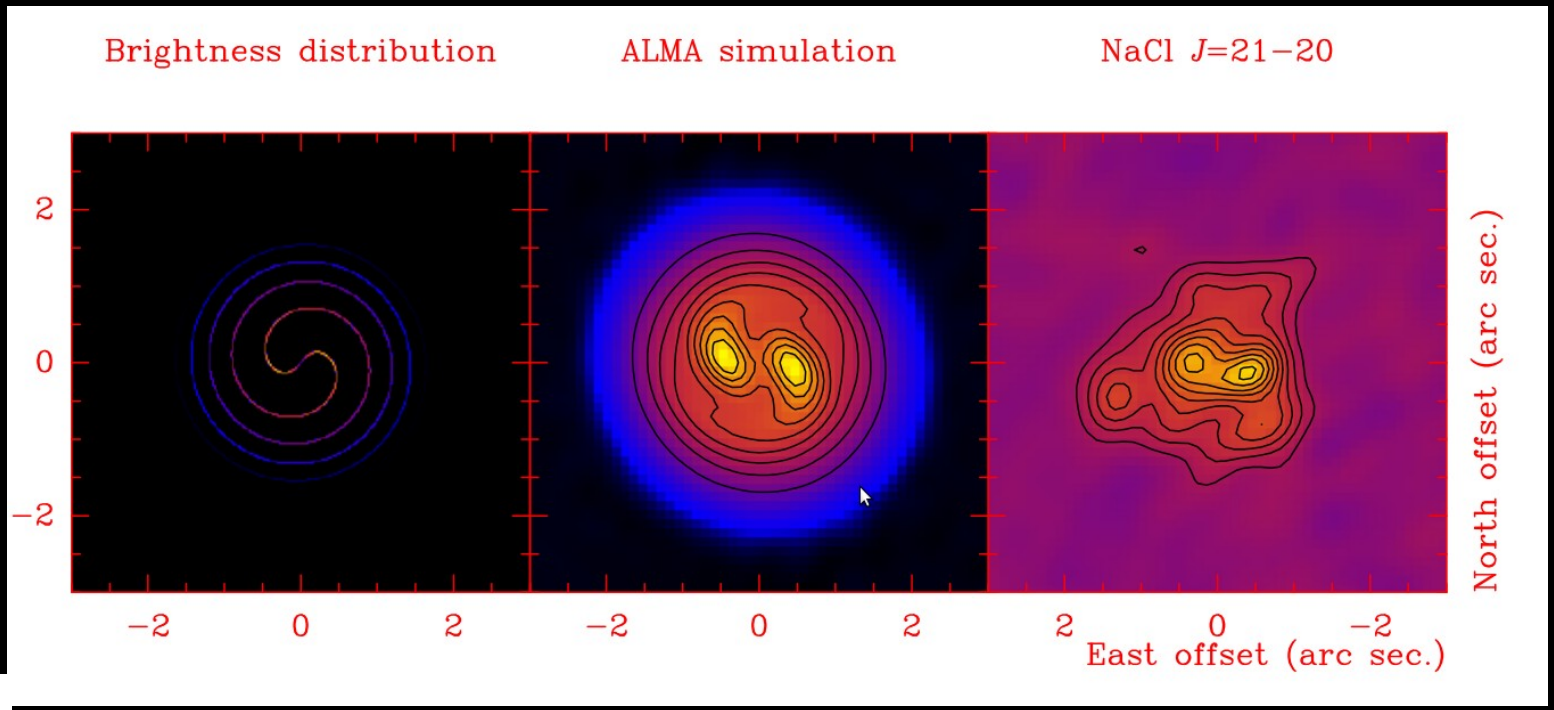
Hints of a spiral structure in the innermost regions around IRC+10216



G. Quintana-Lacaci

Pacific Rim, Hong Kong, 14th Dec 2015

Metals in IRC+10216: Single dish

Astron. Astrophys. 183, L10–L12 (1987)

Letter to the Editor

ASTRONOMY AND ASTROPHYSICS

Metals in IRC+10216: detection of NaCl, AlCl, and KCl, and tentative detection of AlF

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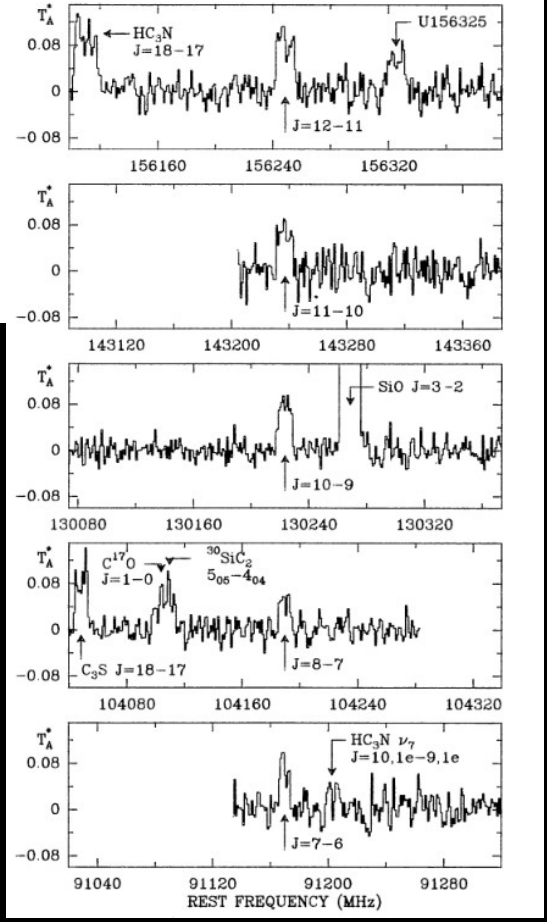
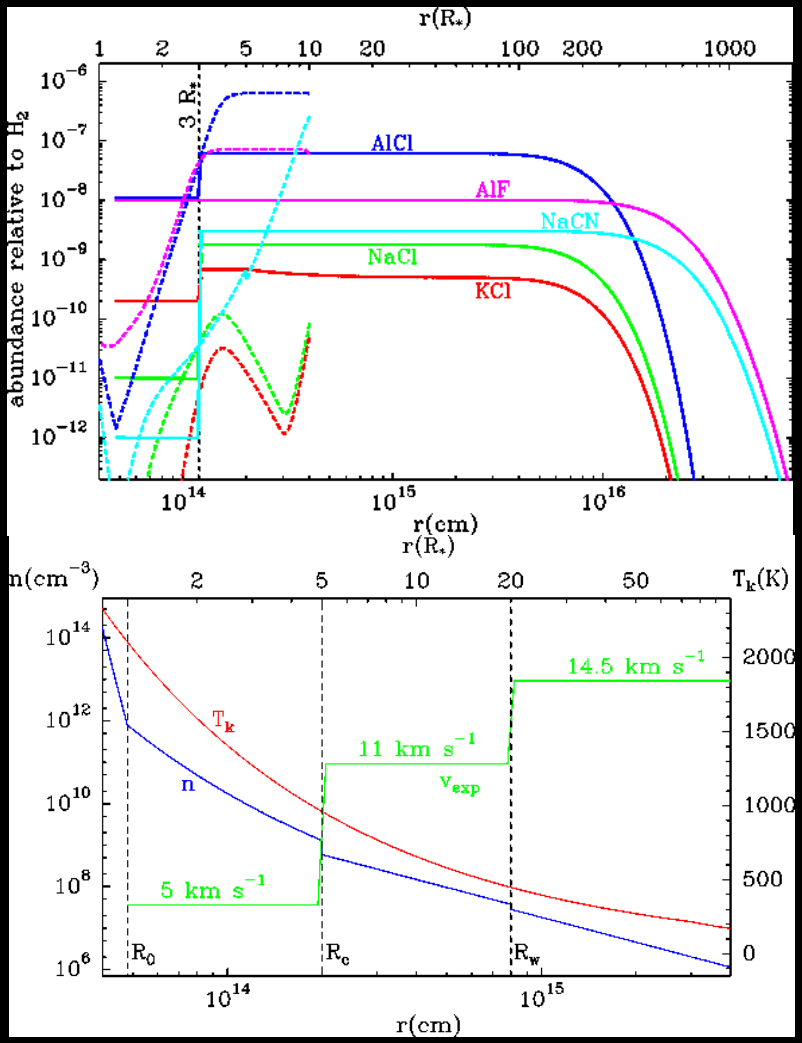
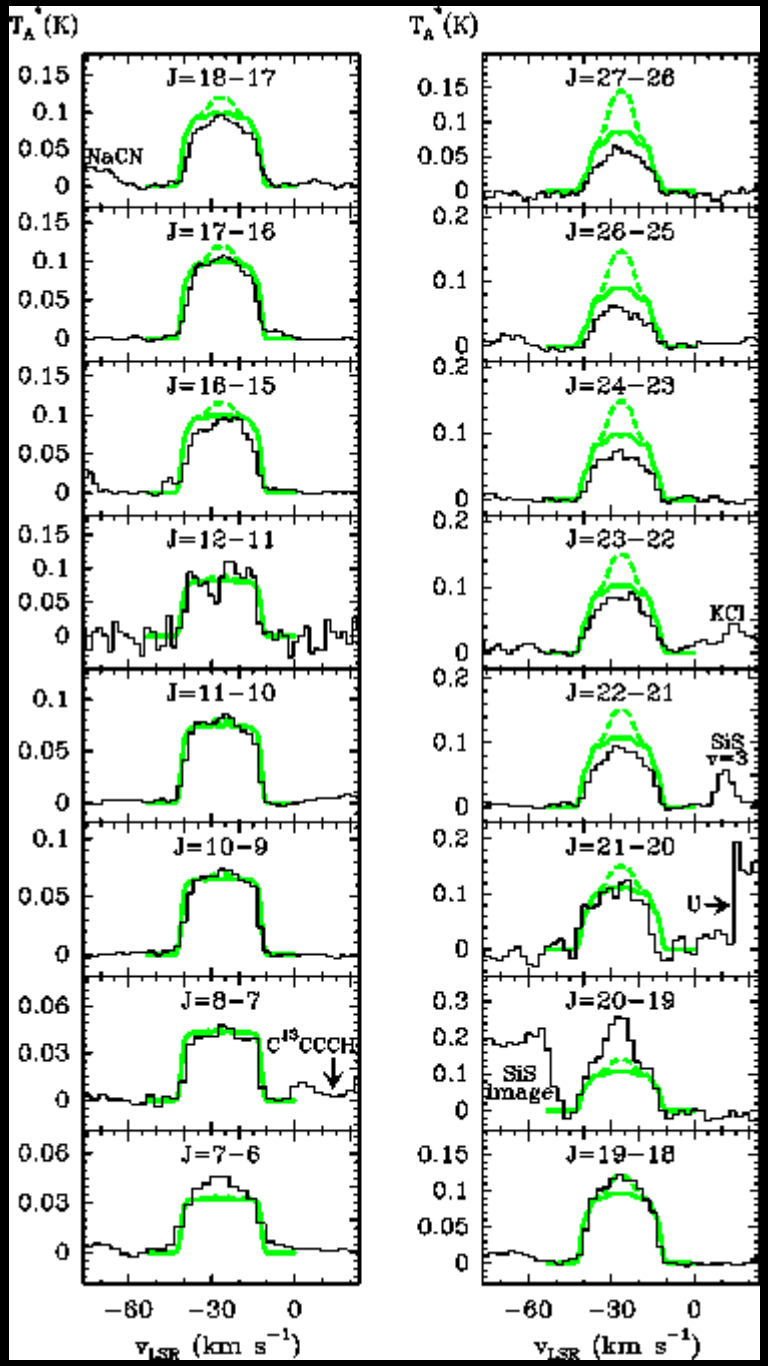
[2] Groupe d'Astrophysique de l'Observatoire de Grenoble, USTMG, CERMO, BP 68, F-38402 St. Martin d'Hères Cedex, France

