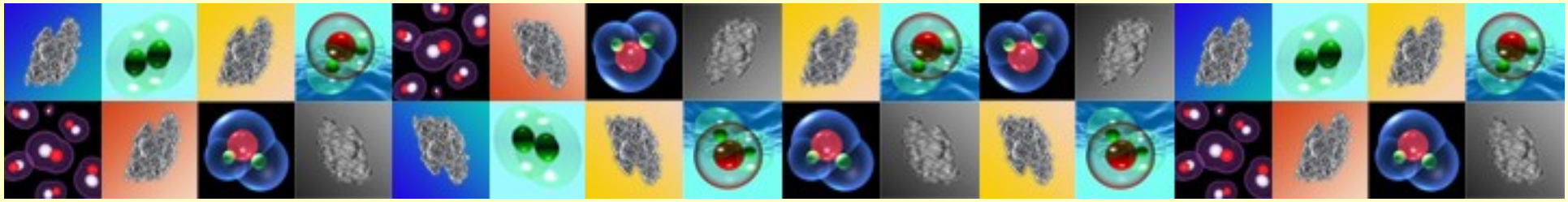
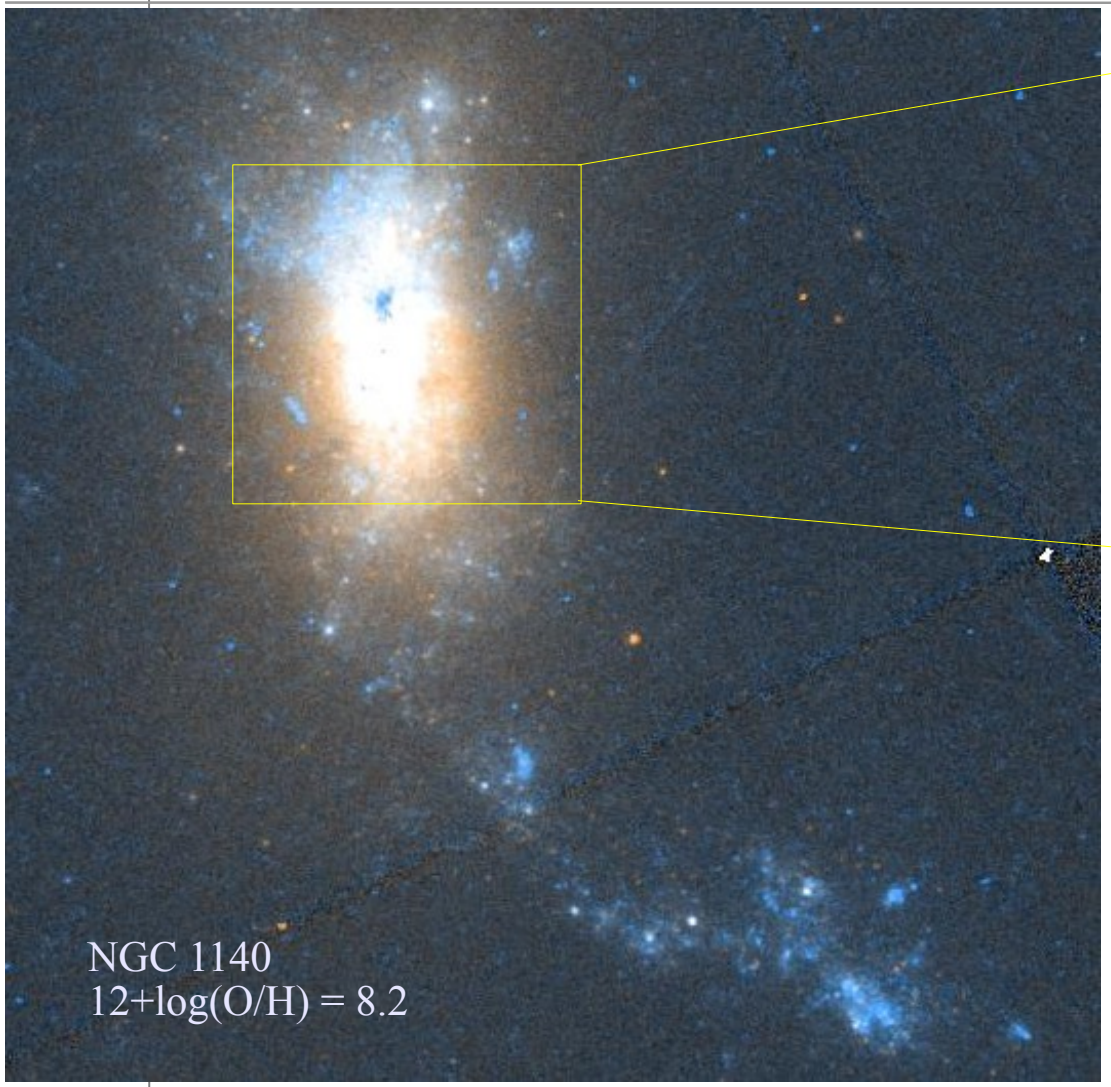
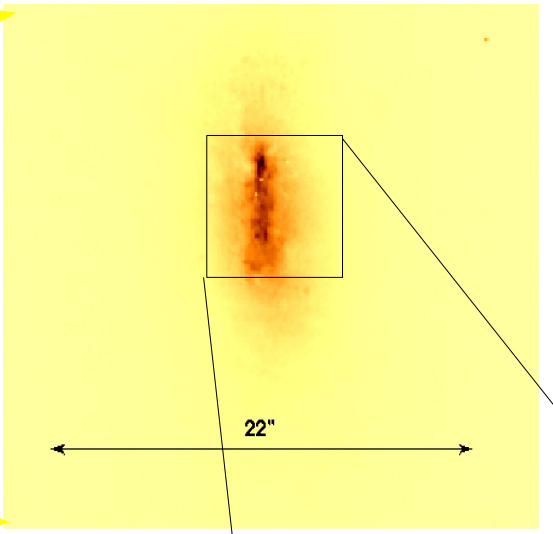


