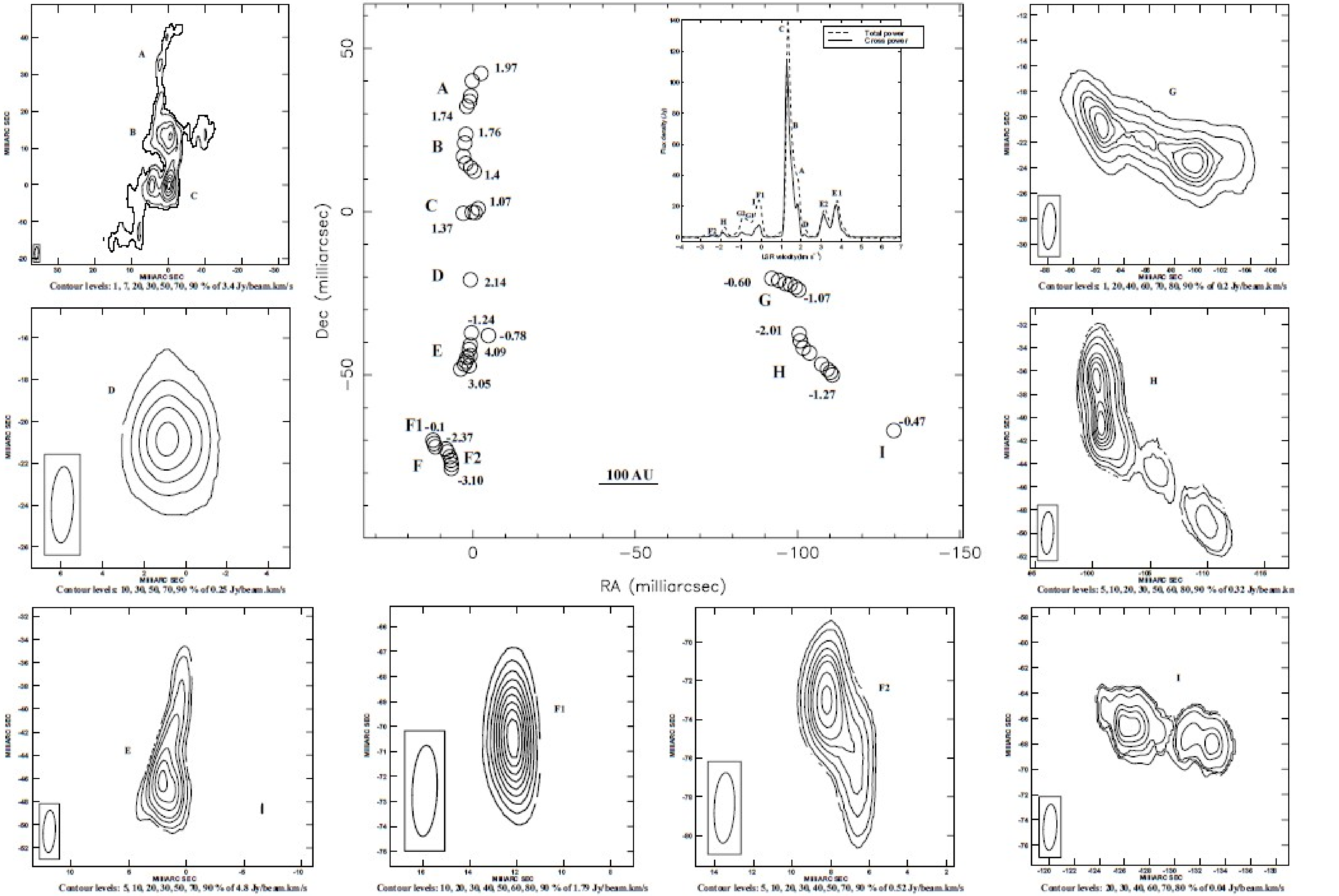


VLBI observations of 6.7 and 12.2 GHz methanol masers toward high mass star-forming regions

III. The milliarcsecond structures of masing regions

V. Minier[1,2], R. S. Booth[1], and J. E. Conway[1]

A&A 383, 614–630 (2002)



A HIGH SPECTRAL RESOLUTION VLBI STUDY OF THE 12 GHz METHANOL MASERS IN W3(OH): THEIR SUBMILLIARCSECOND STRUCTURE AND CLUES ON SATURATION

The Astrophysical Journal, 583:776–788, 2003 February 1

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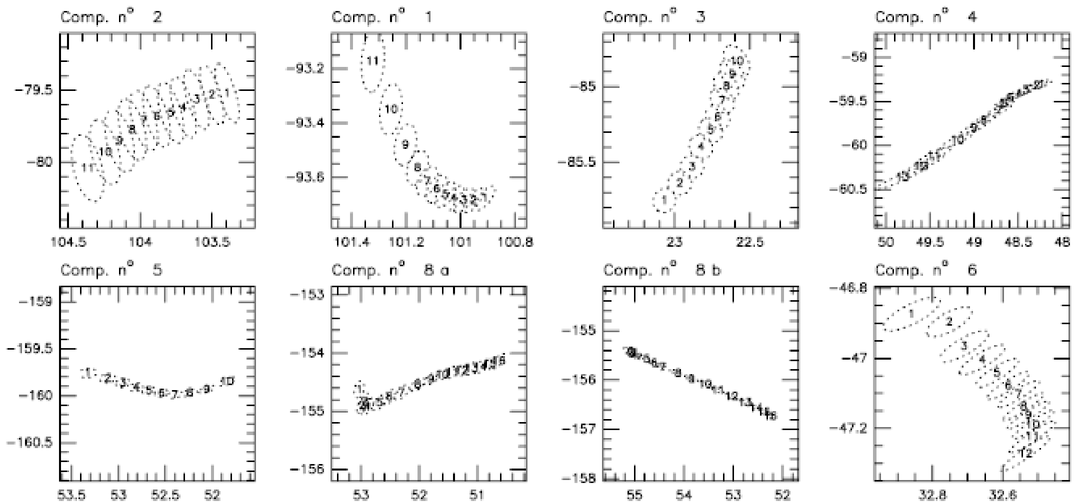
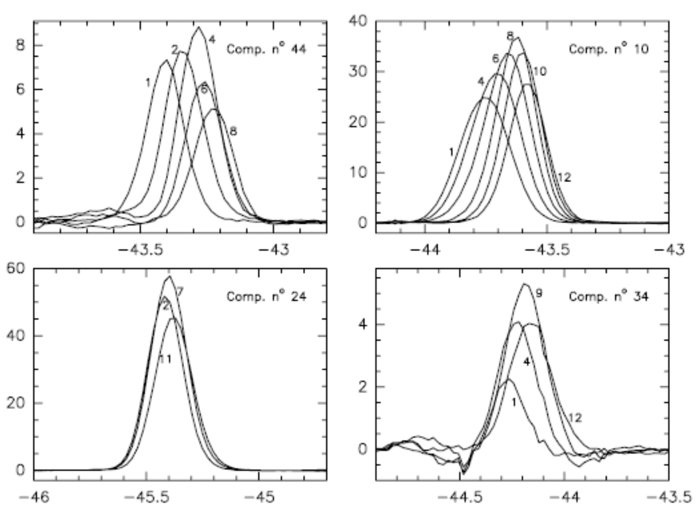
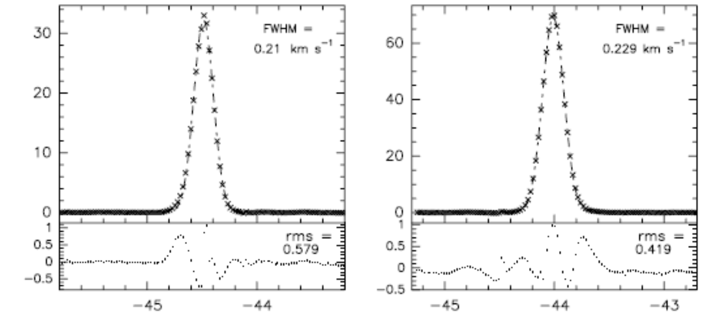
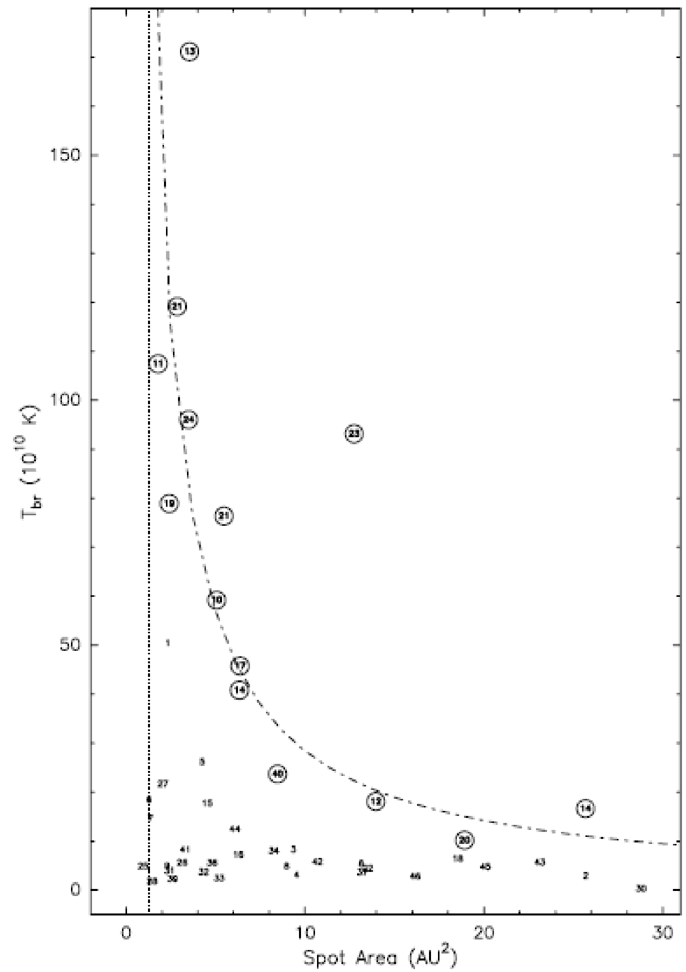