Received June 25, accepted July 7, 1987



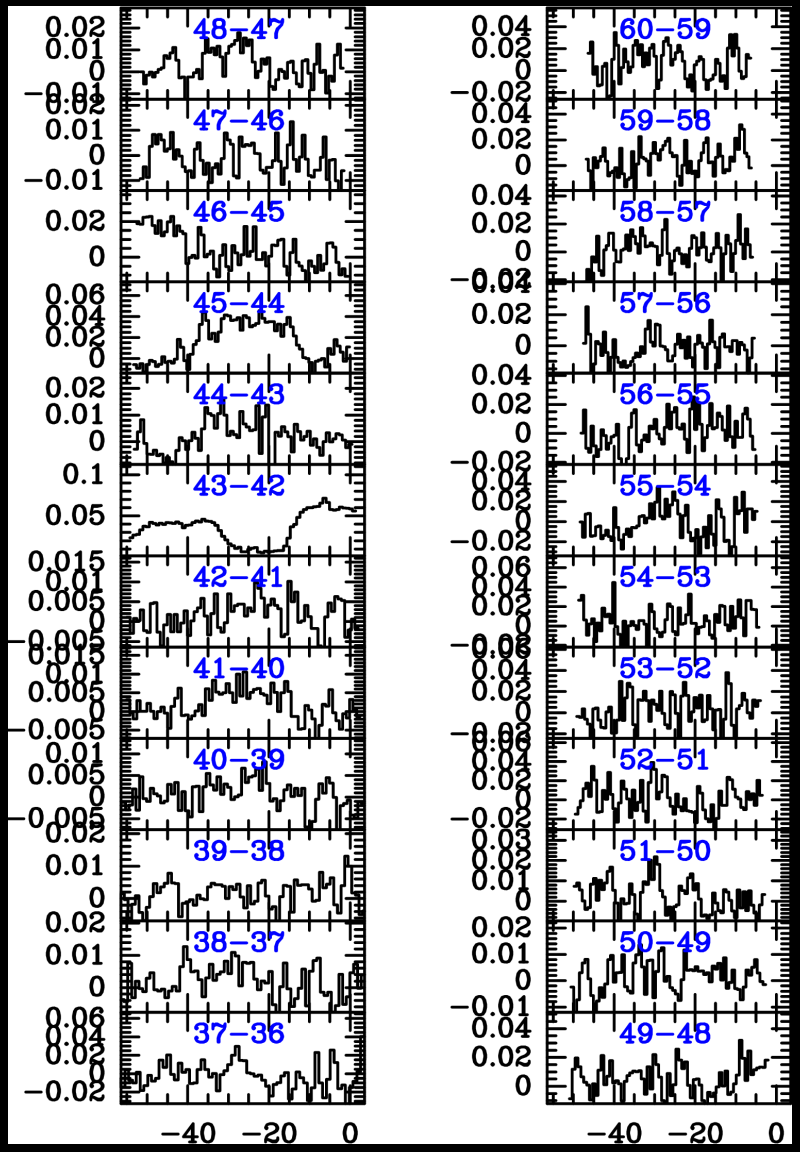
Metals in IRC+10216: Single dish





Agúndez et al. 2012

Metals in IRC+10216: Single dish

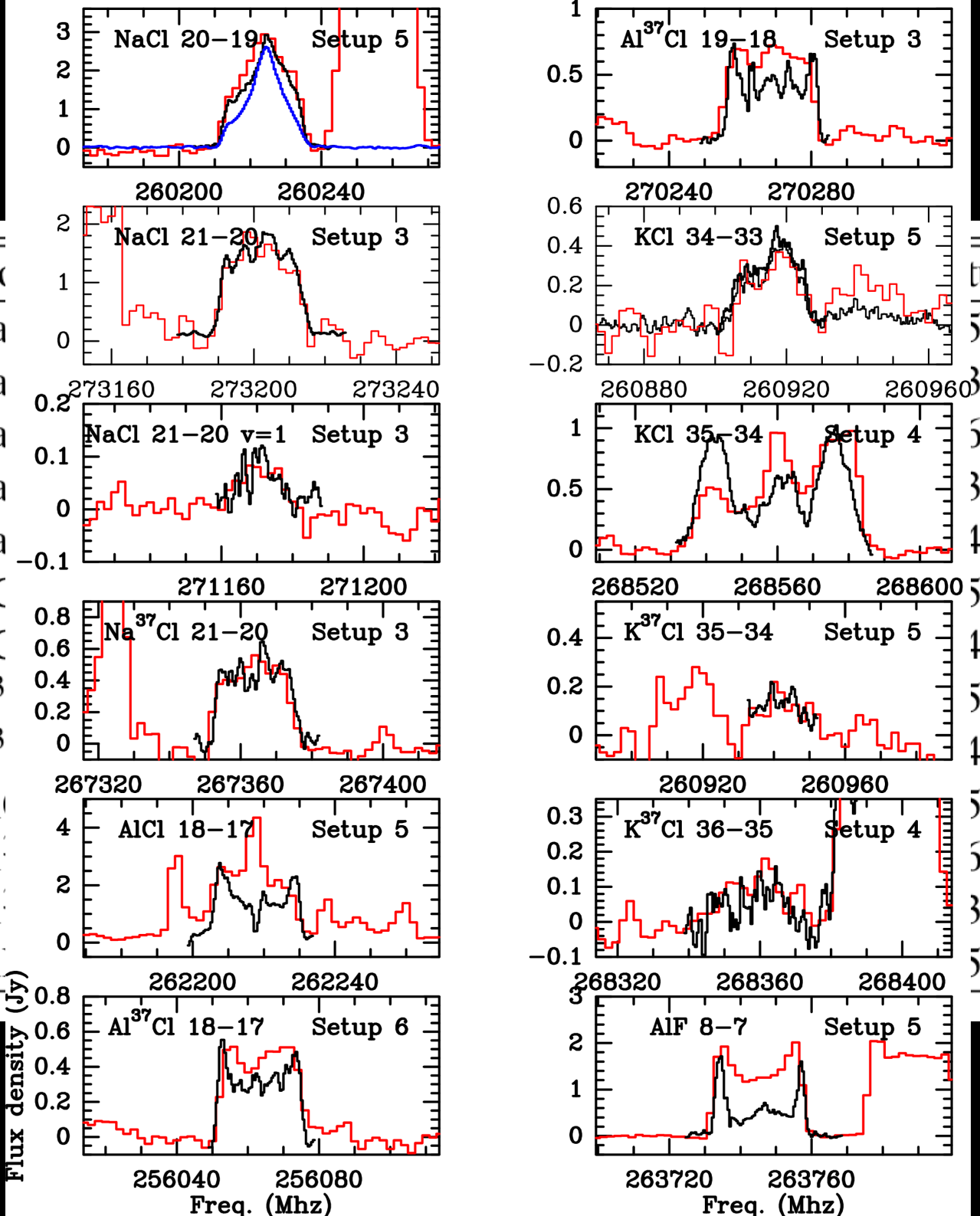


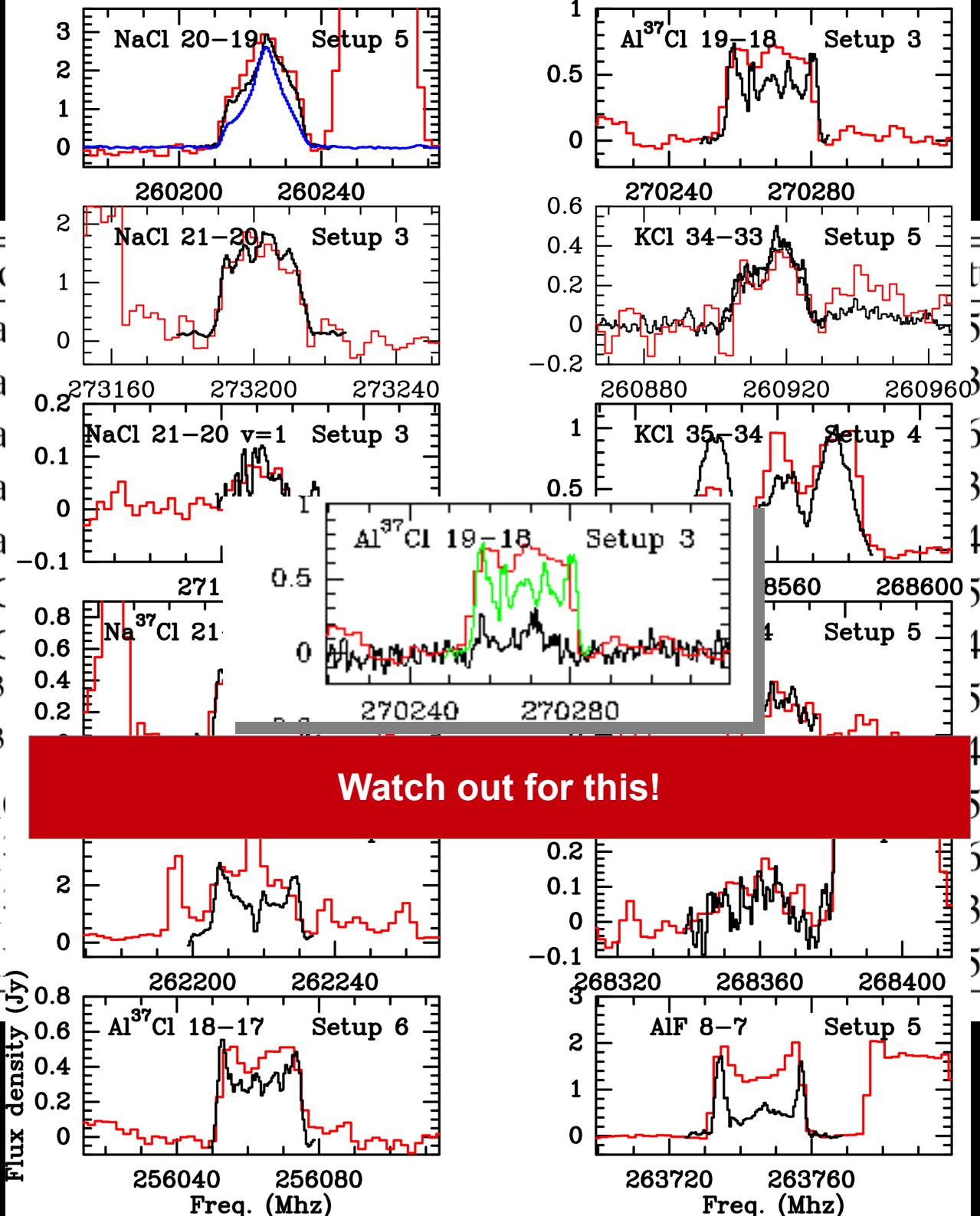
HIFI – Cernicharo et al. (in preparation)