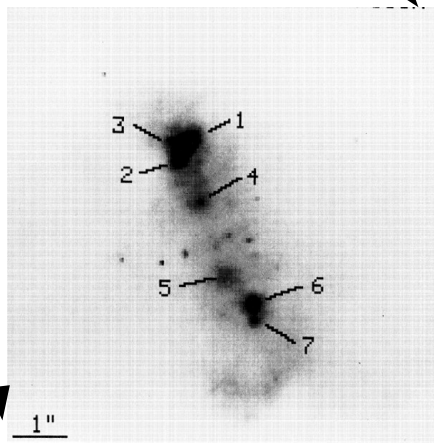
MODULO - Observing progress

- NGC 1140: 39+55=94 hrs IRAM and 15 hrs APEX time allocated (although lost a significant amountof IRAM time to bad weather). 9 transitions observed, although detections of only 4 CO transitions [but significant upper limits for ^{13}CO(1-0), HCN(1-0), CS(2-1), CN(1-0), C^{18}O(1-0)]. IRAM TAC refused HCO+ !
- BCD equatorial sample: ~36 hrs ^{12}CO(1-0), ^{12}CO(2-1) + 32 hrs to do ^{12}CO(2-1), ^{12}CO(3-2) APEX (Swedish time). Period 87 reapplied for only ^{12}CO(3-2) (ESO, Swedish).
- BCD equatorial sample: additional IRAM time to make up for time lost to wobbler problem (very recently observed):

NGC 1140: First case study (-10º, fortunate for ALMA)