Models of class II methanol masers based on improved molecular data

D. M. Cragg,[1★] A. M. Sobolev[2★] and P. D. Godfrey[1★]

Mon. Not. R. Astron. Soc. 360, 533–545 (2005)

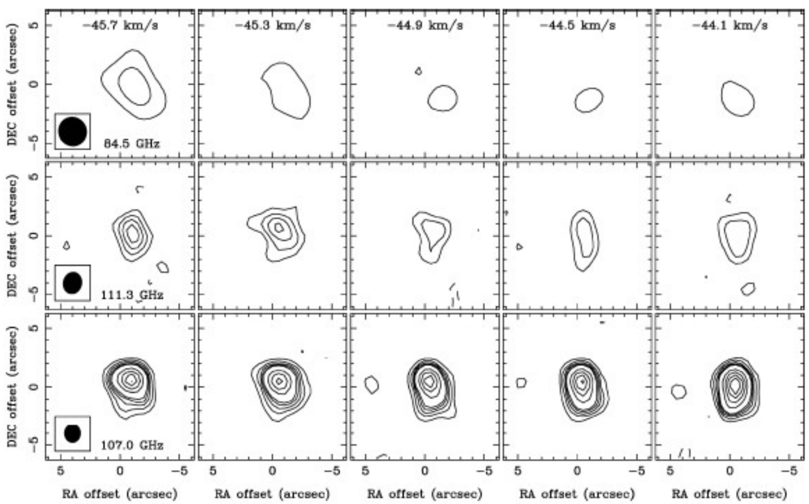
Table 1. Comparison between maser flux densities observed towards W3(OH) and four model calculations, following Sutton et al. (2001).

Transition	Frequency (MHz)	S_{obs} (Jy)	T_{calc} (K)	S_{calc} (Jy)	T_{calc} (K)	S_{calc} (Jy)	T_{calc} (K)	S_{calc} (Jy)	T_{calc} (K)	S_{calc} (Jy)	Ref
			Model B		Model C		Model D		Model E		
		Collisions	Old		New		New		New		
		T_k	150		150		150		145		
		T_d	175		175		175		145		
		$\log(n_H)$	7.0		7.0		7.5		7.0		
		$\log(N_M/\Delta V)$	12.0		12.0		12.0		12.0		
		W_{HII}	0.2		0.2		0.2		0.2		
BIMA observations, included in the fit											
7(2)–8(1) A−	80 993.3	<0.3	9.53E+02	0.0	5.56E+04	1.8	2.36E+03	0.2	7.92E+02	0.2	(a)
13(−3)–14(−2) E	84 423.7	<0.3	1.25E+02	0.0	2.89E+04	1.0	7.13E+03	0.5	3.01E+02	0.1	(a)
6(−2)–7(−1) E	85 568.1	<0.7	−1.40E+02	0.0	−1.02E+02	0.0	2.38E+00	0.0	−1.33E+02	0.0	(a)
7(2)–6(3) A−	86 615.6	6.7	1.99E+05	8.0	1.02E+06	37.0	1.28E+05	9.7	3.93E+04	10.2	(a)
7(2)–6(3) A+	86 902.9	7.2	1.82E+05	7.3	9.48E+05	34.6	1.15E+05	8.8	3.08E+04	8.0	(a)
8(3)–9(2) E	94 541.8	<0.4	−5.40E+01	0.0	2.59E+02	0.0	2.57E+02	0.0	−5.49E+01	0.0	(a)
3(1)–4(0) A+	107 013.8	72.0	1.18E+06	72.0	1.30E+06	72.0	6.23E+05	72.0	1.82E+05	72.0	(a)
0(0)–1(−1) E	108 893.9	<0.6	8.09E+03	0.5	5.66E+04	3.2	4.25E+04	5.1	3.00E+03	1.2	(a)
7(2)–8(1) A+	111 289.6	<1.0	2.86E+02	0.0	5.19E+03	0.3	9.50E+02	0.1	3.40E+02	0.1	(a)
Previous observations, not included in the fit											
9(2)–10(1) A+	23 121.0	9.5	3.42E+03	0.0	1.35E+06	3.5	1.44E+05	0.8	3.12E+04	0.6	(b)
4(0)–3(1) E	28 316.0	−0.6	−1.61E+03	0.0	−1.63E+03	0.0	−1.62E+03	0.0	−1.61E+03	0.0	(c)

MODEL OF THE W3(OH) ENVIRONMENT BASED ON DATA BOTH MASER AND “QUASI-THERMAL” METHANOL LIN

ANDREI M. SOBOLEV[1], EDMUND C. SUTTON[2], DINAH M. CRAG
and PETER D. GODFREY[3]

