Dense gas tracing the collisional past of Andromeda. An atypical inner region?

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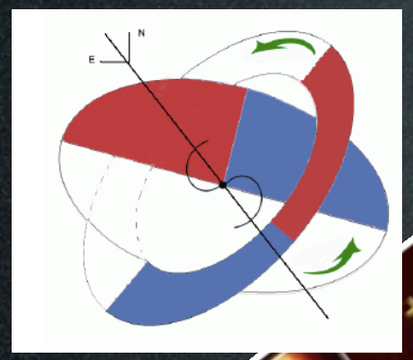
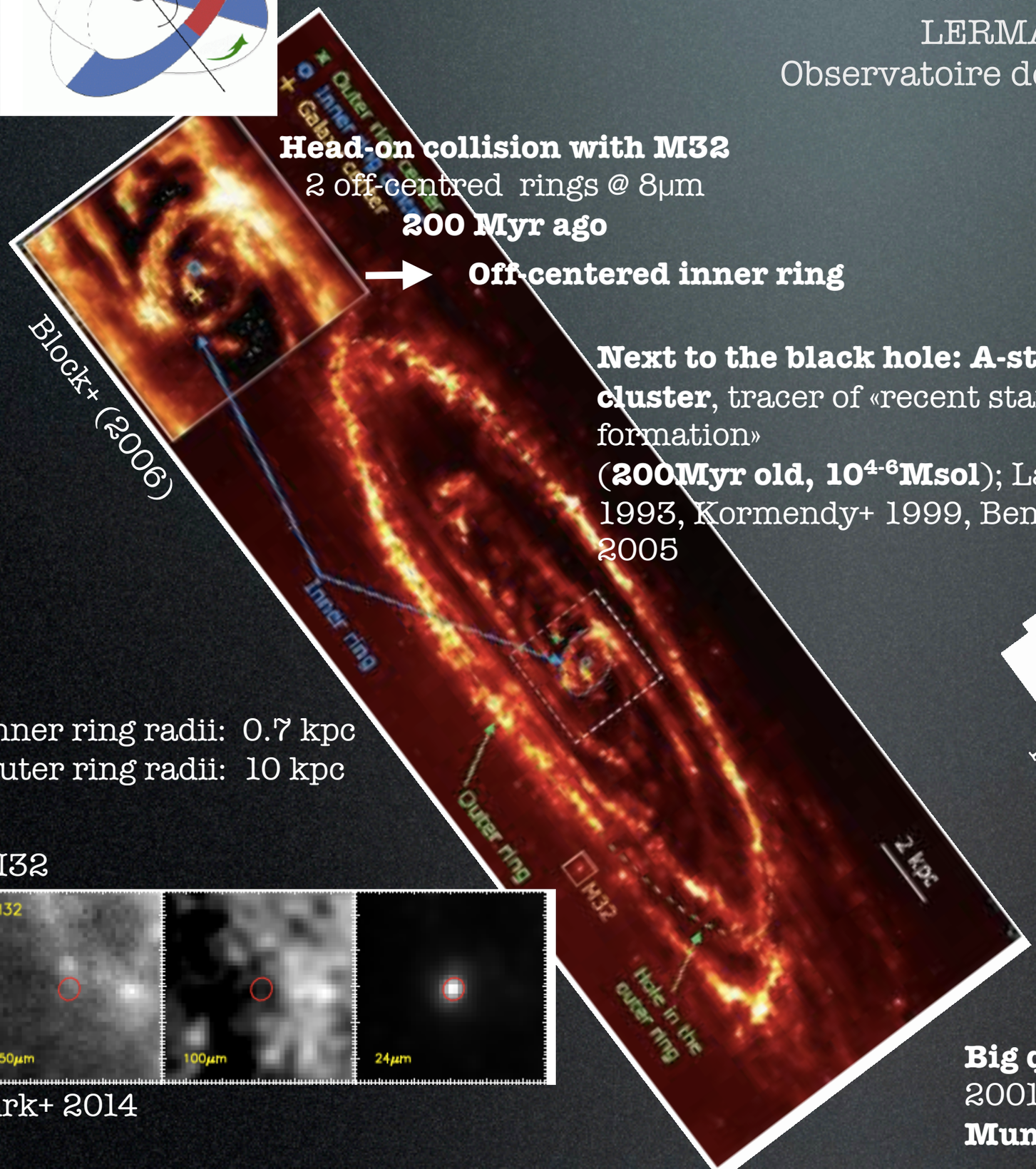
Melchior & Combes (2011)