Metals as seen by ALMA

Molecule	Trans.	Freq (MHz)	Beam	Setup
NaCl	20–19	260223.113	$0.''867 \times 0.''563$	5
NaCl	21–20	273202.100	$0.''704 \times 0.''516$	3
NaCl v=1	20–19	258287.756	$0.''758 \times 0.''606$	6
NaCl v=1	21-20	271170.047	$0.''711 \times 0.''514$	3
$Na^{37}Cl$	21–20	267365.814	$0.''709 \times 0.''551$	4
KCl	34–33	260916.468	$0.''866 \times 0.''561$	5
KCl	35–34	268558.984	$0.''705 \times 0.''549$	4
$K^{37}Cl$	35–34	260939.948	$0.''865 \times 0.''561$	5
$K^{37}Cl$	36–35	268363.909	$0.''706 \times 0.''549$	4
AlCl	18–17	262219.282	$0.''863 \times 0.''559$	5
$Al^{37}Cl$	18–17	256063.773	$0.''764 \times 0.''611$	6
$Al^{37}Cl$	19–18	270269.445	$0.''714 \times 0.''515$	3
AlF	8–7	263749.390	$0.''858 \times 0.''557$	5

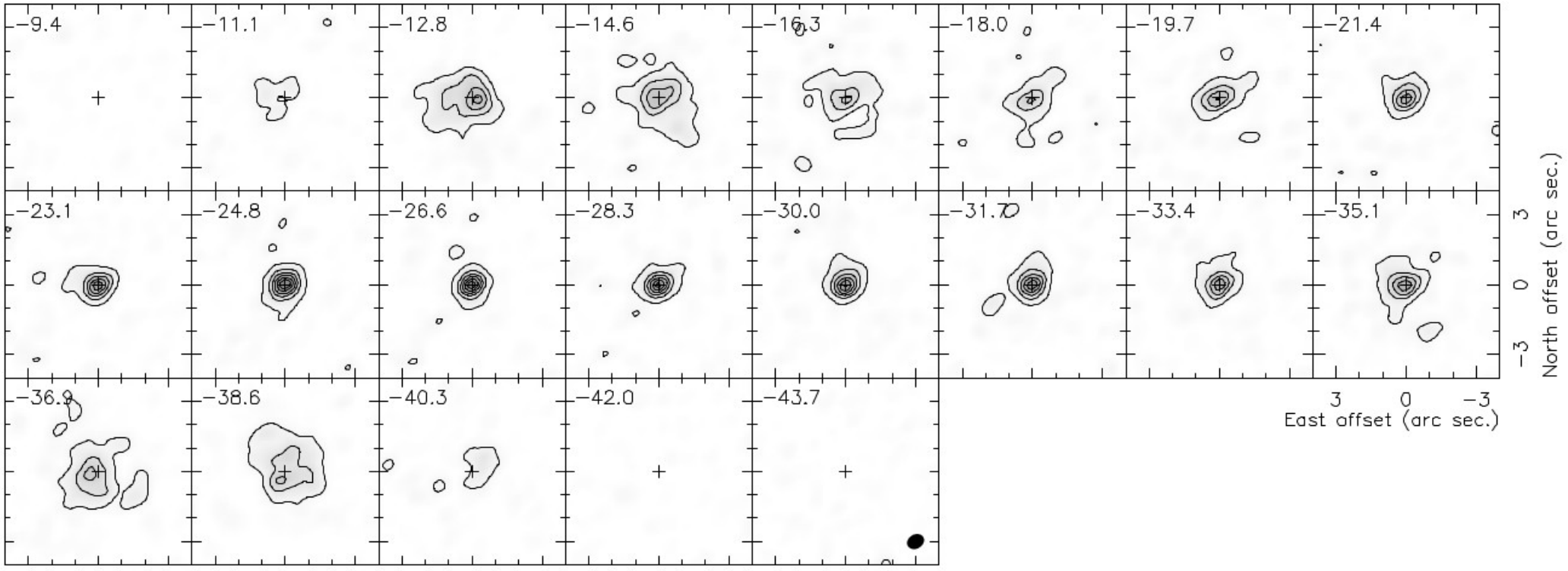
Cycle 0 - BAND 6 Observations


NaCl 20−19 Setup 5
260200 260240
Al37Cl 19−18 Setup 3
270240 270280
NaCl 21−20 Setup 3
273160 273200 273240
KCl 34−33 Setup 5
260880 260920 260960
NaCl 21−20 v=1 Setup 3
271160 271200
KCl 35−34 Setup 4
268520 268560 268600
Na37Cl 21−20 Setup 3
267320 267360 267400
K37Cl 35−34 Setup 5
260920 260960
AlCl 18−17 Setup 5
262200 262240
K37Cl 36−35 Setup 4
268320 268360 268400
Al37Cl 18−17 Setup 6
256040 256080
AlF 8−7 Setup 5
263720 263760
Flux density (Jy)
Freq. (Mhz)
Freq. (Mhz)



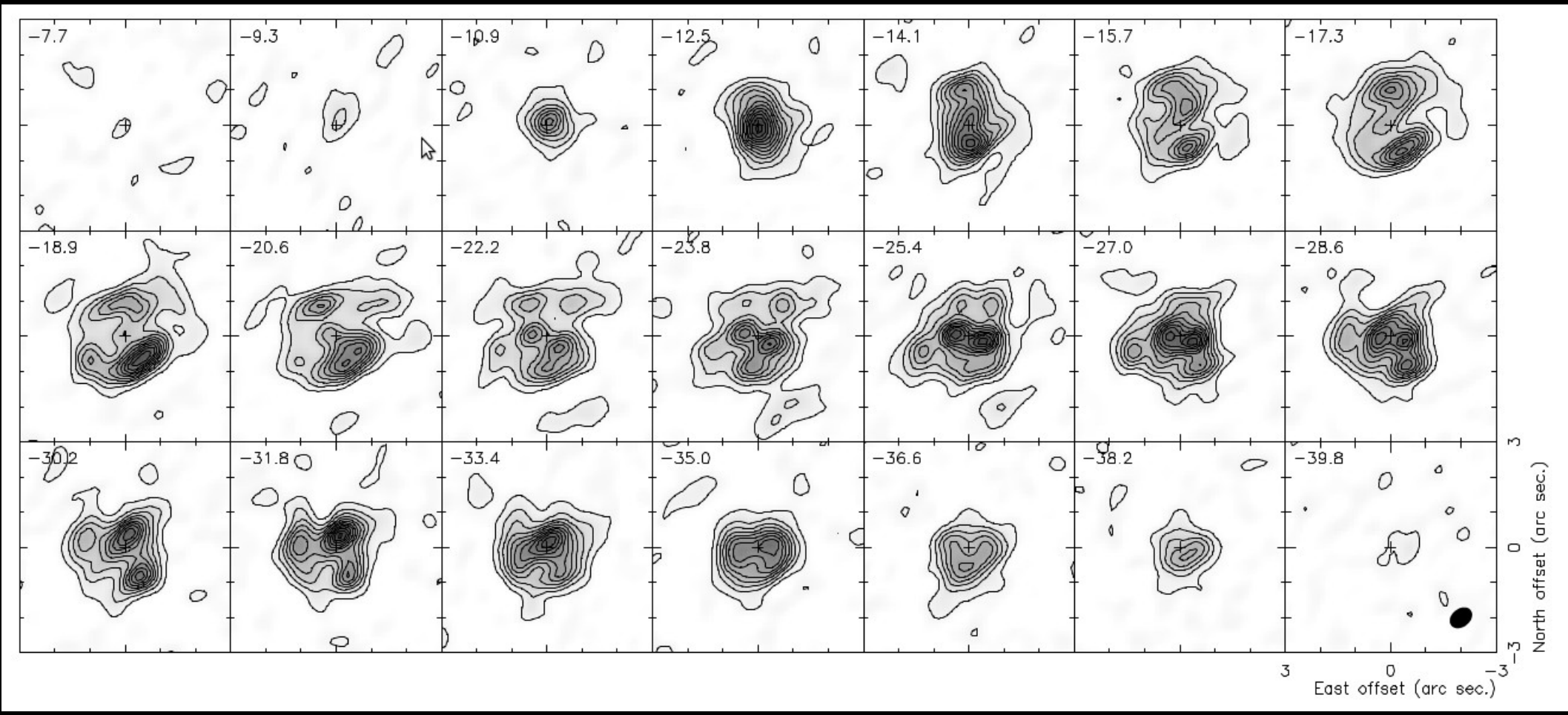
Watch out for this!