Astrophys.Space Sci. 2004



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			Model B		Model C		Model D		Model E		
Collisions			Old		New		New		New		
T_k			150		150		150		145		
T_d			175		175		175		145		
$\log(n_H)$			7.0		7.0		7.5		7.0		
$\log(N_M/\Delta V)$			12.0		12.0		12.0		12.0		
W_{HII}			0.2		0.2		0.2		0.2		
Transition	Frequency (MHz)	S_{obs} (Jy)	T_{calc} (K)	S_{calc} (Jy)	T_{calc} (K)	S_{calc} (Jy)	T_{calc} (K)	S_{calc} (Jy)	T_{calc} (K)	S_{calc} (Jy)	Ref
BIMA observations, included in the fit											
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13(−3)–14(−2) E	84 423.7	<0.3	1.25E+02	0.0	2.89E+04	1.0	7.13E+03	0.5	3.01E+02	0.1	(a)
6(−2)–7(−1) E	85 568.1	<0.7	−1.40E+02	0.0	−1.02E+02	0.0	2.38E+00	0.0	−1.33E+02	0.0	(a)
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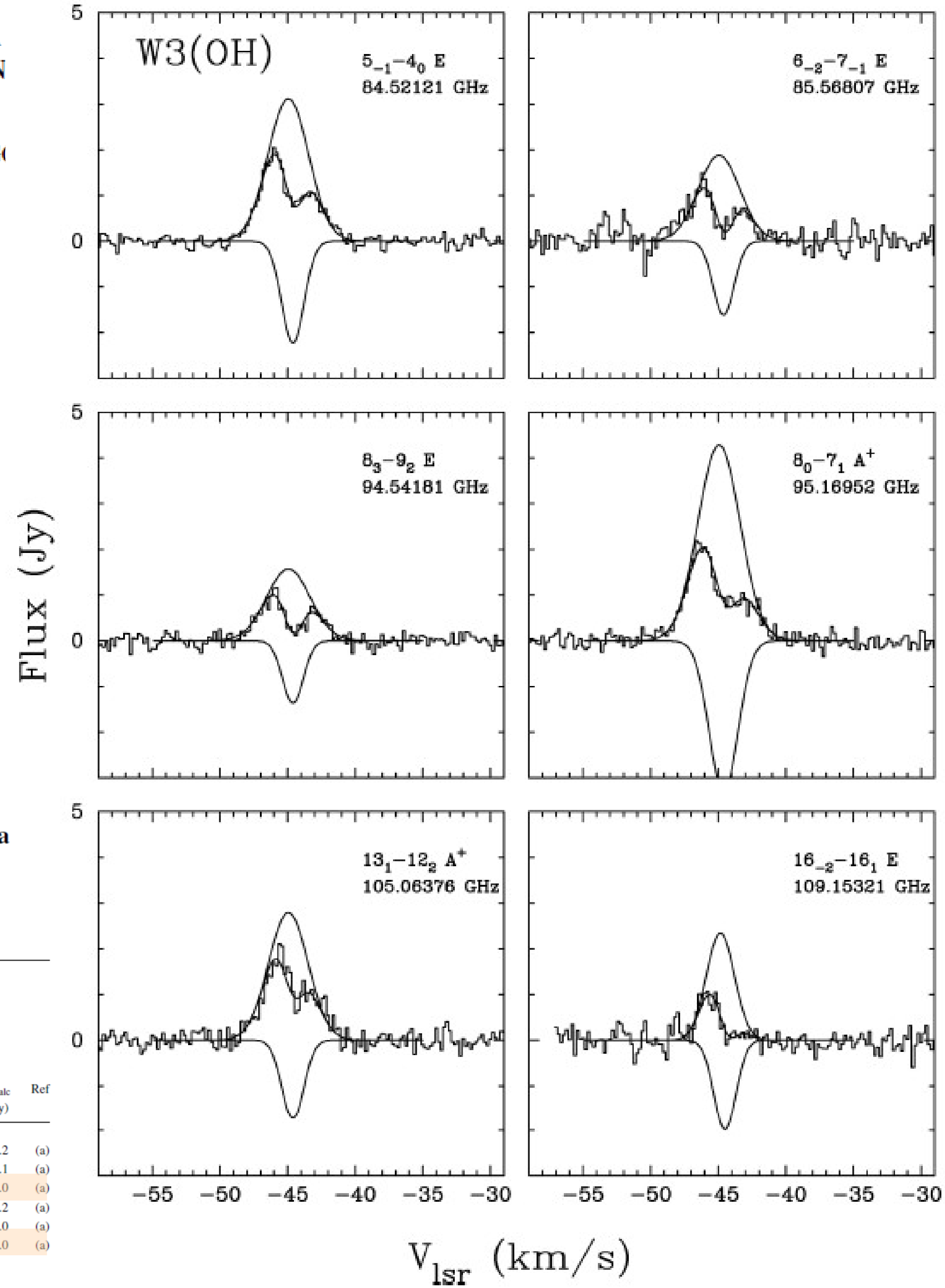

Mon. Not. R. Astron. Soc. **371**, 1550–1558 (2006)

Discovery of large-scale methanol and hydroxyl maser filaments in W3(OH)

L. Harvey-Smith★† and R. J. Cohen

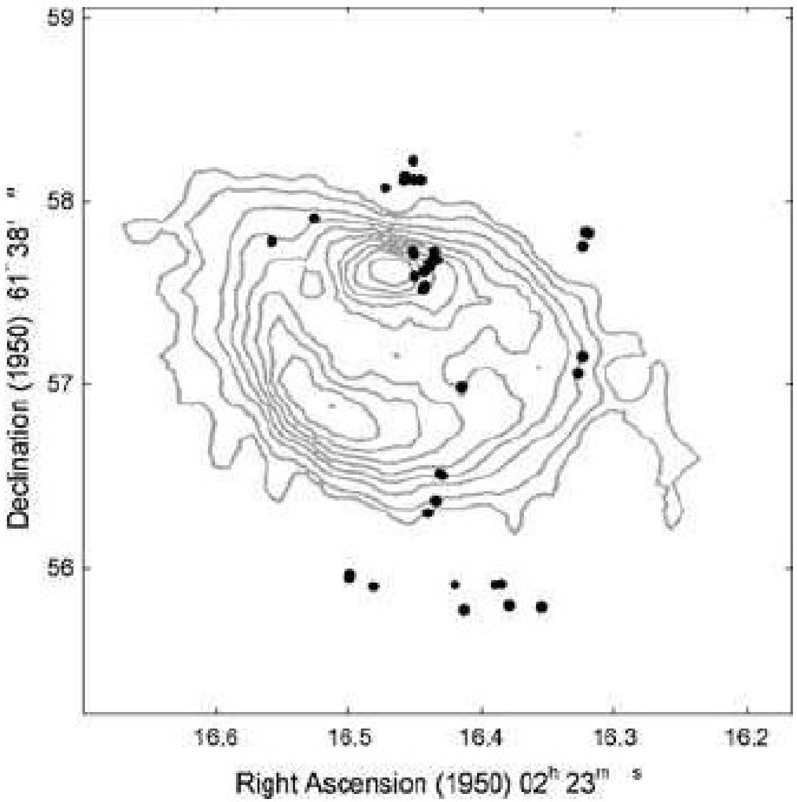

Figure 2. Positions of the 6.7-GHz methanol masers in W3(OH) overlaid on the 23.7-GHz continuum image by Guilloteau et al. (1983). The positional accuracy of the alignment is 0″.1.

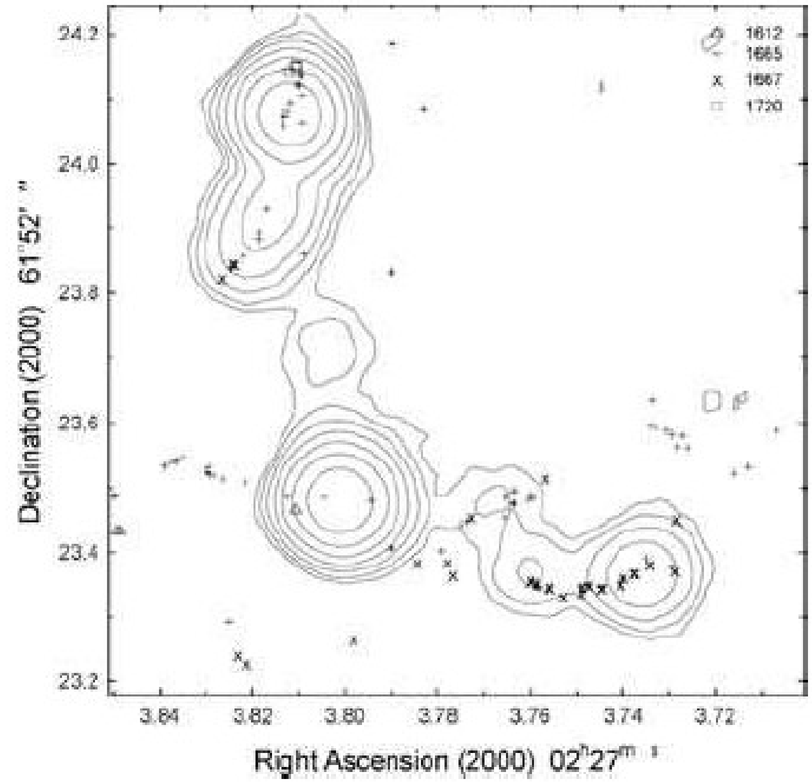

Figure 3. MERLIN image of the 6.7-GHz methanol emission in the south of W3(OH) (contours), showing the southern filament (Section 3.2.2). The methanol emission is integrated between −41.6 and −48.2 km s^{-1}. Ground-state OH masers (symbols) from Wright et al. (2004a,b) are also shown.