Block+ (2006)

Head-on collision with M32
2 off-centred rings @ 8μm
200 Myr ago
→ **Off-centered inner ring**

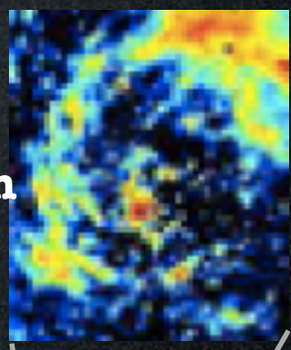
Next to the black hole: A-star cluster, tracer of «recent star formation»
(**200Myr old, $10^{4\text{-}6}$Msol**); Lauer+ 1993, Kormendy+ 1999, Bender+ 2005

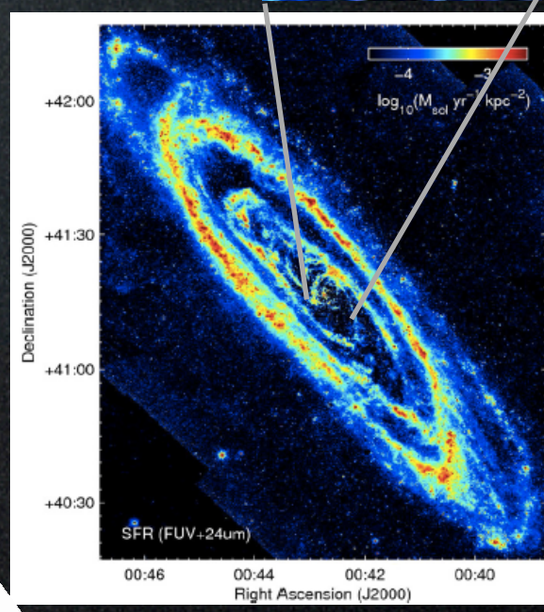
Inner ring radii: 0.7 kpc
Outer ring radii: 10 kpc