Metals as seen by ALMA



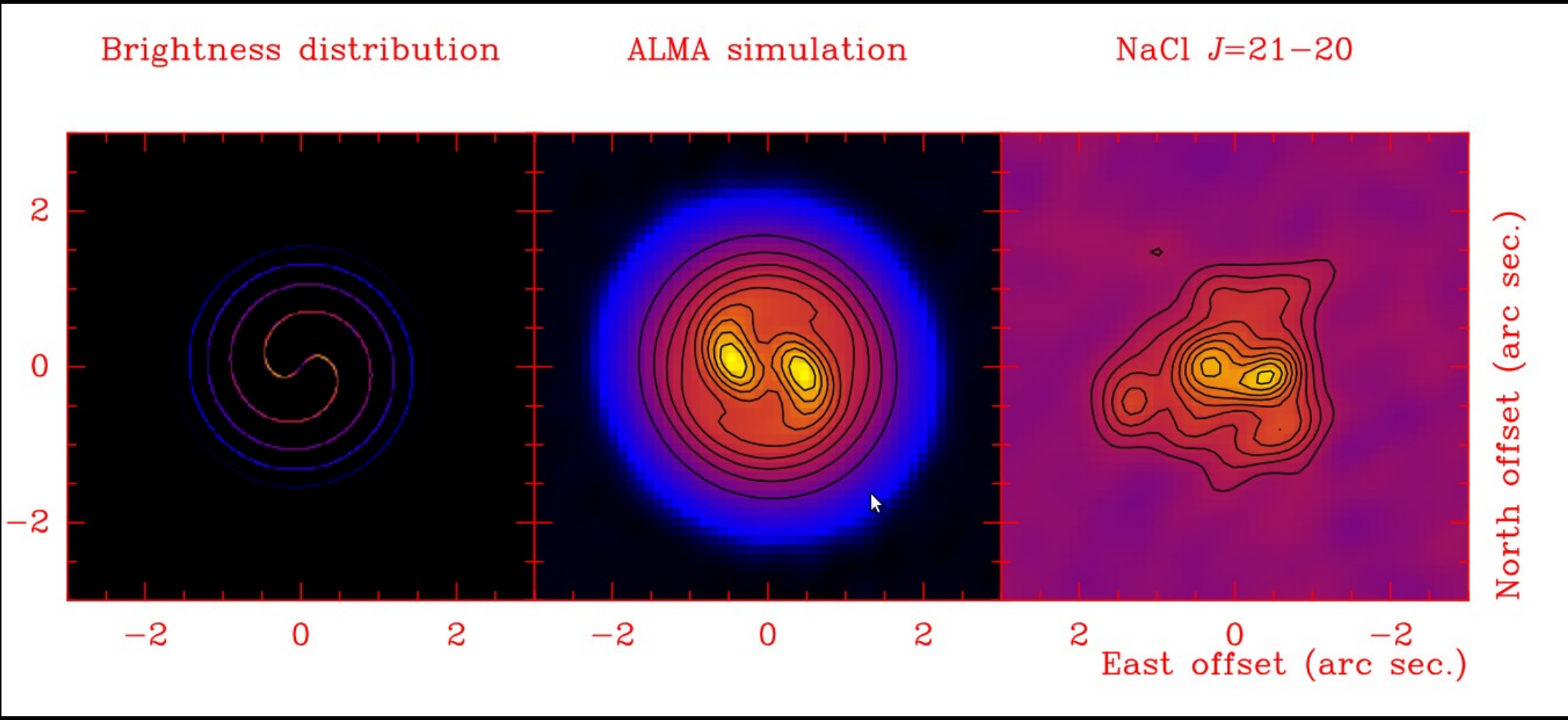
$Al^{37}Cl$ 18-17

Metals as seen by ALMA



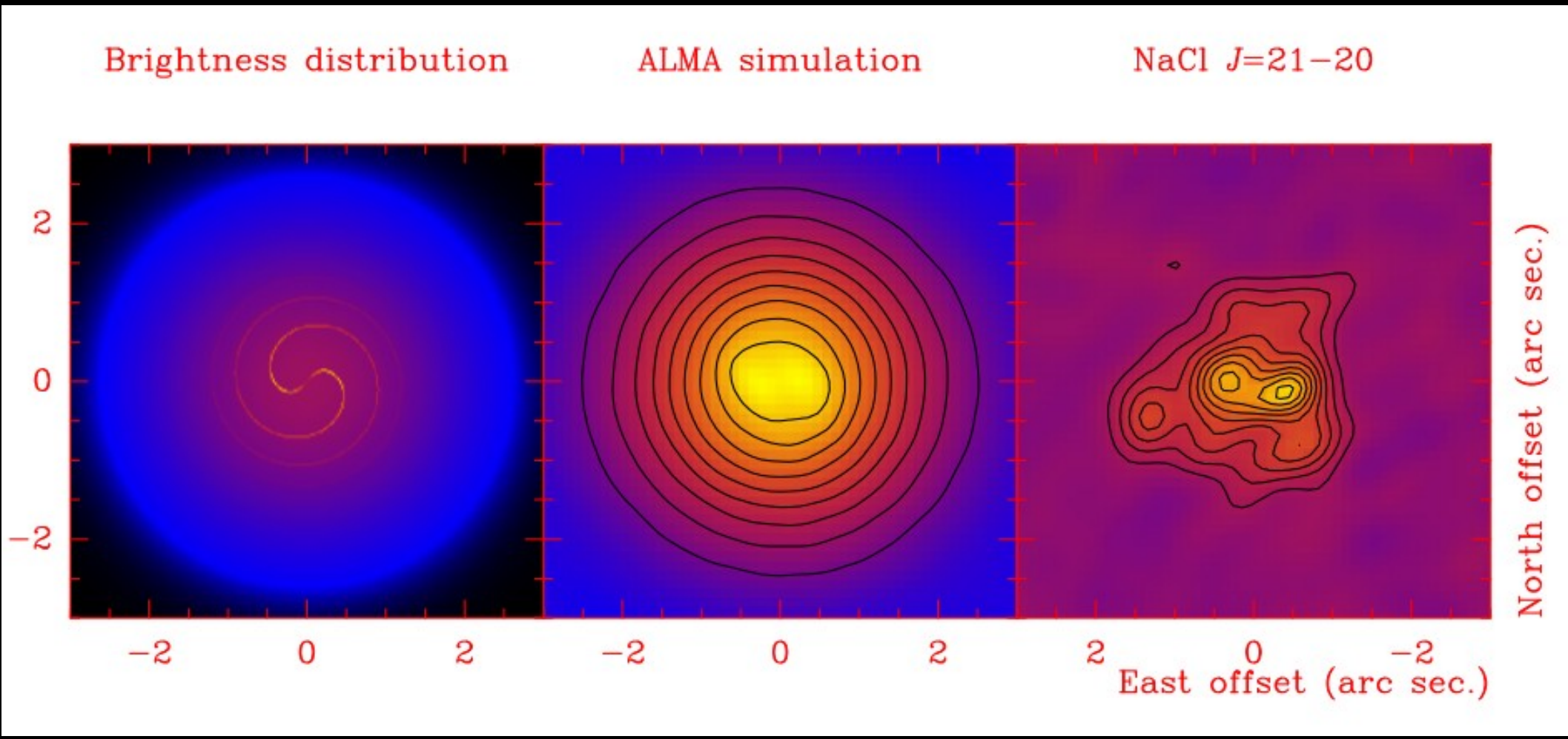
NaCl 21-20

Metals as seen by ALMA



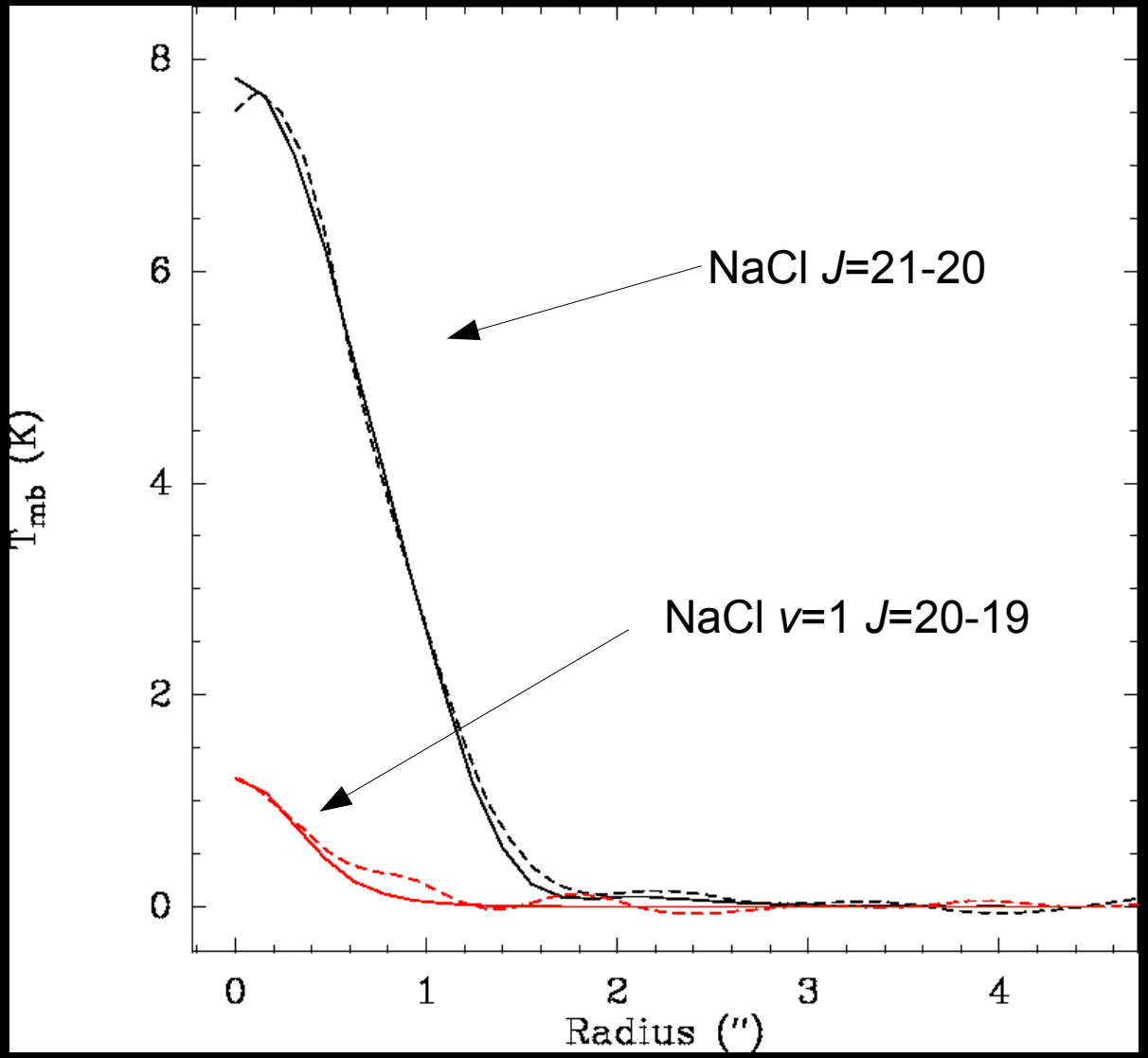
NaCl & Kcl emissions

Metals as seen by ALMA



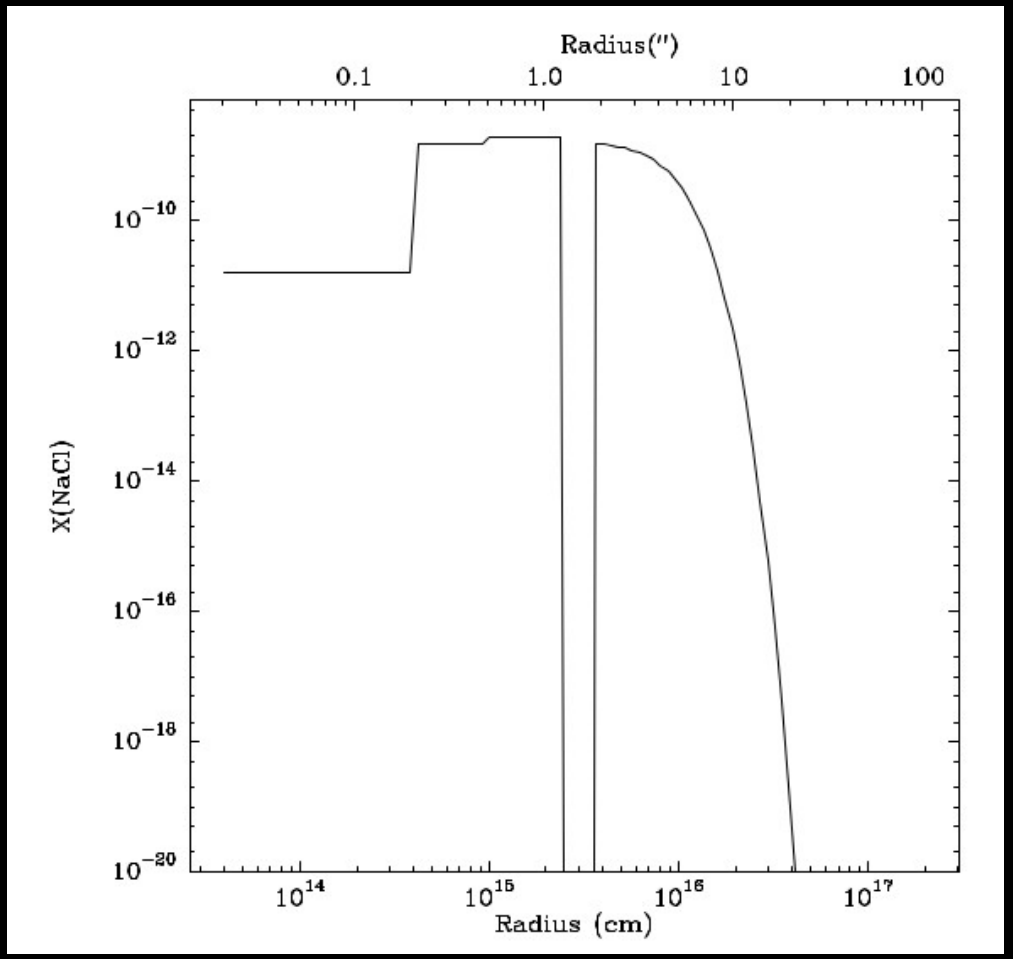
Al-bearing emission

Spiral Fitting