Mon. Not. R. Astron. Soc. 371, 1550–1558 (2006)

Discovery of large-scale methanol and hydroxyl maser filaments in W3(OH)

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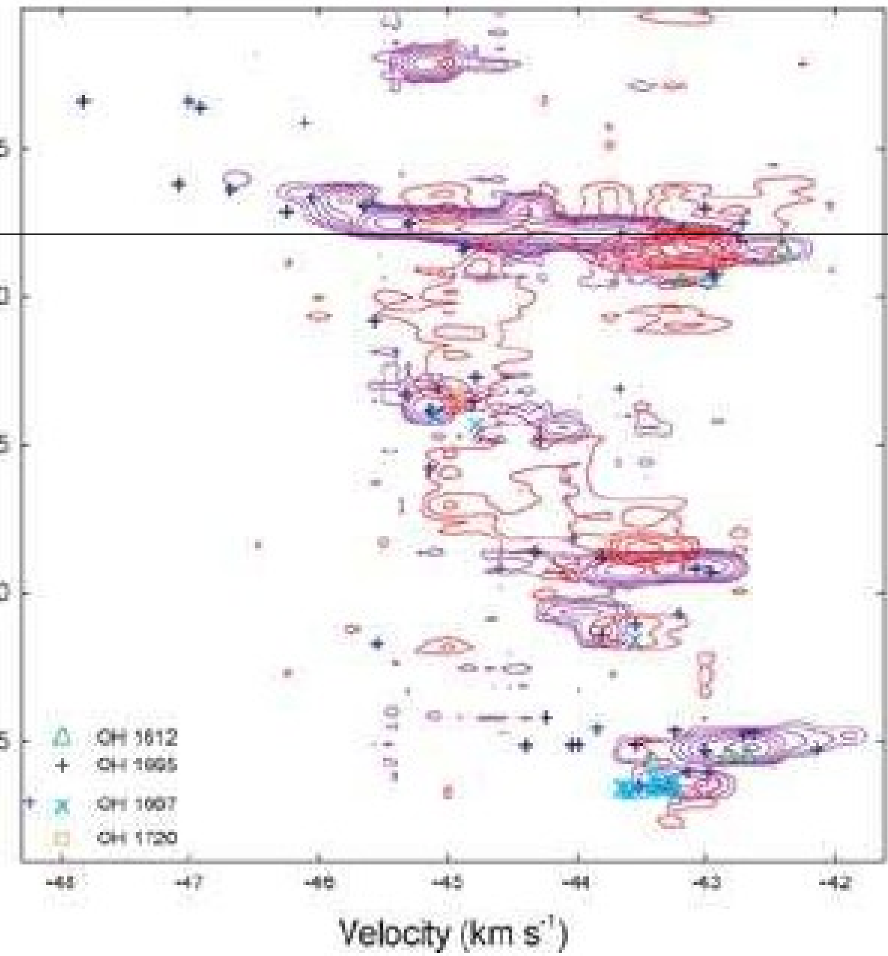
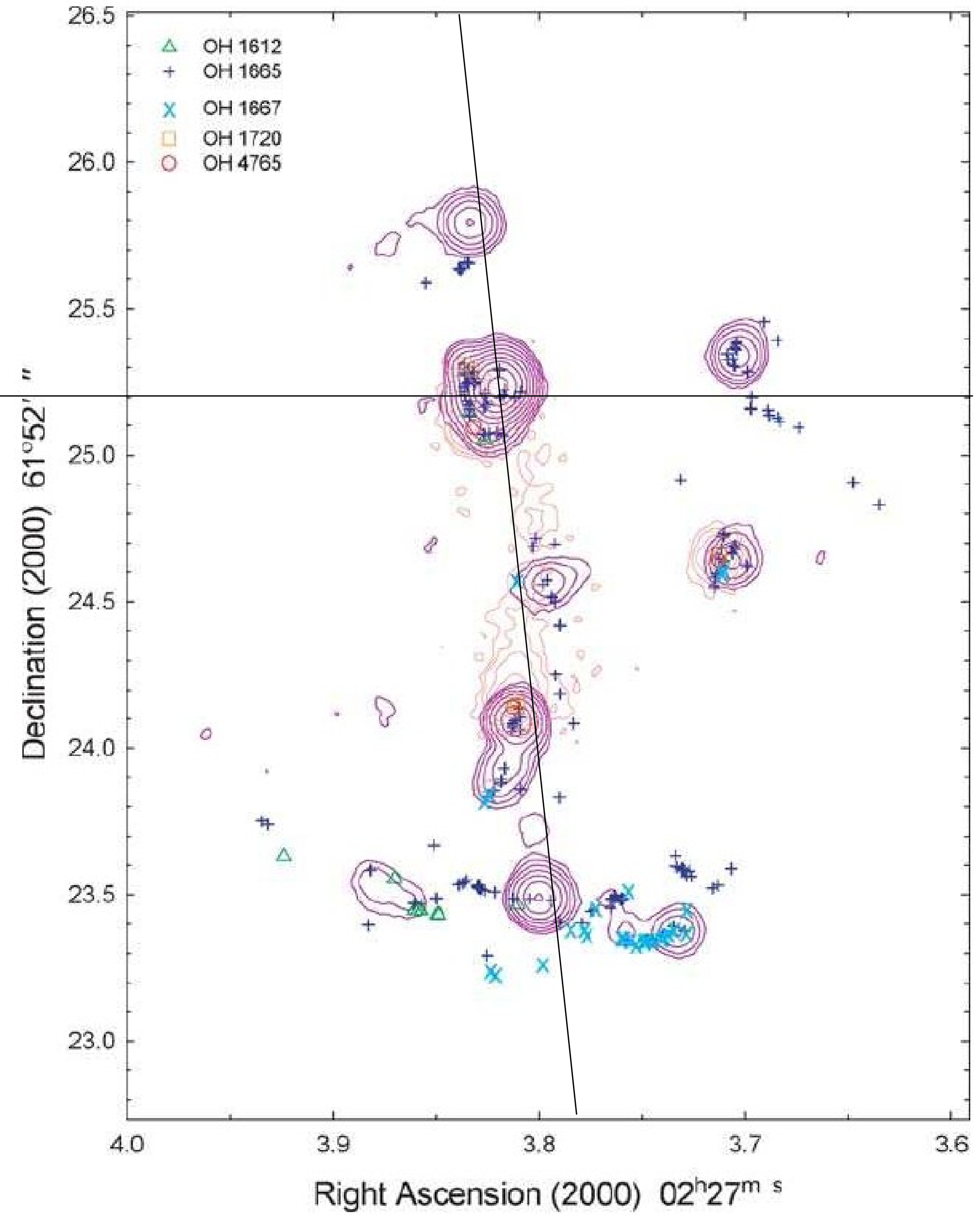