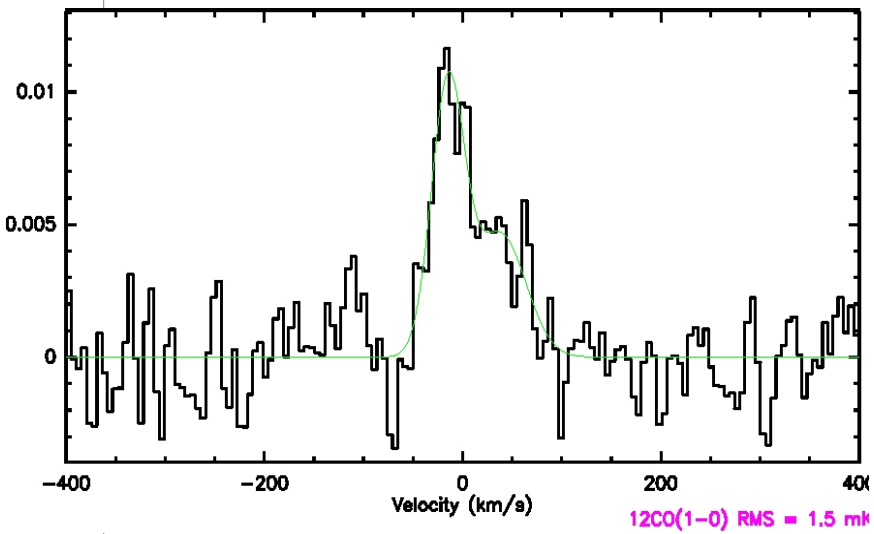


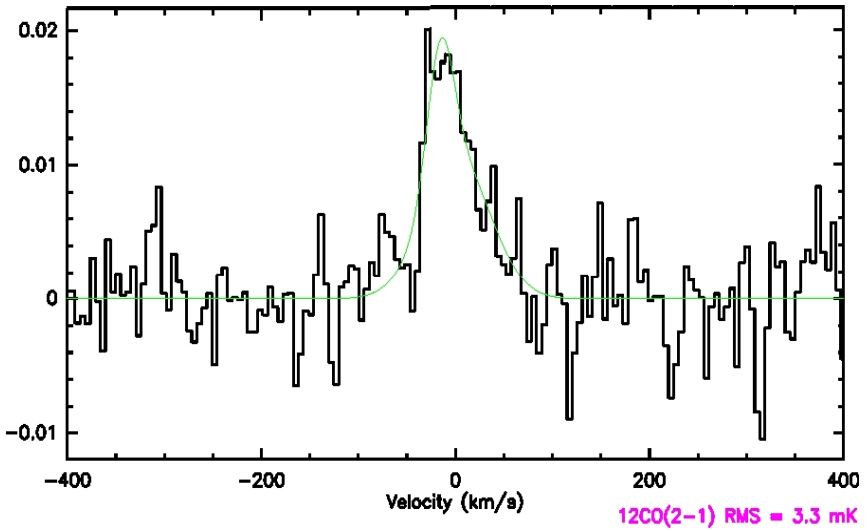


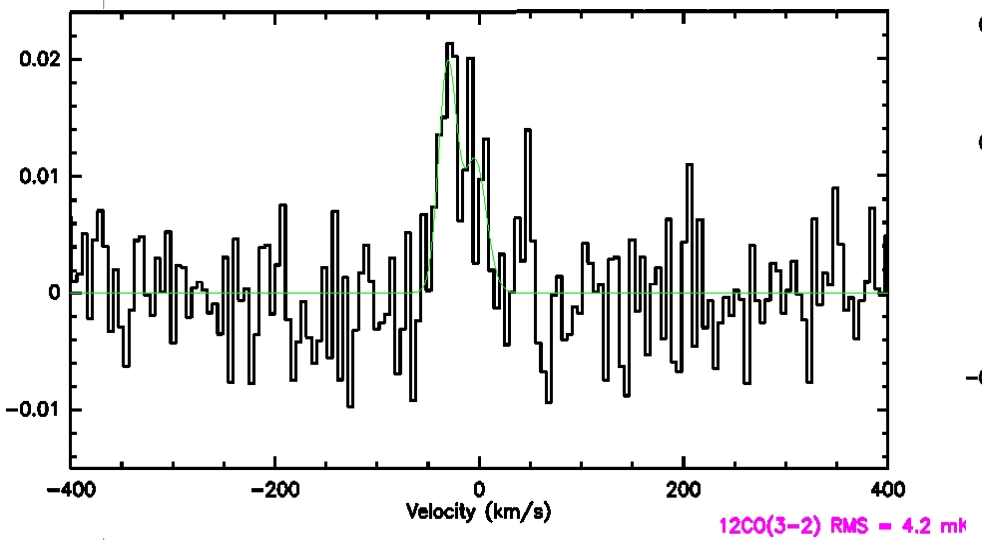


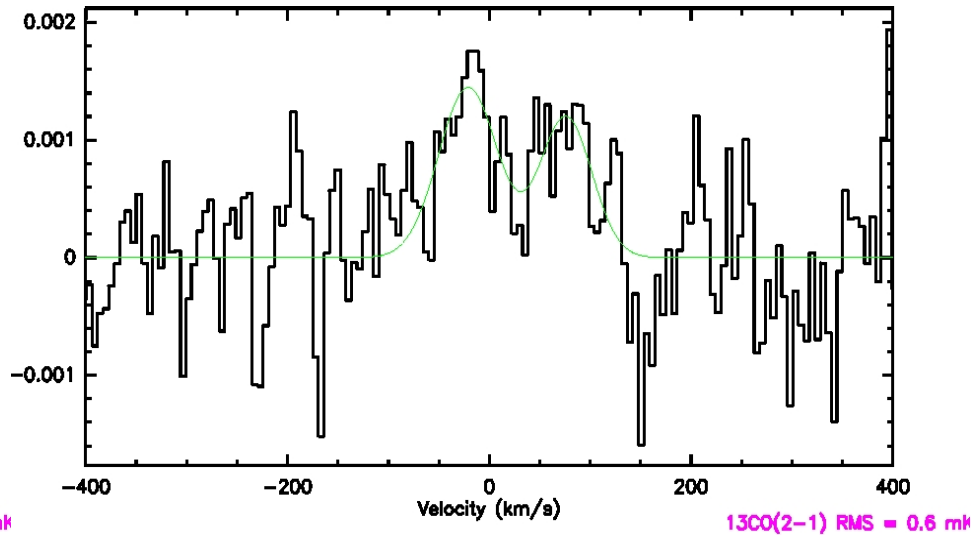
HII regions powered by SSCs containing ~4000 O4 stars (assuming 18.2 Mpc distance) (Hunter+ 1994a, de Grijs+ 2004): faintest of 6 clusters 3 x 30Doradus.