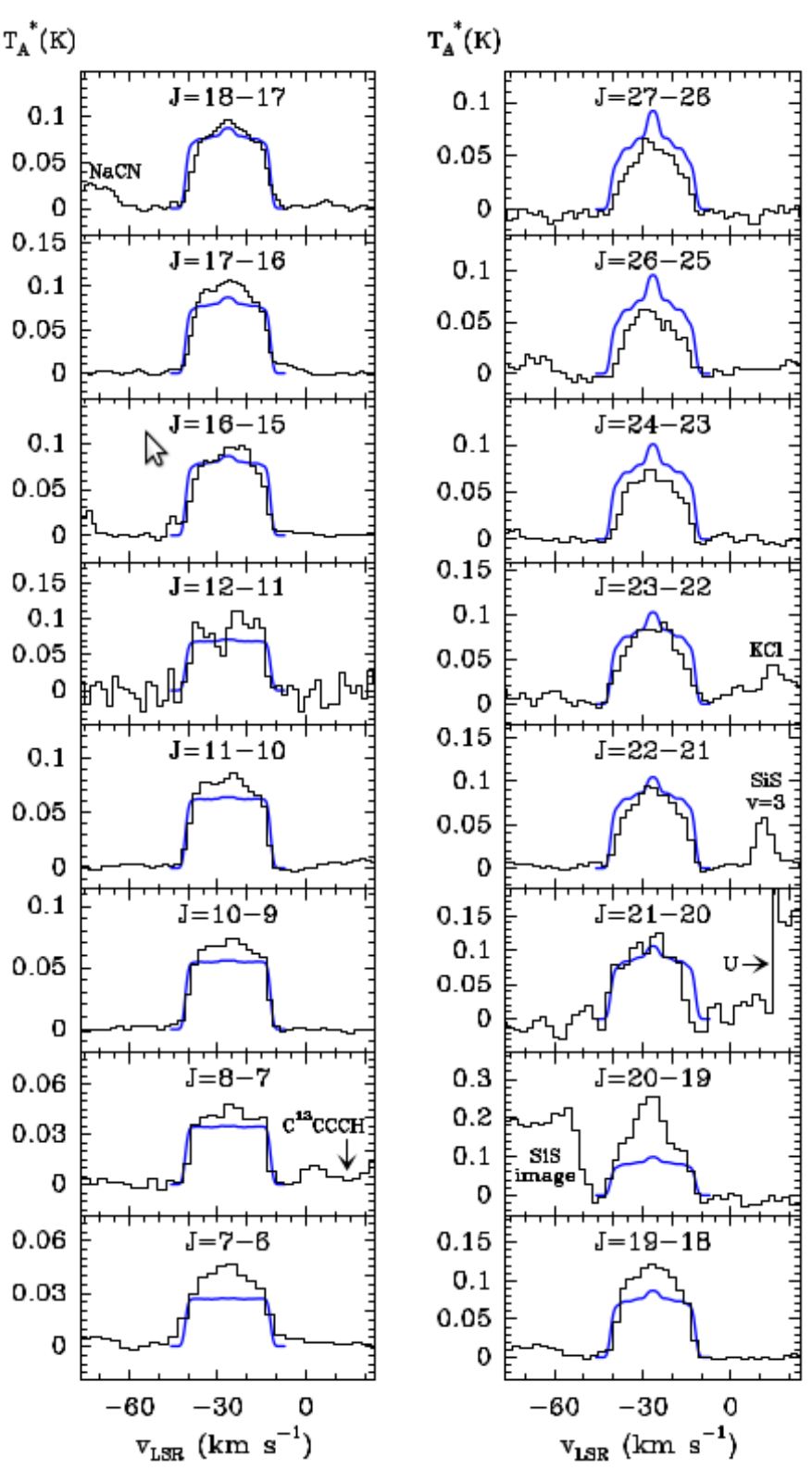
Quintana-Lacaci et al. ApJ accepted
Cabezas et al. ApJ submitted

Spiral fitting

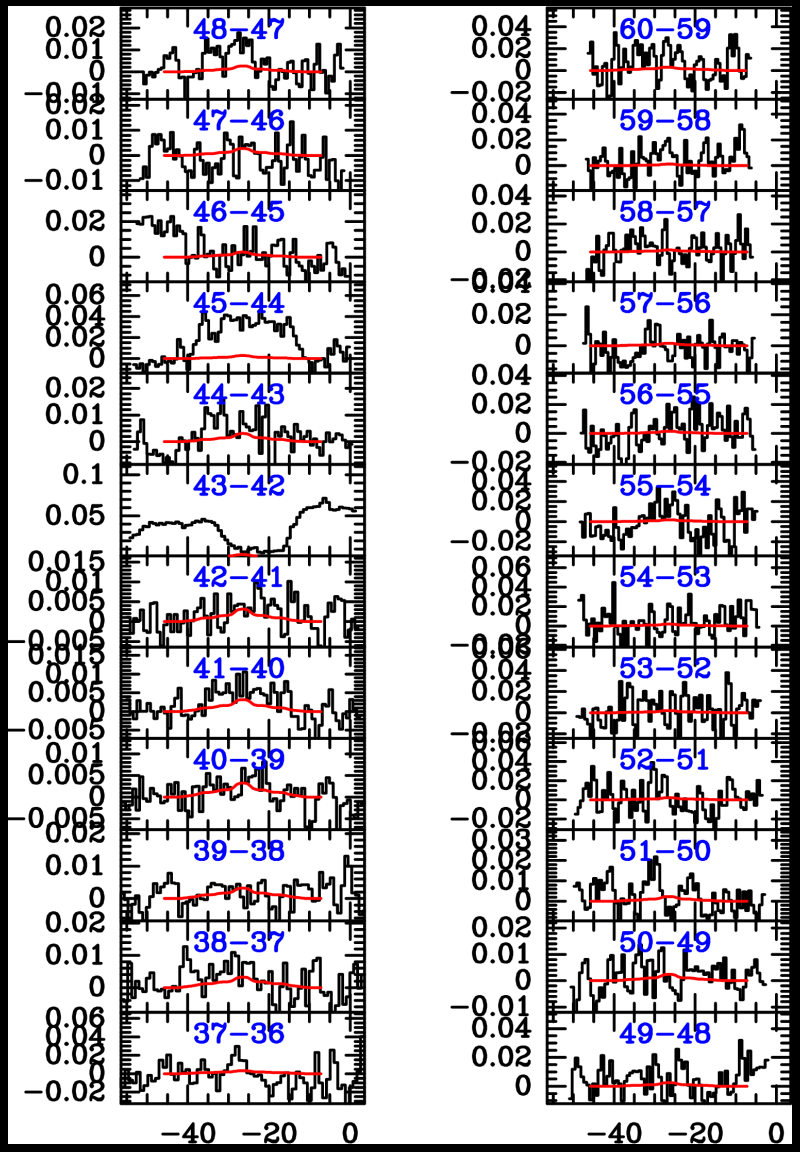


Mass = 1.0 10^{22} gr = 1.7 10^{-6} M_{earth}

Rin= 27 au

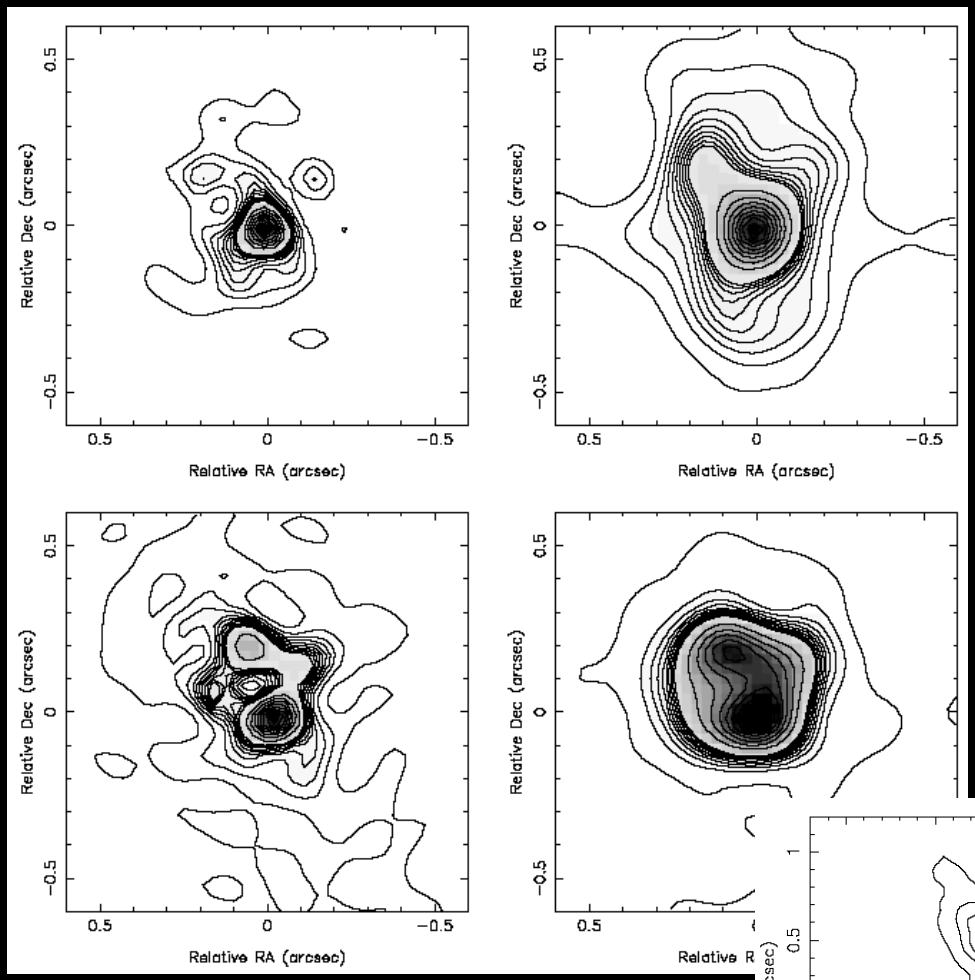


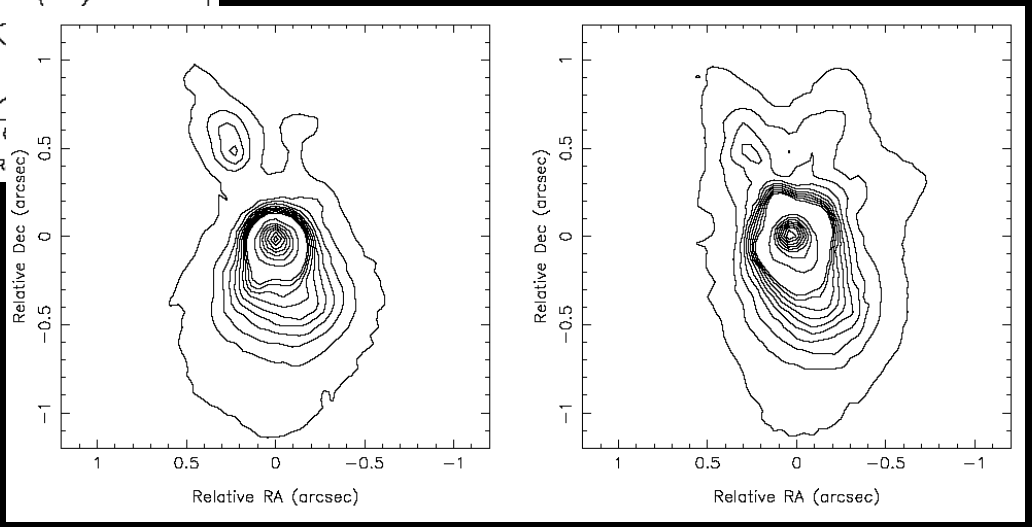
Metals in IRC+10216: Single dish



HIFI – Cernicharo et al. (in preparation)