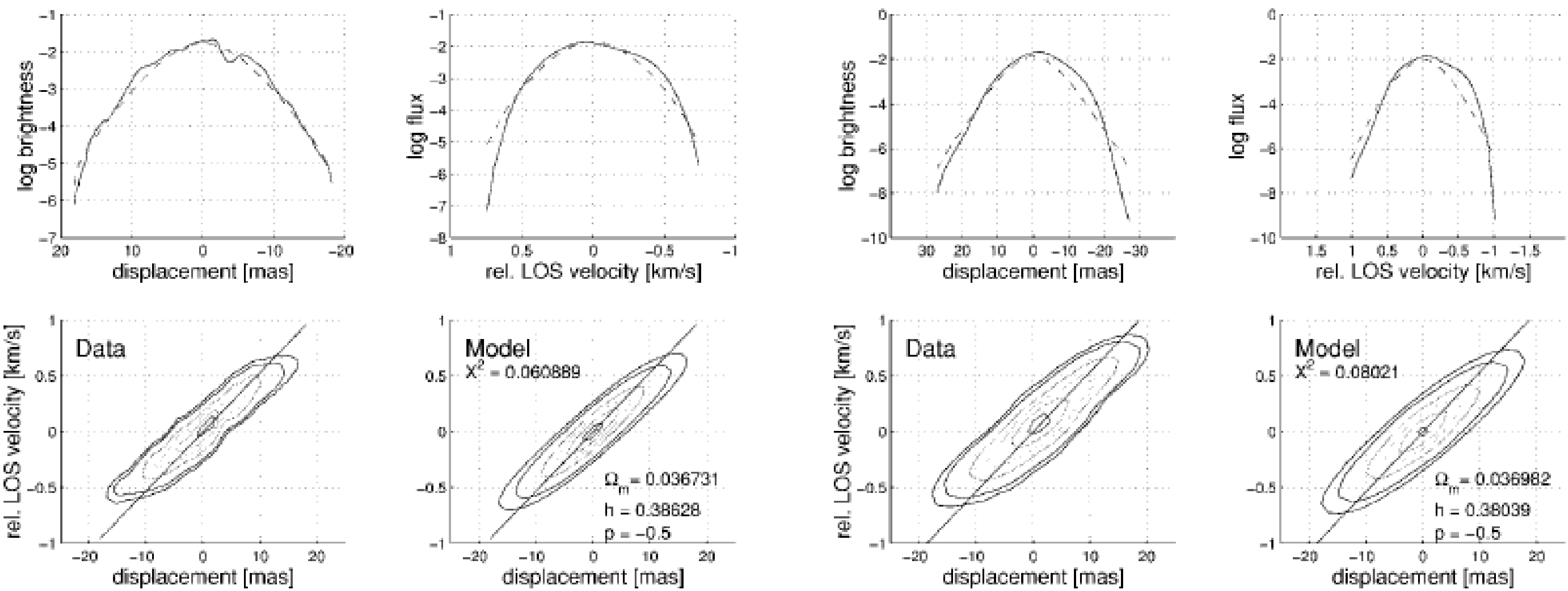


Есть ли указания
на существование
тонкой структуры?

THE ASTROPHYSICAL JOURNAL, 603:L113–L116, 2004 March 10

A CIRCUMSTELLAR DISK IN A HIGH-MASS STAR-FORMING REGION

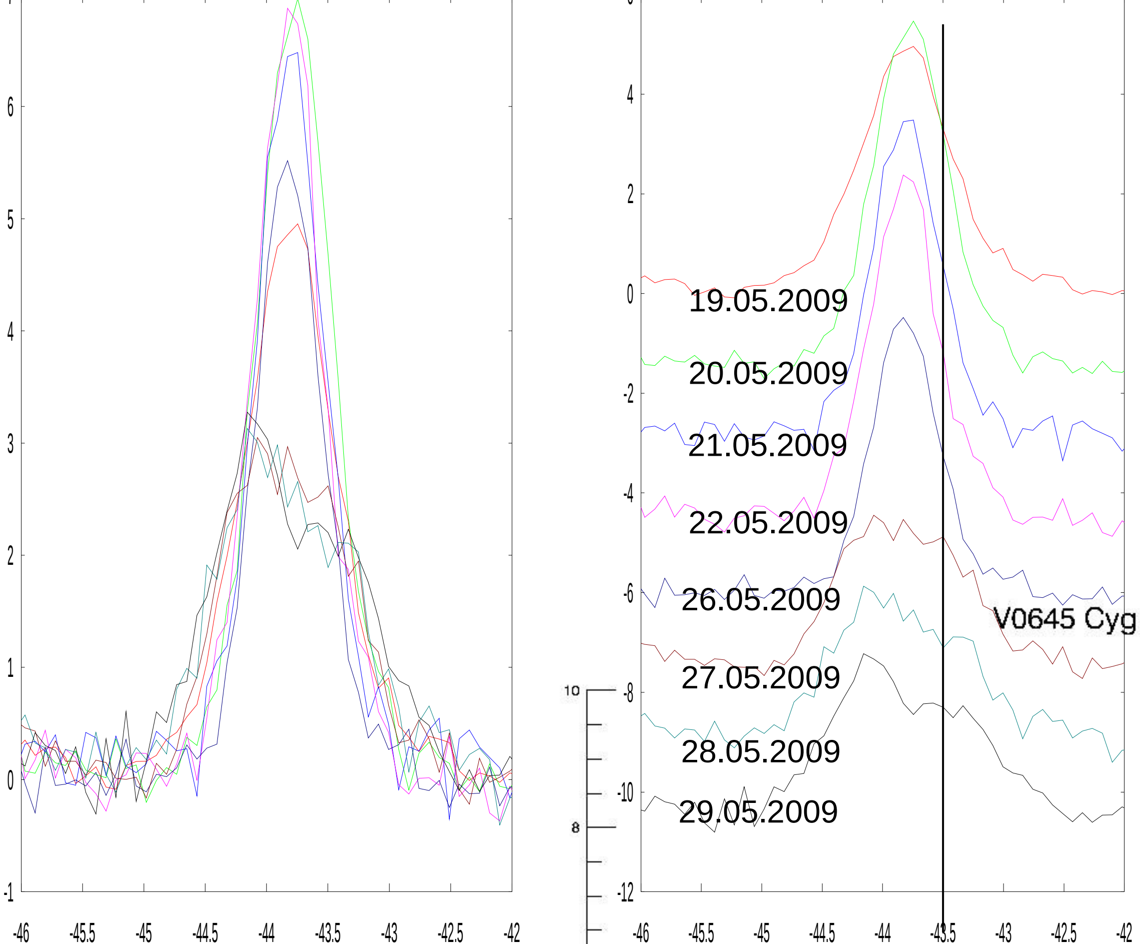
MICHELE R. PESTALOZZI,[1] MOSHE ELITZUR,[2] JOHN E. CONWAY,[1] AND ROY S. BOOTH[1]