M32

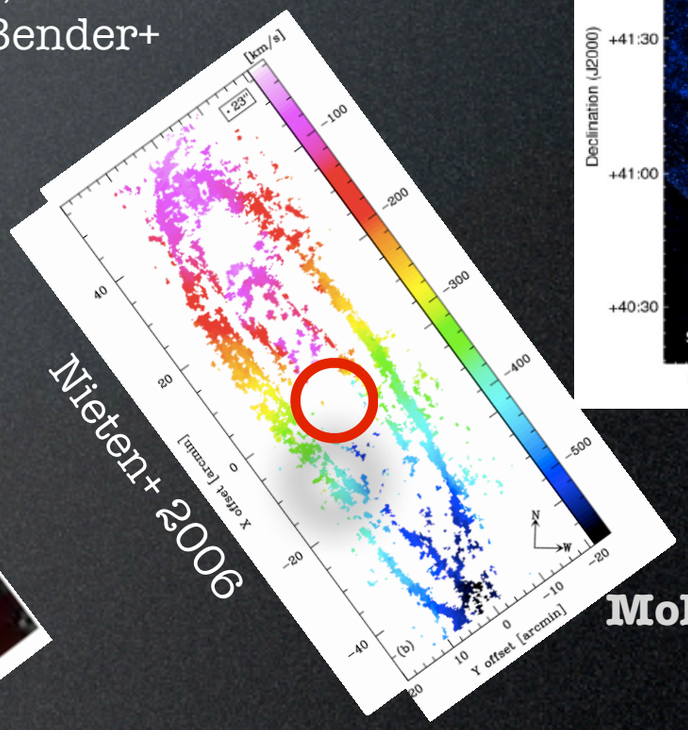
Kirk+ 2014

Very little star formation
SFR=$0.25^{+0.06}$ Msol/year





Ford+ 2013



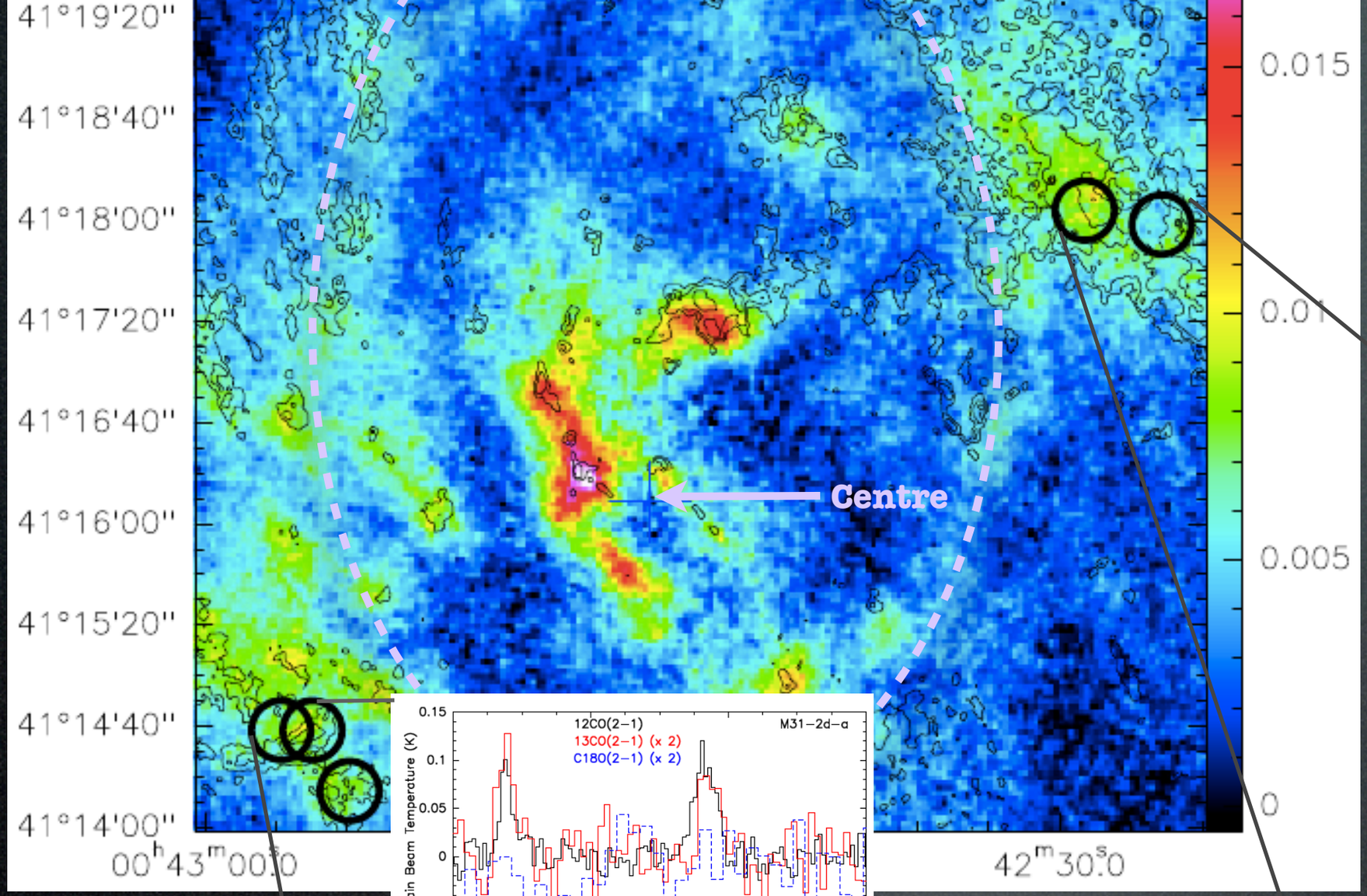
Nieten+ 2006

Molecular gas CO

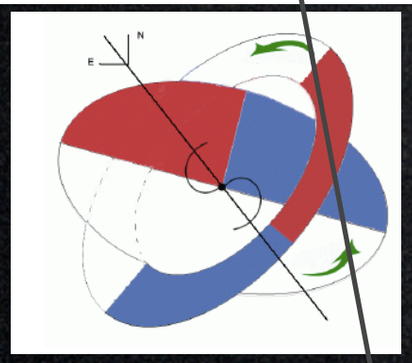