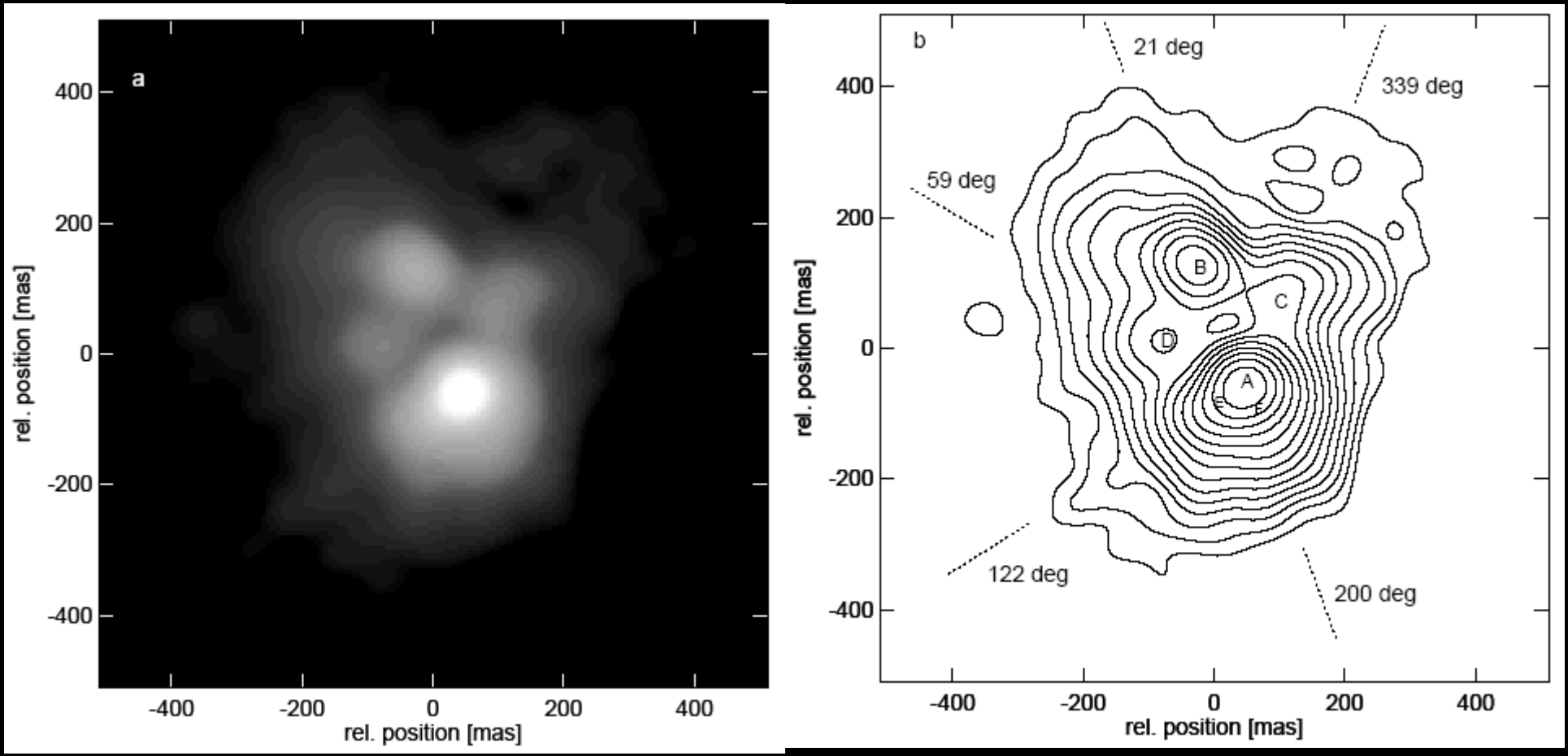
Other Structures: Outflow





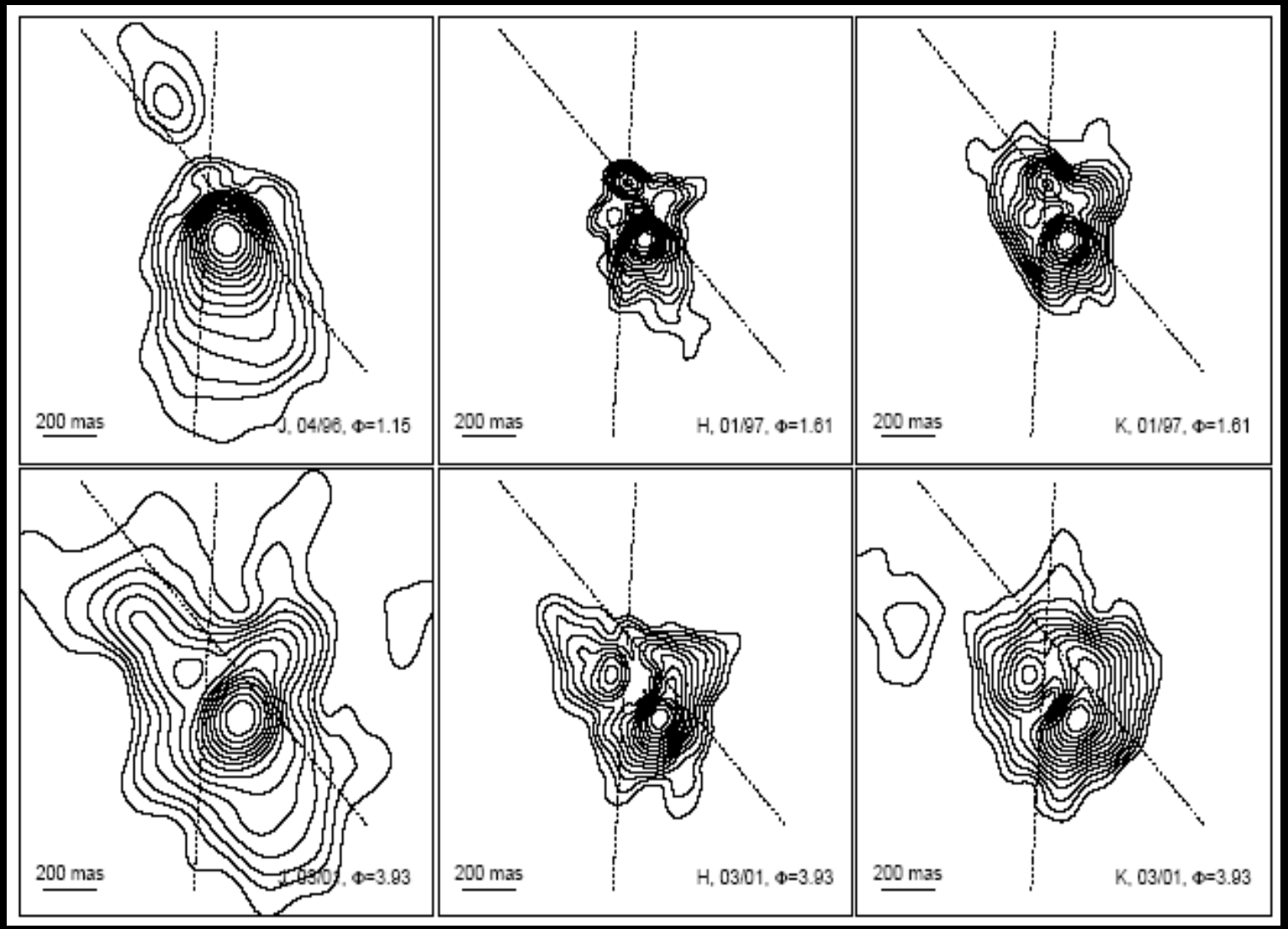
Haniff & Buscher, 1998
NIR (K: 2.2um and L:3.4um)

Other Structures: Outflow



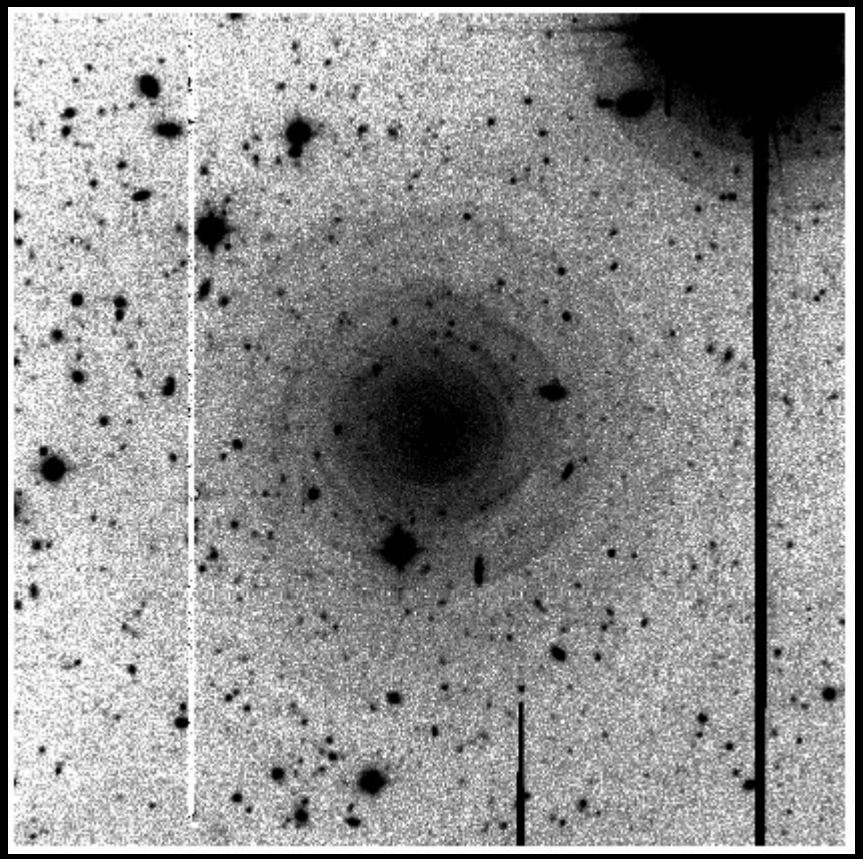
Weigelt et al.,1998
K' band (2.17um)