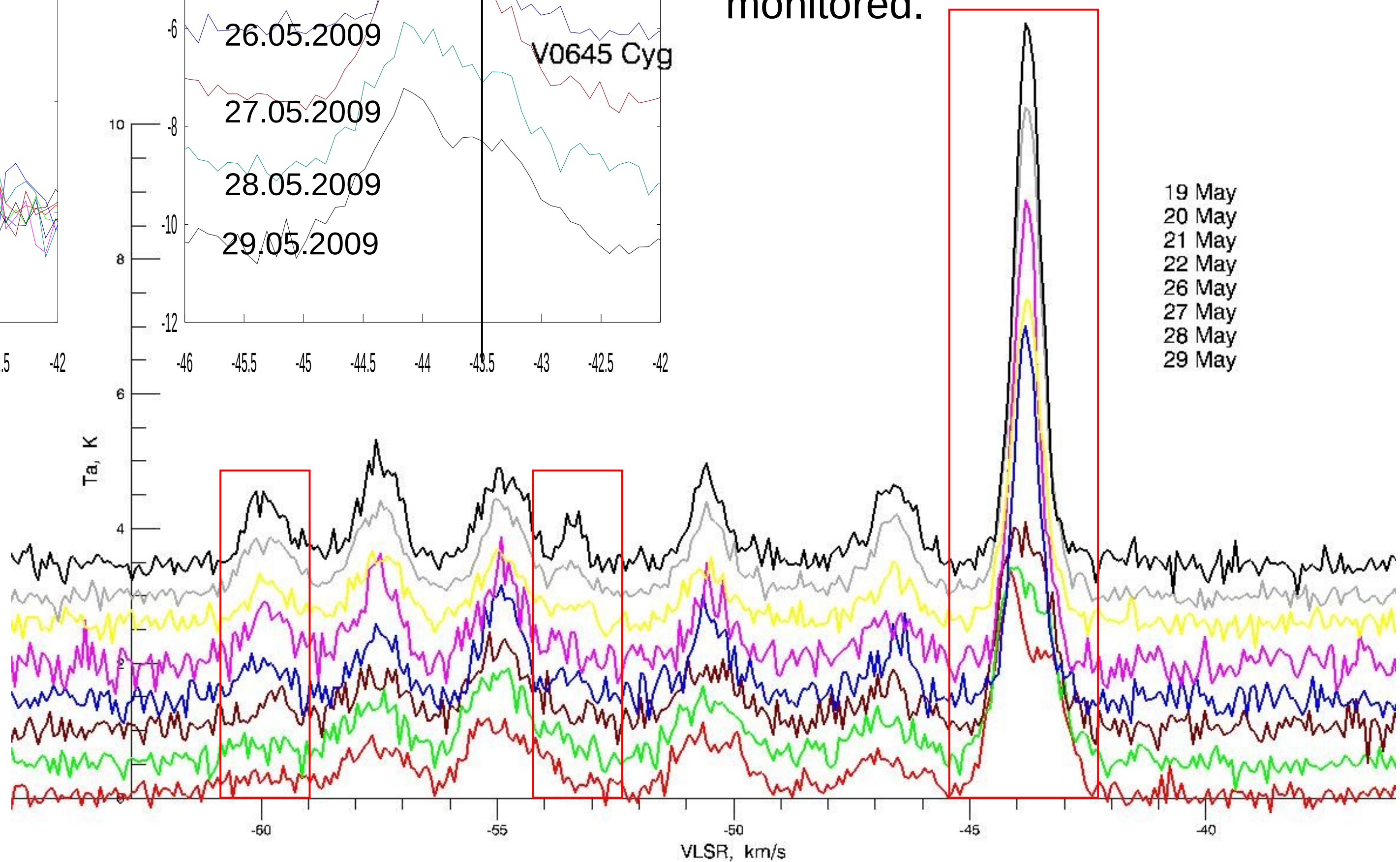


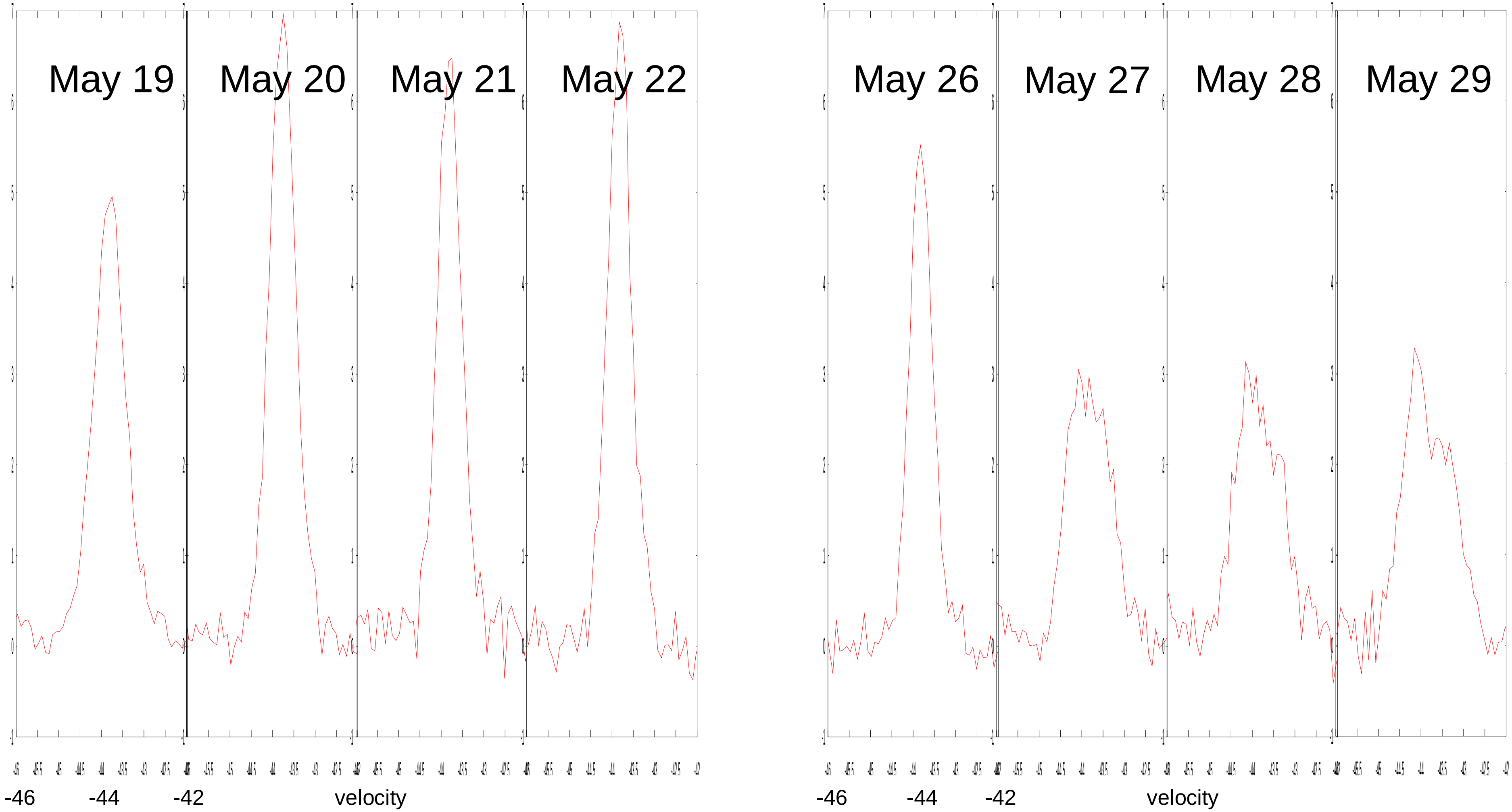
Variability of H_2O maser in V0645 Cyg (19-29.05.2009)

Red rectangles show features with pronounced variability

The strongest feature at -43.8 km/s experienced dramatic change between May 26 and 27.
At this moment the source was not monitored.







Variability of H_2O maser in V0645 Cyg (19-29.05.2009)

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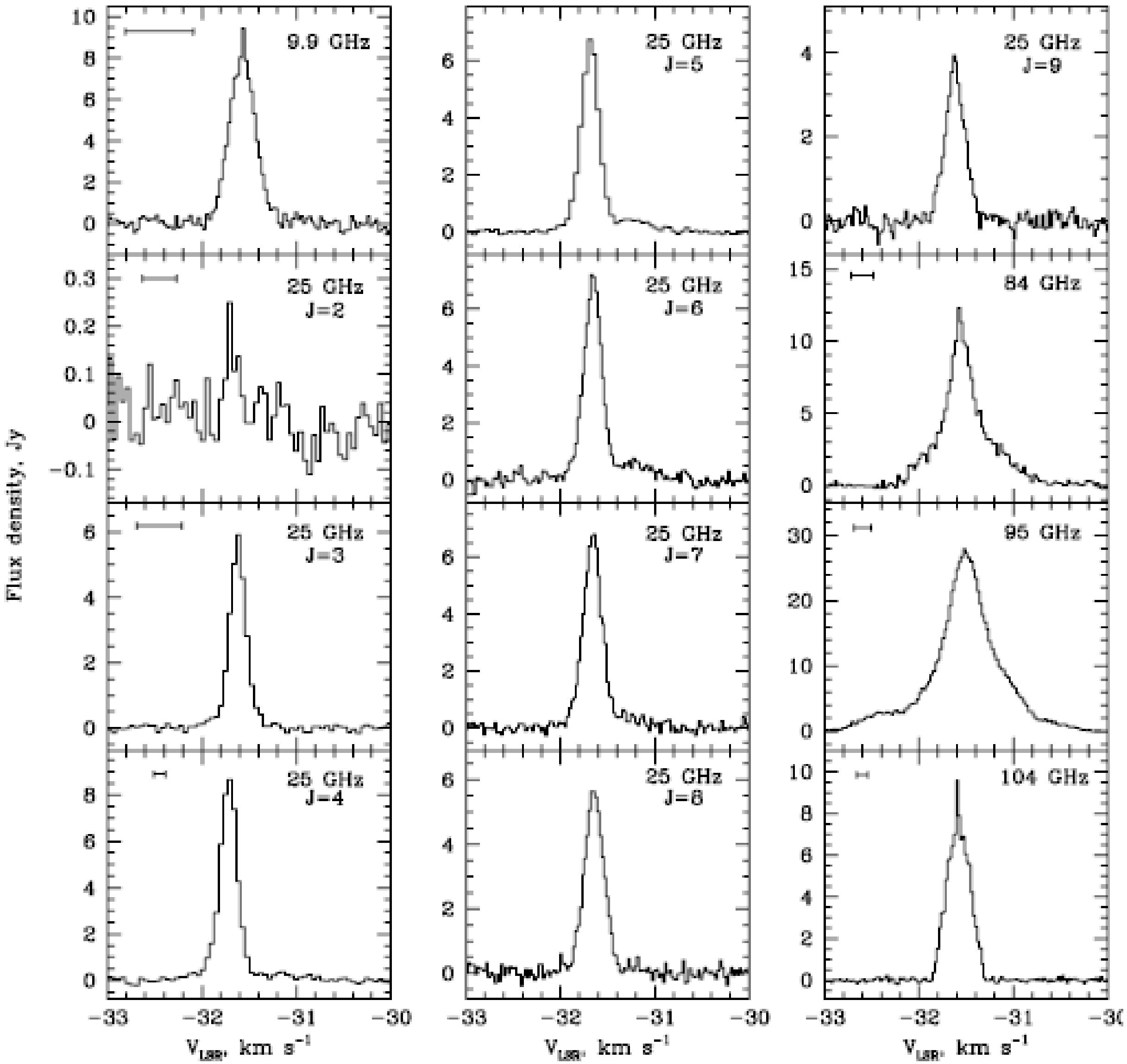
Class I methanol masers in the outflow of IRAS 16 547–4247