Big quiet black hole: 0.7-1.4 10^8 M_{sol}! (Bacon+ 2001, Bender+ 2005)
Mumur of the black hole: gas infall? (Li+ 2011)

Detection of dense gas at IRAM 30m

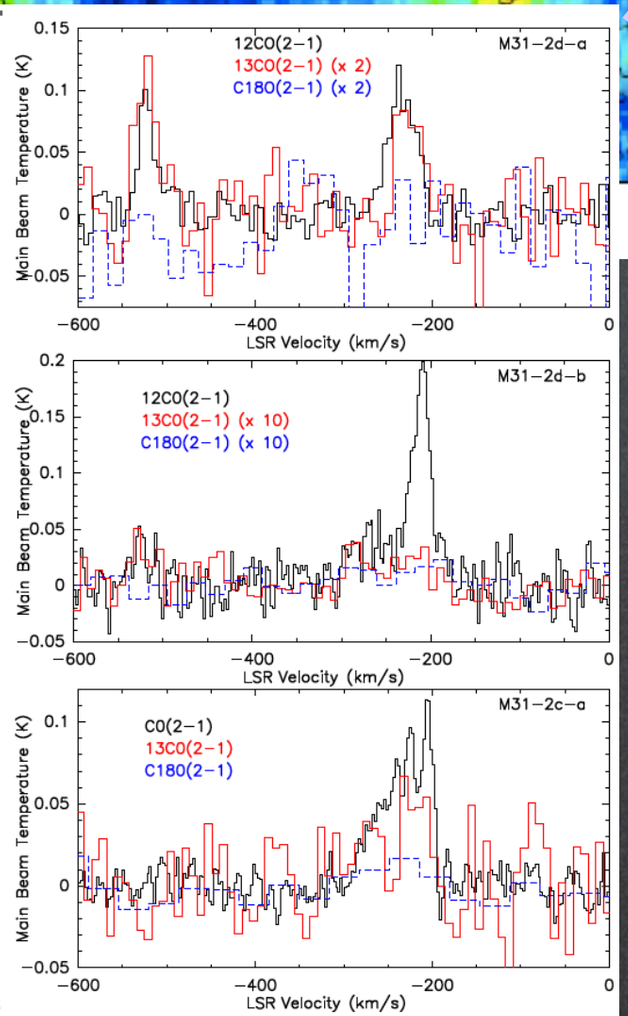
^{12}CO(2-1), ^{13}CO(2-1), C^{18}O(2-1)