NGC 1140 CO detections

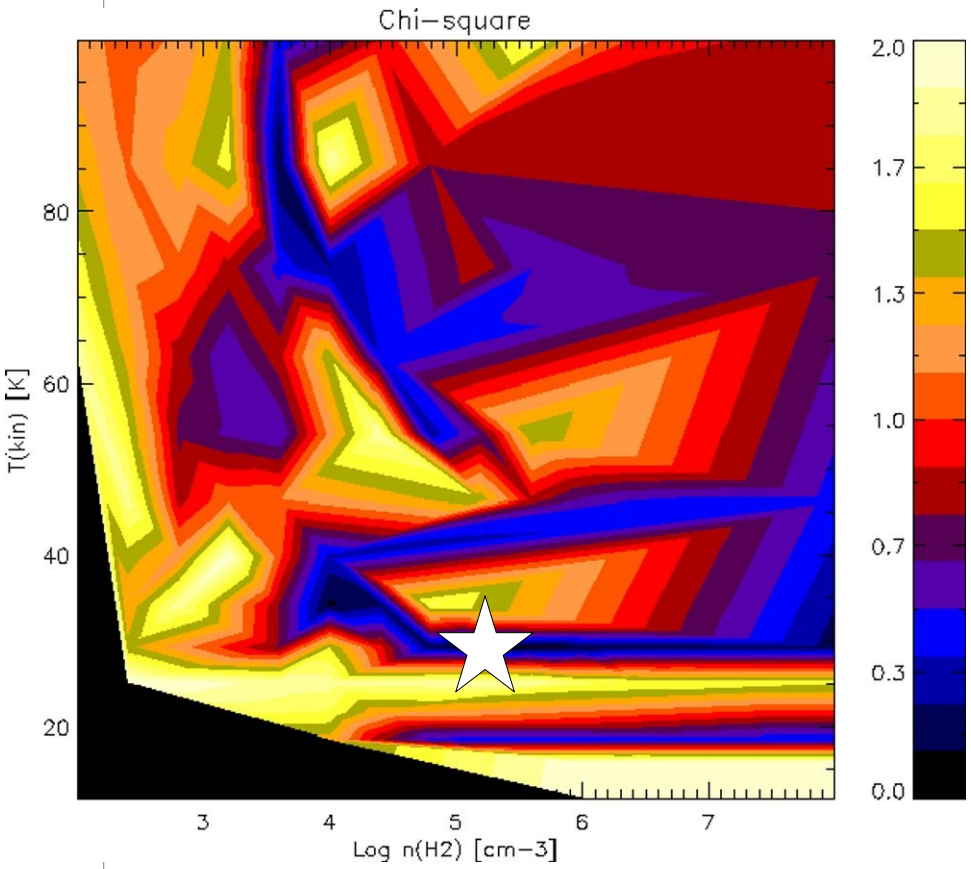








Physical conditions in NGC 1140 with Radex



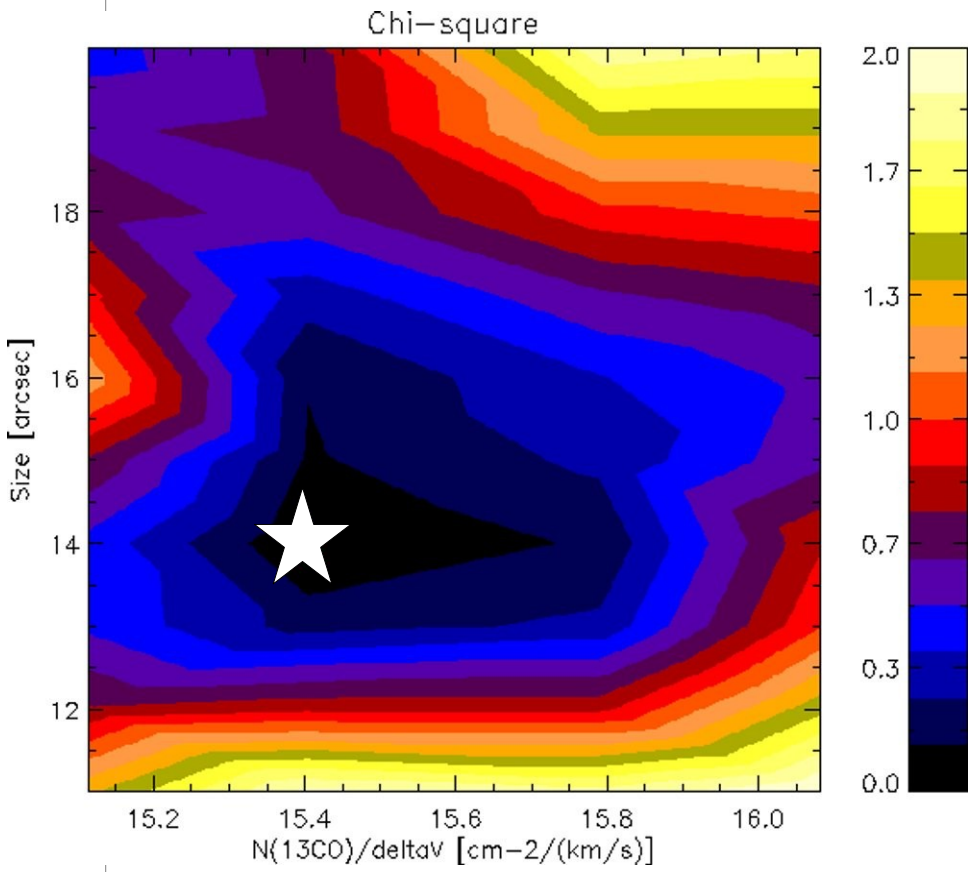
Using the 4 CO detections + ^{13}CO(1-0) UL, predict 4 line ratios with Radex grid with:

T_{kin} = 20 – 100K
N(CO) = 10^{15} – 10^{19} cm^{-2}
n(H_2) = 10^{3} – 10^{8} cm^{-3}
^{12}C/^{13}C = 25, 50, 100
Source size = 1 – 20 arcsec

Best fit gives

n(H_2) ~ $10^{5.2}$ cm^{-3},
T_{kin} ~ 29 K

Physical conditions in NGC 1140 with Radex, continued



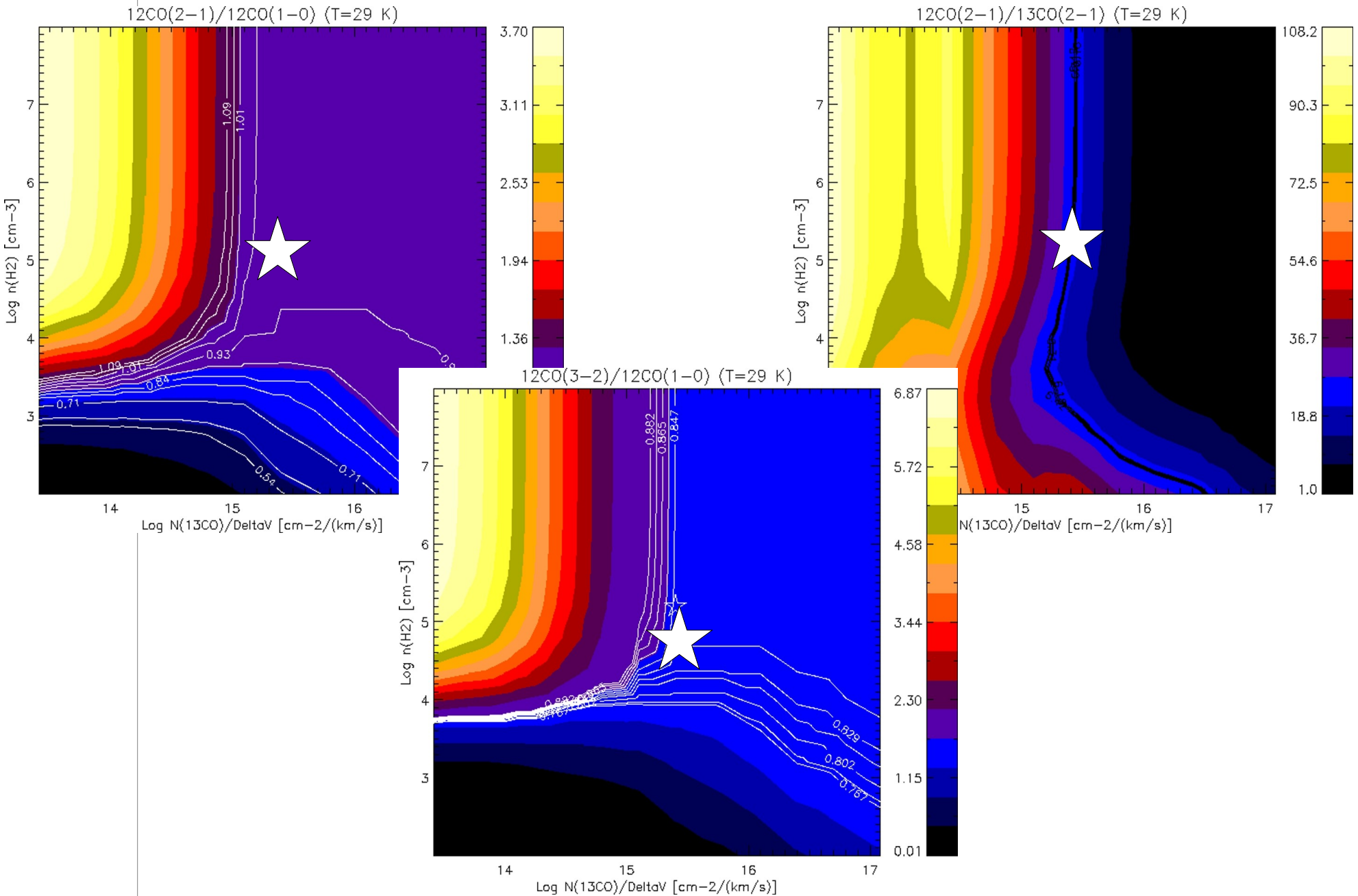
Using the 4 CO detections + ^{13}CO(1-0) UL, predict 4 line ratios with Radex grid with:

T_{kin} = 20 – 100K
N(CO) = 10^{15} – 10^{19} cm^{-2}
n(H_2) = 10^{3} – 10^{8} cm^{-3}
^{12}C/^{13}C = 25, 50, 100
Source size = 1 – 20 arcsec

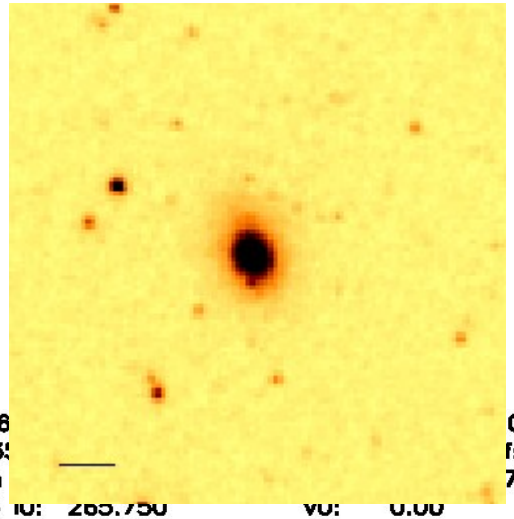
Best fit gives

Source size ~ 14 arcsec
N(^{12}CO) ~ 10^{19} cm^{-2},
assuming V=40 km s^{-1},
abundance 13C/12C = 100