Other Structures: Outflow



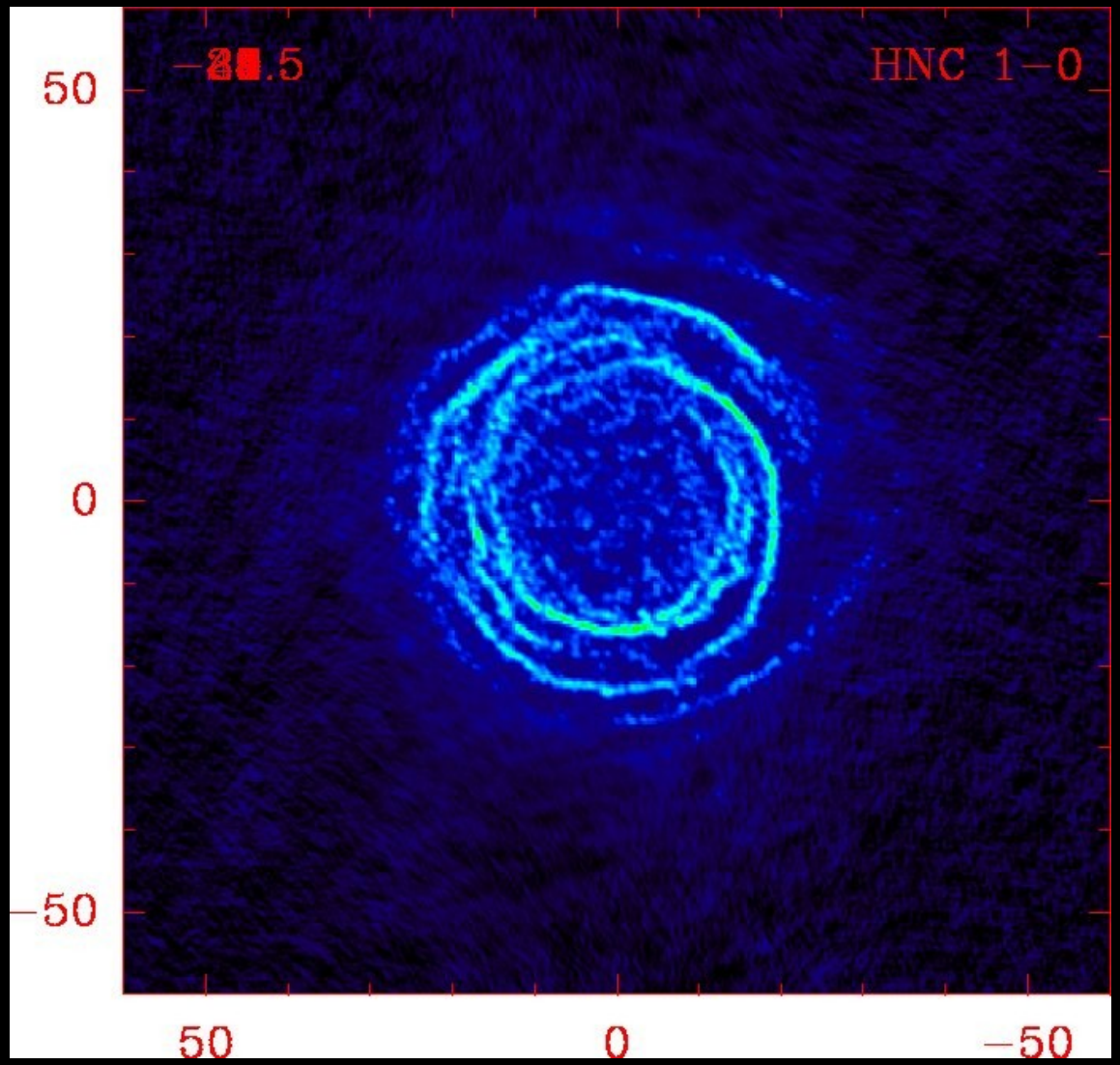
Weigelt et al., 2002
NIR (JHK)

Other Structures: Shells



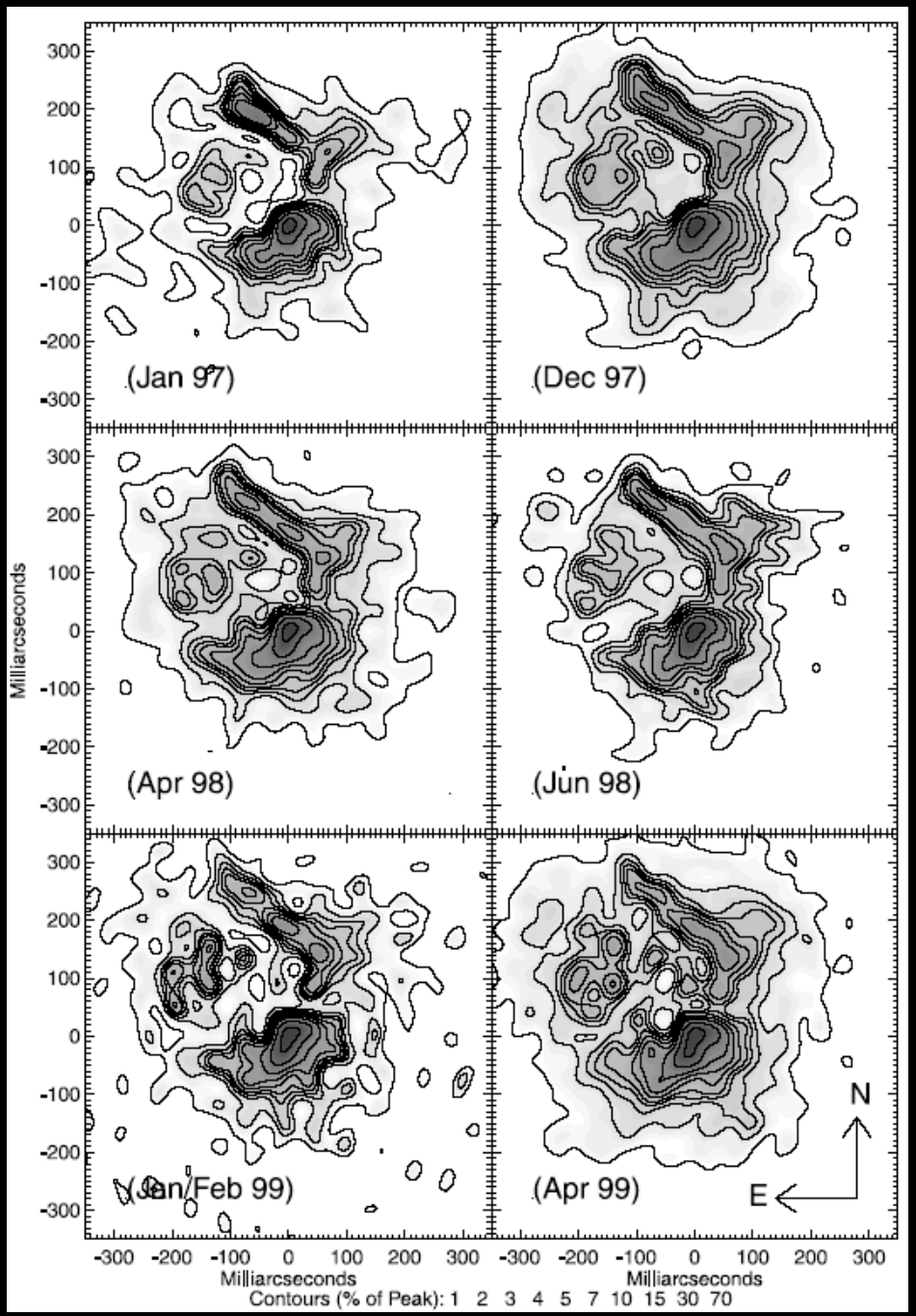
Mauron and Huggins, 1999
B and V Bands

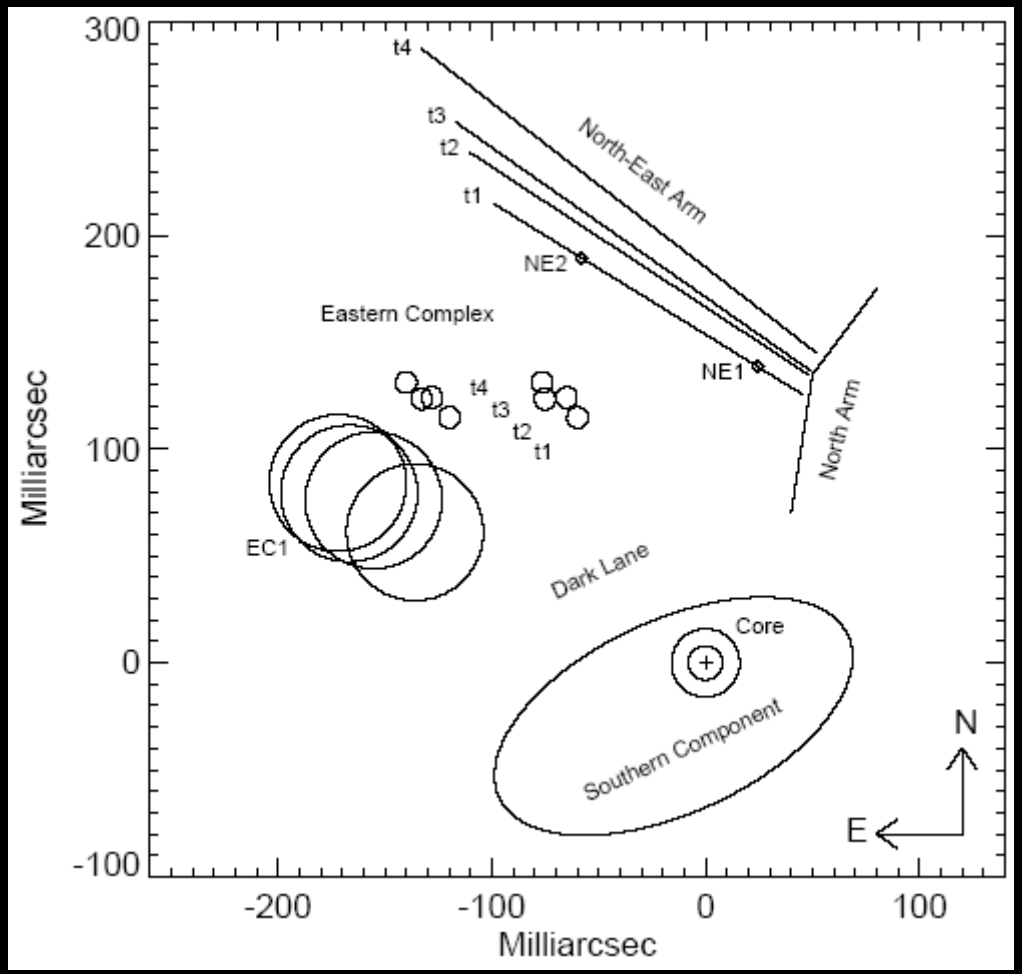
Other Structures: Shells



HNC 1-0 Cycle 2 HPBW 0.8”