Mon. Not. R. Astron. Soc. **373**, 411–424 (2006)

M. A. Voronkov,[1,2★] K. J. Brooks,[1] A. M. Sobolev,[3] S. P. Ellingsen,[4] A. B. Ostrovskii[3] and J. L. Caswell[1]

сп.разрешение 0.022 км/с



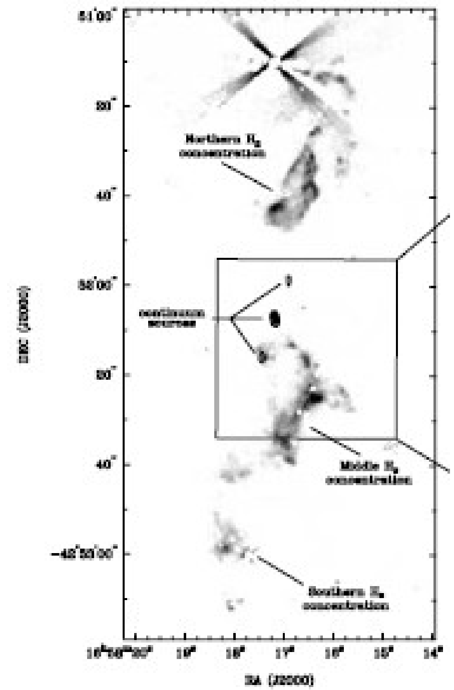


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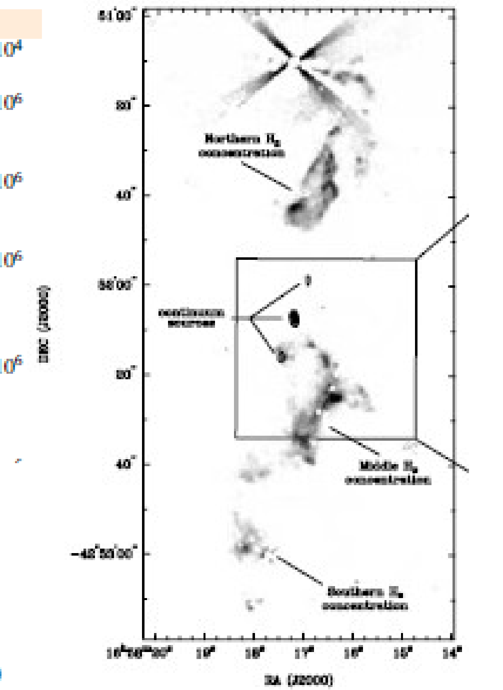
Table 2. Fit results and profile parameters. The uncertainties are given in parentheses and expressed in units of the least significant figure.

Spot	LSR velocity[a] (km s^{-1})	α_{2000} 16^h58^m (^{s})	Gaussian components δ_{2000} $-42°$ (arcmin arcsec)	Line FWHM (km s^{-1})	Flux density (Jy)	Size (arcsec)	Peak LSR velocity[b] (km s^{-1})	Peak flux density[c] (Jy)	$\int f(v)\,dv$ (Jy km s^{-1})	T_b limit (K)
A			5_{-1}–4_0 E (84 GHz)				−32.82	14.6	11.39 (7)	4.5×10^4
	−32.79	16.585 (2)	52 29.56 (2)	0.72 (2)	14.6 (3)	0.40 (6)				
	−31.83	16.516 (8)	52 28.42 (8)	0.25 (9)	0.8 (3)	1.0 (3)				
			8_0–7_1 A$^+$ (95 GHz)				−32.80	38.80	32.7 (1)	9.5×10^4
	−32.793	16.595 (1)	52 29.74 (1)	0.775 (6)	38.6 (3)	0.3 (2)				
	−31.77	16.527 (9)	52 28.68 (8)	0.28 (4)	2.1 (3)	0.9 (2)				
B			9_{-1}–8_{-2} E (9.9 GHz)				−31.56	9.5	2.80 (4)	5.3×10^7
	−31.572	16.460 (2)	52 25.73 (3)	0.32 (1)	8.1 (3)	0.10 (9)				
	−31.554[d]			<0.029[e]	2.4 (3)					
			2_2–2_1 E (25 GHz)				−31.71	0.3	0.032 (3)	2.8×10^4
	−31.69	16.44 (2)	52 26.4 (2)	0.15 (8)	0.2 (1)	3 (2)				
			3_2–3_1 E (25 GHz)				−31.61	5.9	1.303 (8)	2.6×10^6
	−31.620	16.459 (2)	52 25.90 (4)	0.186 (7)	5.2 (2)	0.08 (3)				
	−31.63[d]			0.46 (16)	0.6 (2)					
			4_2–4_1 E (25 GHz)				−31.71	8.7	2.17 (6)	3.9×10^6
	−31.715	16.459 (2)	52 25.90 (4)	0.203 (7)	8.3 (3)	0.24 (6)				
	−31.8[d]			0.5 (3)	0.6 (3)					
			5_2–5_1 E (25 GHz)				−31.69	6.7	1.80 (2)	3.0×10^6
	−31.678	16.461 (8)	52 25.70 (11)	0.211 (5)	6.4 (2)	0.093 (8)				
	−31.82[d]			0.3 (1)	0.5 (2)					
	−31.24	16.581 (6)	52 25.5 (1)	0.5 (2)	0.4 (2)	0.5 (4)				
			6_2–6_1 E (25 GHz), May				−31.69	7.5	2.047 (4)	3.3×10^6
	−31.701	16.464 (3)	52 25.76 (5)	0.211 (5)	7.3 (2)	0.17 (7)				
	−31.89[d]			0.18 (6)	0.5 (2)					
	−31.23	16.594 (1)	52 25.32 (2)	0.5 (1)	0.6 (2)	0.4 (1)				
			8_0–7_1 A$^+$ (95 GHz)				−31.52	27.90	19.0 (1)	
	−32.35	16.469 (2)	52 26.52 (2)	0.59 (6)	2.8 (2)	0.4 (1)				
	−31.808	16.467 (5)	52 26.15 (4)	0.415 (9)	7.2 (2)	0.7 (1)				
	−31.516	16.463 (1)	52 25.83 (1)	0.329 (3)	20.3 (2)	0.30 (2)				
	−31.235	16.473 (3)	52 25.86 (3)	0.594 (9)	10.4 (2)	0.60 (5)				
	−30.56	16.48 (1)	52 26.1 (1)	0.46 (8)	1.0 (2)	1.3 (5)				
			11_{-1}–10_{-2} E (104 GHz)				−31.60	9.59	2.348 (3)	
	−31.594	16.462 (2)	52 25.64 (2)	<0.022[e]	2.2 (1)	0.2 (1)				
	−31.580[d]			0.293 (5)	7.5 (1)					