Physical conditions in NGC 1140 with Radex, continued

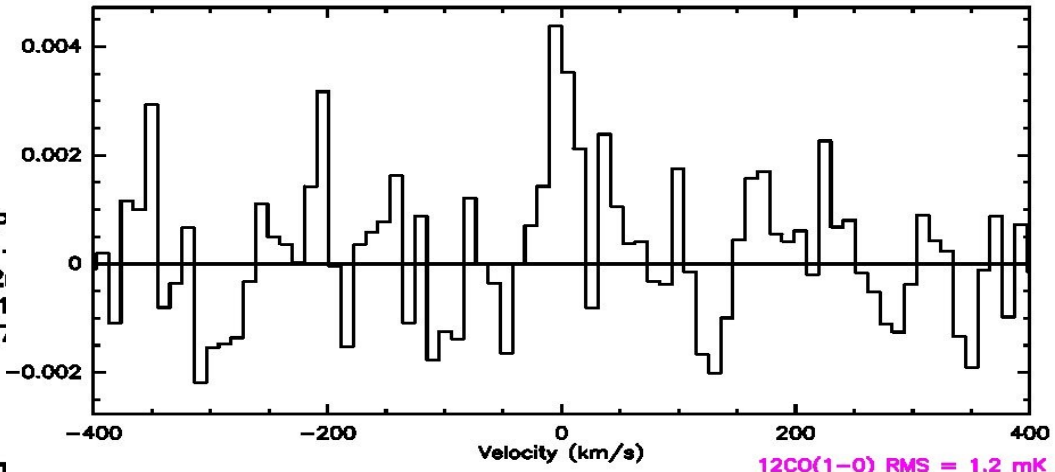


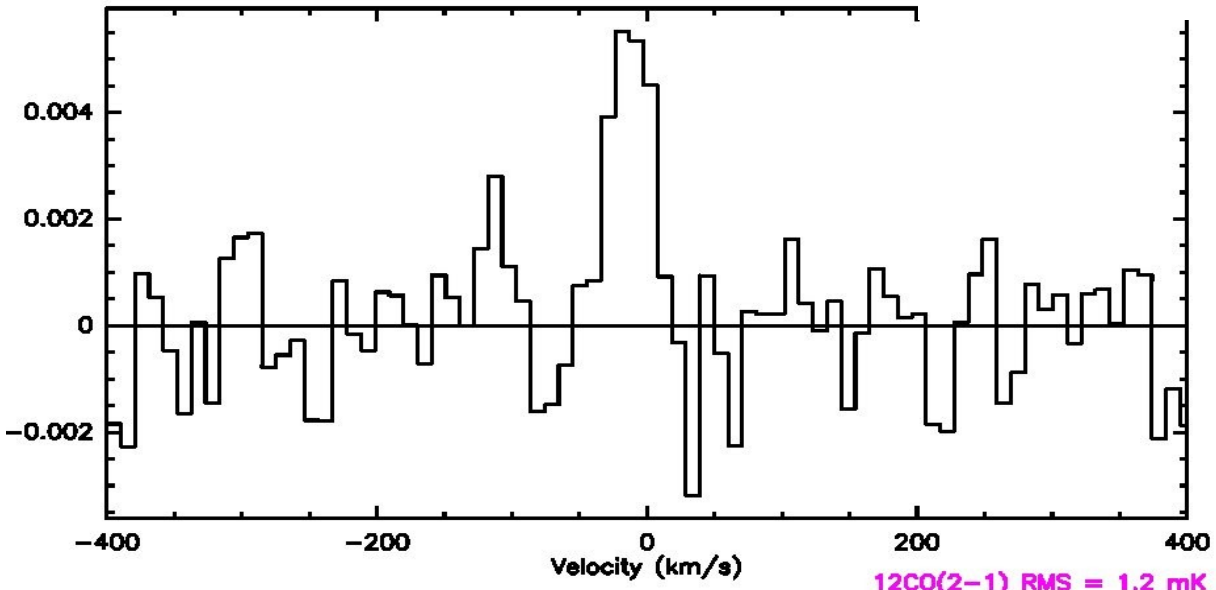
Equatorial BCD sample: Mrk996



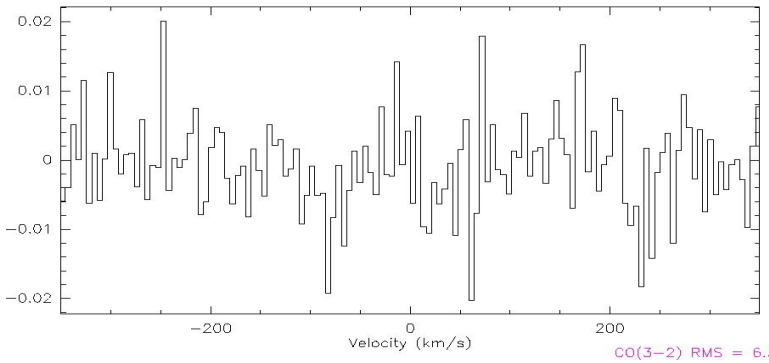
351; 1 MRK996 03-SEP
RA: 01:27:3 fs:
Unknown 73E+02
N: 464 I0: 265.750 V0: 0.00 Dv: 1
F0: 229297.501 Df: −8.000 Fi: 241

347; 1 MRK996 M996 CO10 30ME0VUO-W02 0:03-SEP-2010 R:03-SEP-2010
RA: 01:27:35.50 DEC: −06:19:36.0 Eq 2000.0 Offs: +0.0 +0.0
Unknown tau: 0.331 Tsys: 533. Time: 1.14E+03min El: 45.3
N: 1006 I0: 565.500 V0: 0.00 Dv: 10.46 Hel.
F0: 114650.940 Df: −4.000 Fi: 95789.8717