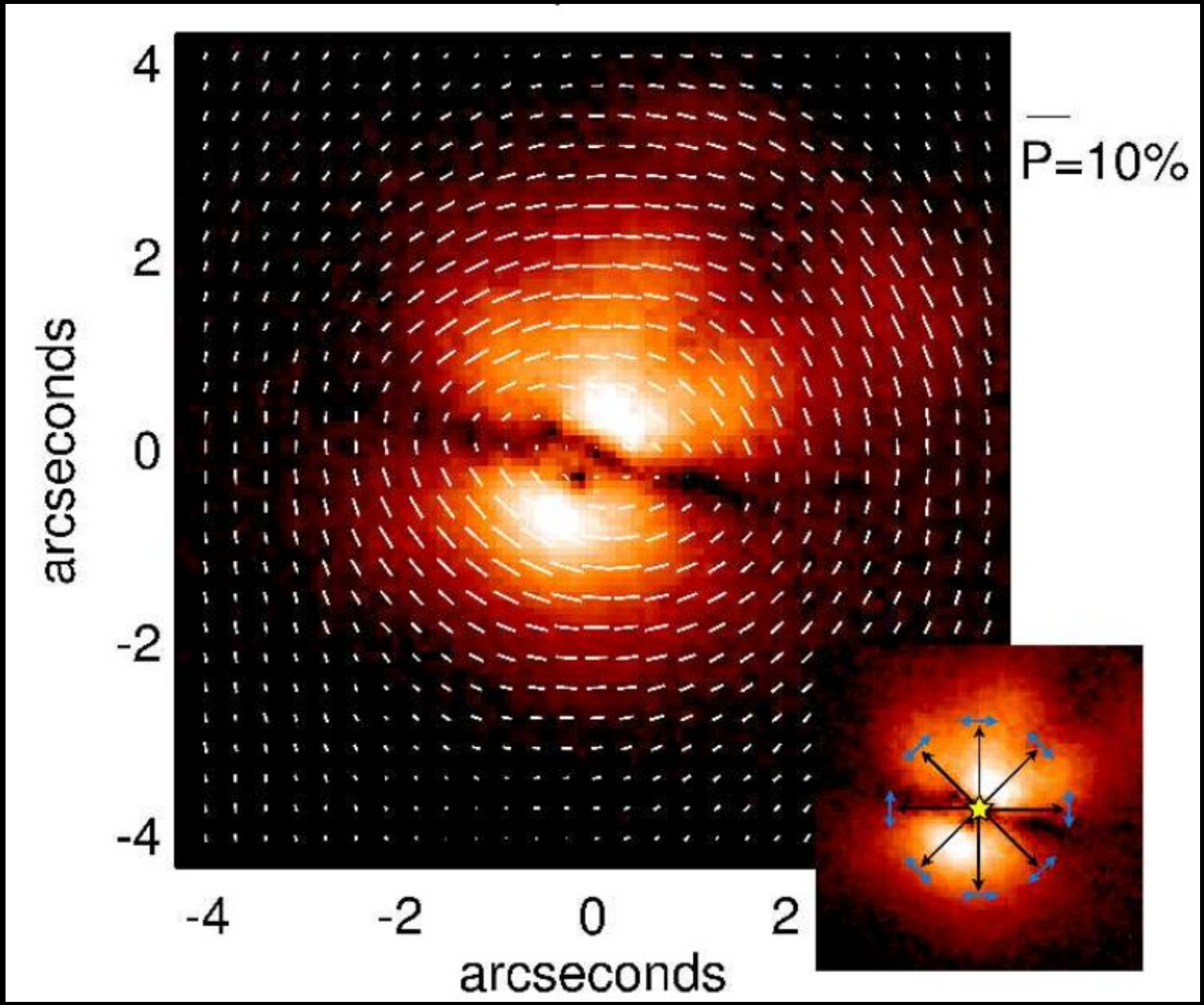
Other Structures: Dust Lane





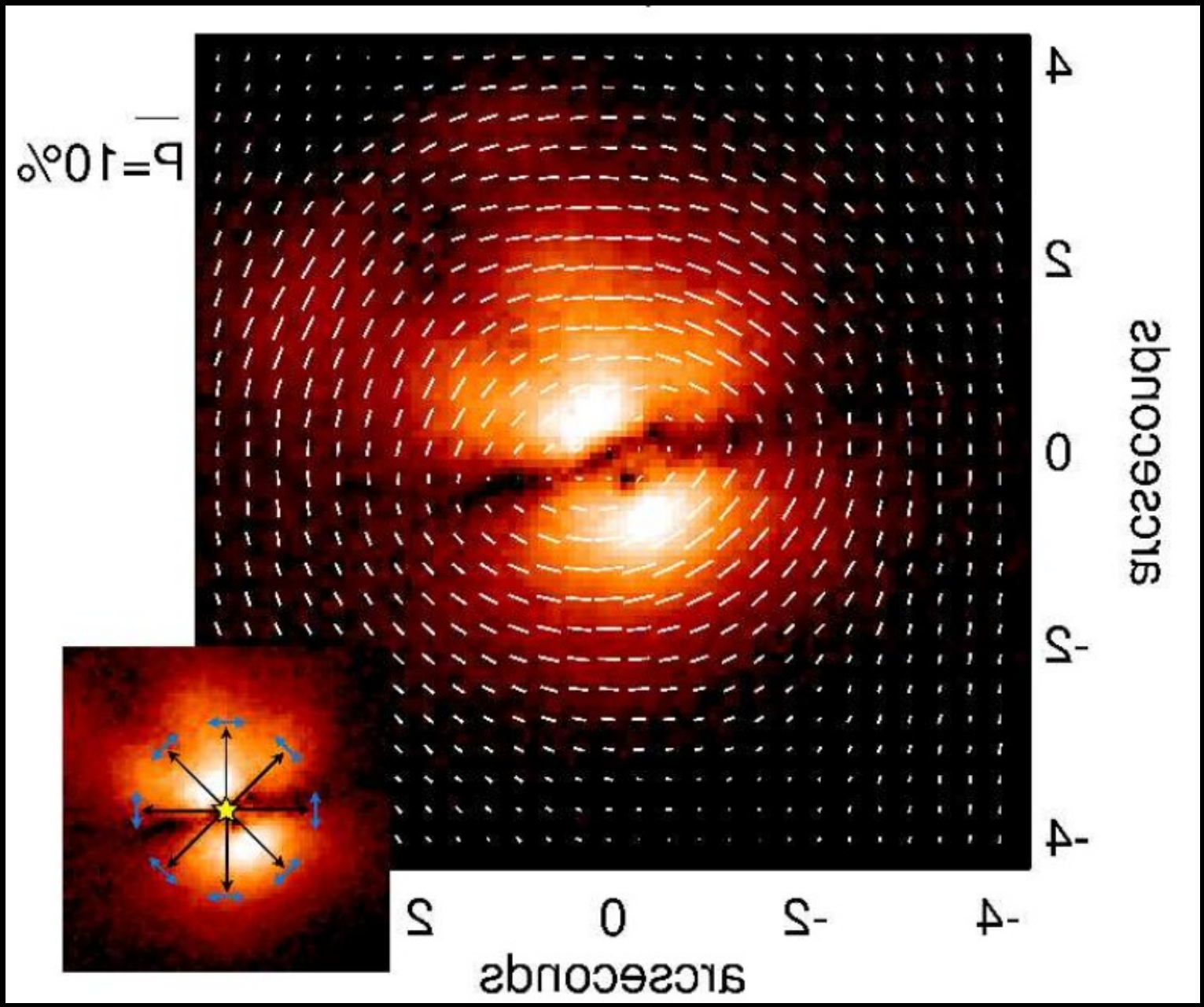
Tuthill et al., 2000
K Band

Other Structures: Dust Lane



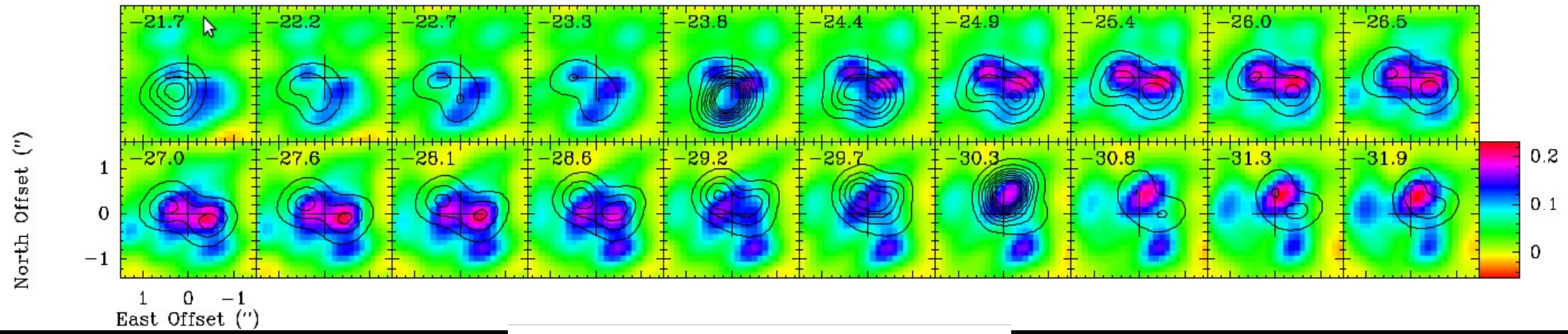
Jeffers et al. 2014

Other Structures: Dust Lane



Jeffers et al. 2014

Rotation



Parameter	Value
Rin	0.″2
i	**15°**
P.A.	120°
V_{exp}	**11 km/s**
V_{rot}	**8 km/s**

Coupled

Fixed

Conclusions

We found an elongation with a P.A.~ 76º visible in NaCl and KCl

Not seen in Al-bearing molecules – Dipole moment

NaCl and KCl are good tracers of high-density regions

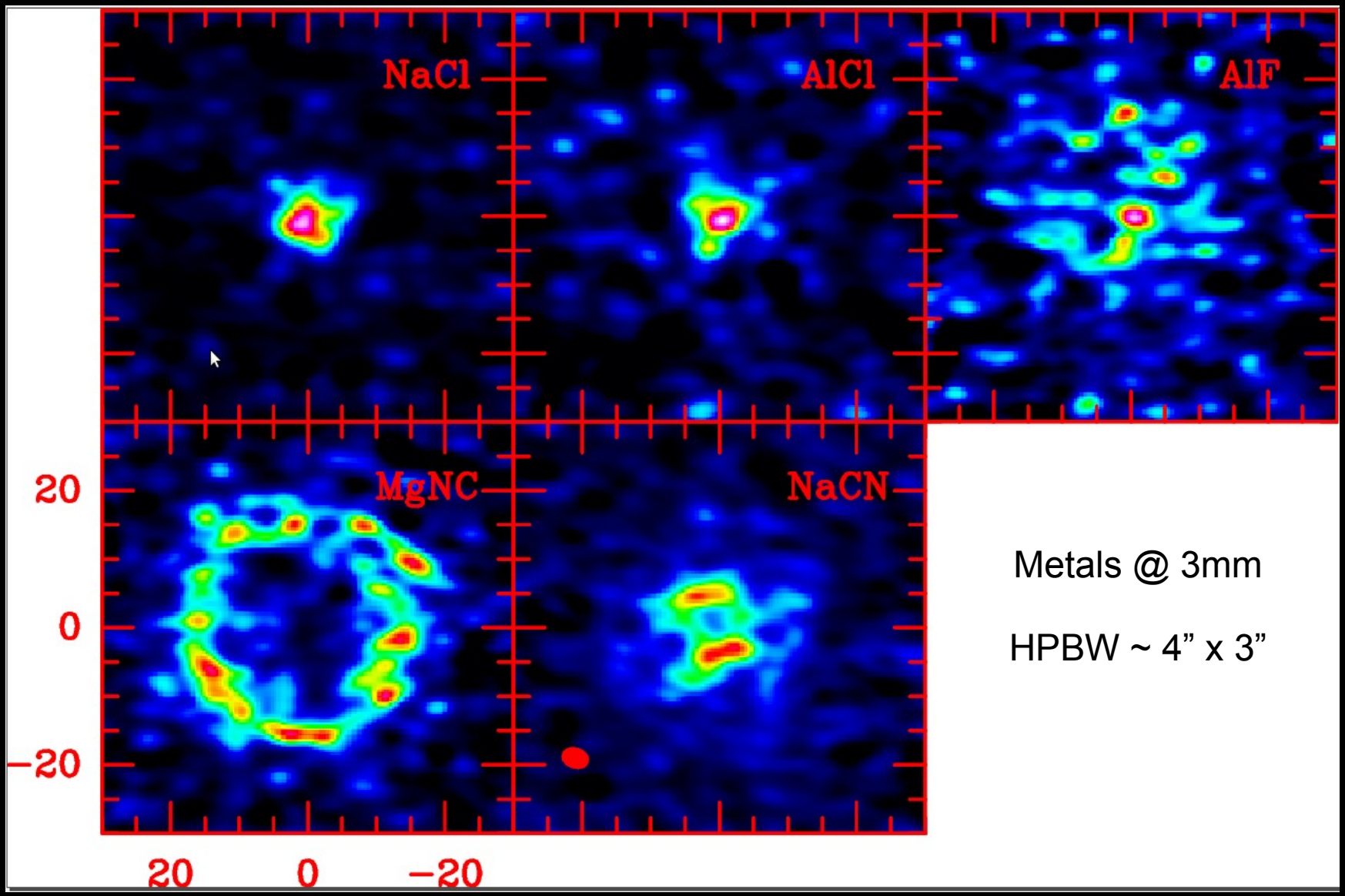
Conciliate the dark lane: rotation + 15º tilt

Orthogonal with the 20º outflow

A Rotating Spiral

Cycle 2...

Cycle 2 – Compact conf. + Short spacing



Extended conf. on the way (~0.6")