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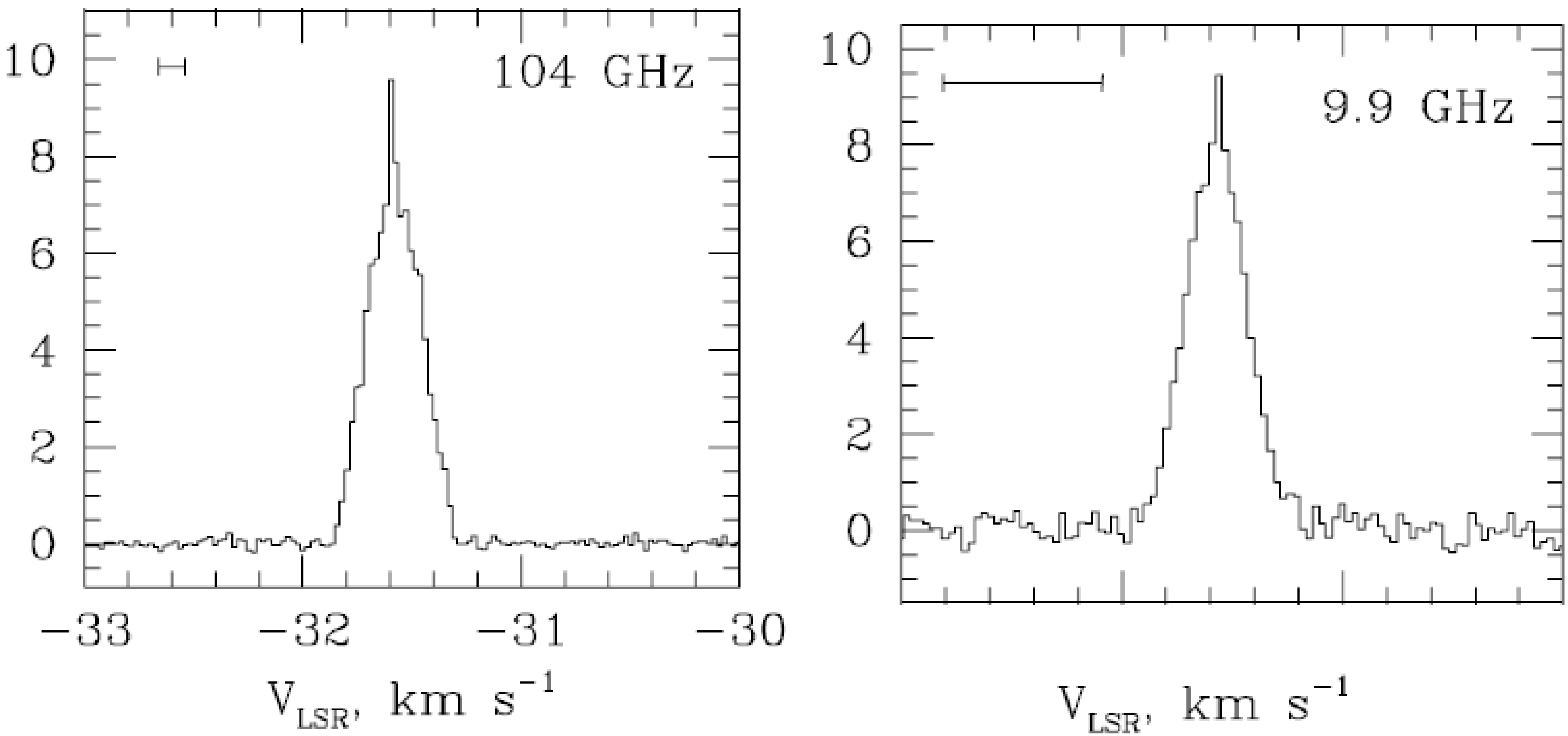
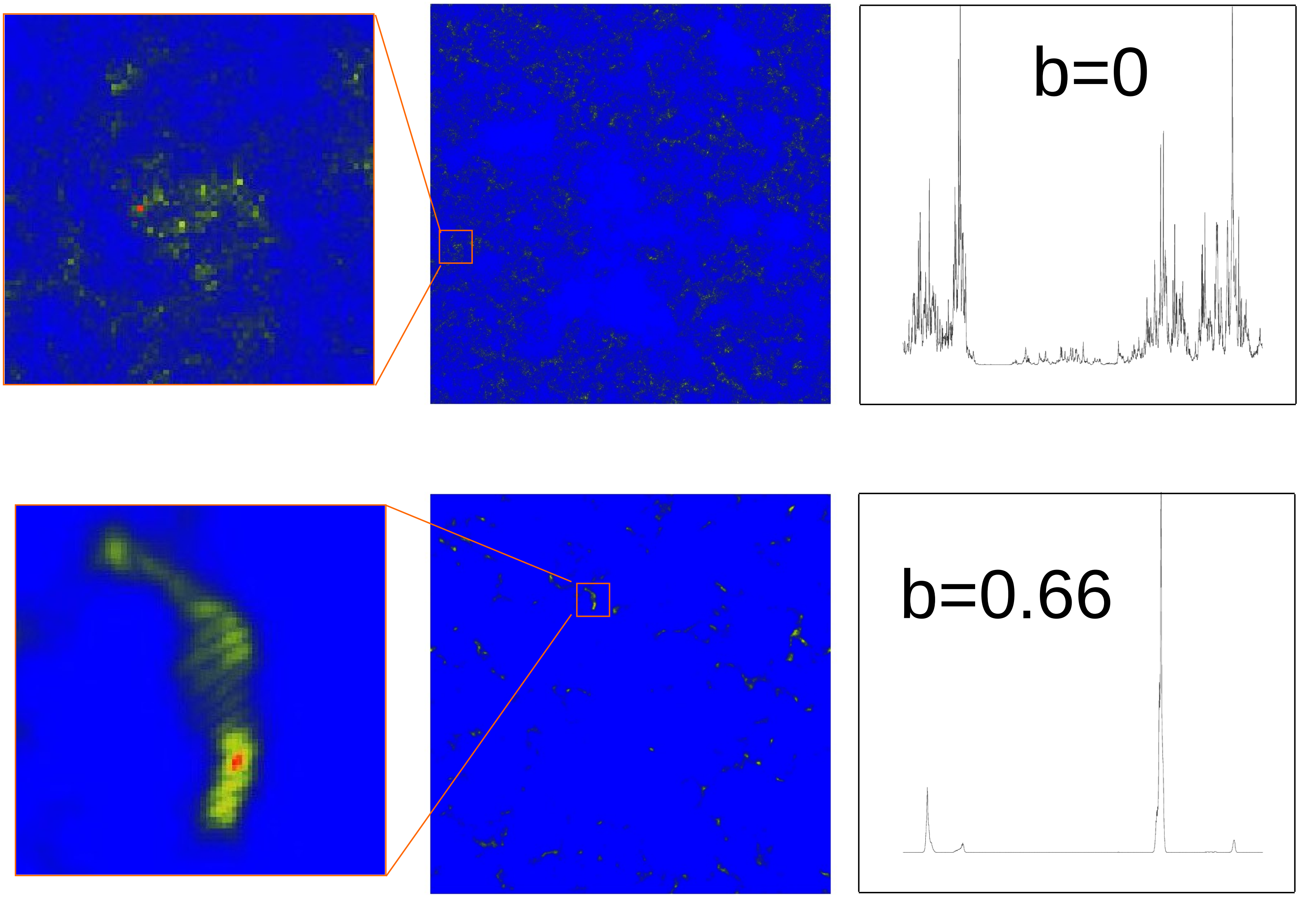


$$V_{lsr} < 0.022 => \tau \sim 100 => T_B > 7x10^{43} \text{ K}$$

новые расчеты (Островский, Соболев)



СПАСИБО

БОЛЬШОЕ!