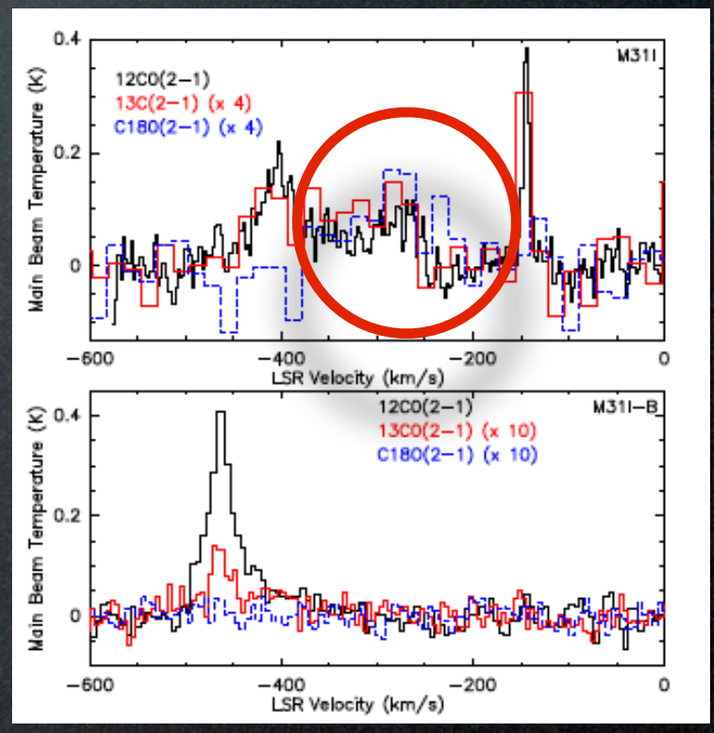


PACS 100um
Courtesy : S. Viaene

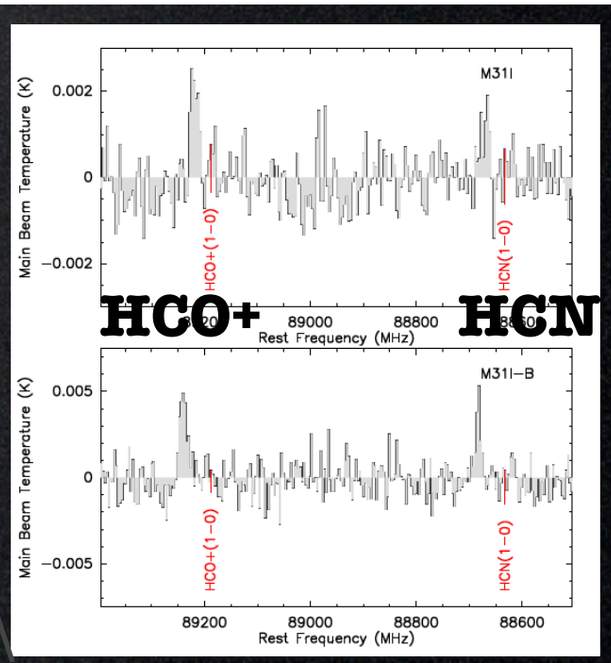


^{12}CO(2-1)
^{13}CO(2-1)
C^{18}O(2-1)





beam = 11arcsec FWHM
= 40 pc



Melchior & Combes 2016

Analysis

Melchior & Combes 2016

2 "counter-rotating" components

Position	V1 km/s	V2 km/s	V3 km/s	SFR Msol/Myr
I	-144	-291	-402	3.2
I-B		-397	-463	2.8
2d-a	-523		-234	1.3
2d-b	-526	-269	-211	1.3
2c-a	-243	-223	-205	1.6

$M_* \sim 3.\ 10^7$ Msol;
Mdust ~ 10^3 Msol;
Tdust=20K

Viaene+ 2014

Average beam filling factor: 0.8%.
The gas is very clumpy.
Average N_H = 16 10^{22} cm^{-2}

HCN and HCO+ subthermally excited, under-abundant
^{13}CO and $C^{18}O$ close to LTE and ^{13}CO depleted

^{13}CO and $C^{18}O$: optically thin (Column densities..)

^{13}CO / $C^{18}O$ = 1 Expected isotope & abundance values : **6-13** (Bergin+ 1995, Wilson & Rood 1994)

$C^{18}O$ abundance compatible with Galactic value
^{13}CO is deficient

^{13}CO deficit observed in post-starbursts (Casoli+ 1991, Davis 2014)

In 30-40 Myr stars decouple from their birth clouds
Bash+ (1977), Bash (1979)

→ **200 Myr starburst** detected next to the centre (possibly in projection) Lauer+ (2012)