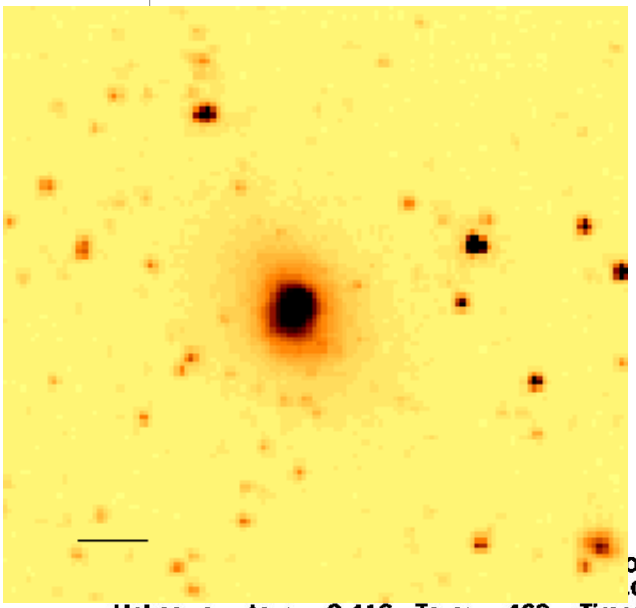




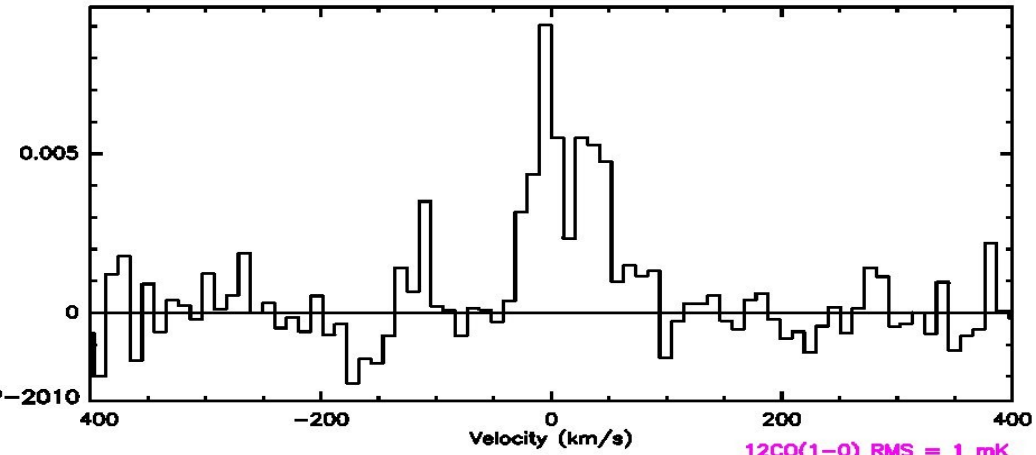
1; 3 MRK996 CO(3−2) AP−H301−F102 0:10−JUN−2010 R:05−SEP−2010
RA: 01:27:35.50 DEC: −06:19:36.0 Eq 2000.0 Offs: +0.2 −0.4
Unknown tau: 0.154 Tsys: 288. Time: 21. min El: 37.5
N: 245 I0: 426.353 V0: 1622. Dv: 5.320 LSR
F0: 343935.313 Df: −6.104 Fi: 335592.285



Equatorial BCD sample: Mrk 900 (NGC 7077)

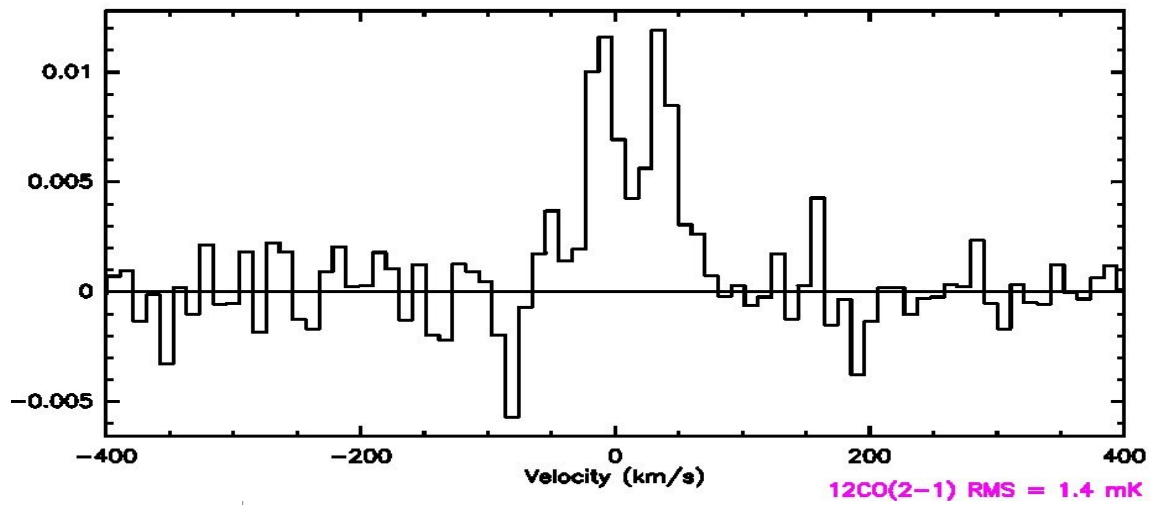


47; 1 MRK900 M900 CO10 30MEOVUO-W02 O:01-SEP-2010 R:01-SEP-2010
RA: 21:29:59.60 DEC: 02:24:51.0 Eq 2000.0 Offs: +0.0 +0.0
Unknown tau: 0.352 Tsys: 557. Time: 1.17E+03min El: 53.8
N: 1006 IO: 565.500 VO: 0.00 Dv: 10.44 Hel.
F0: 114829.911 Df: -4.000 Fi: 95970.3587

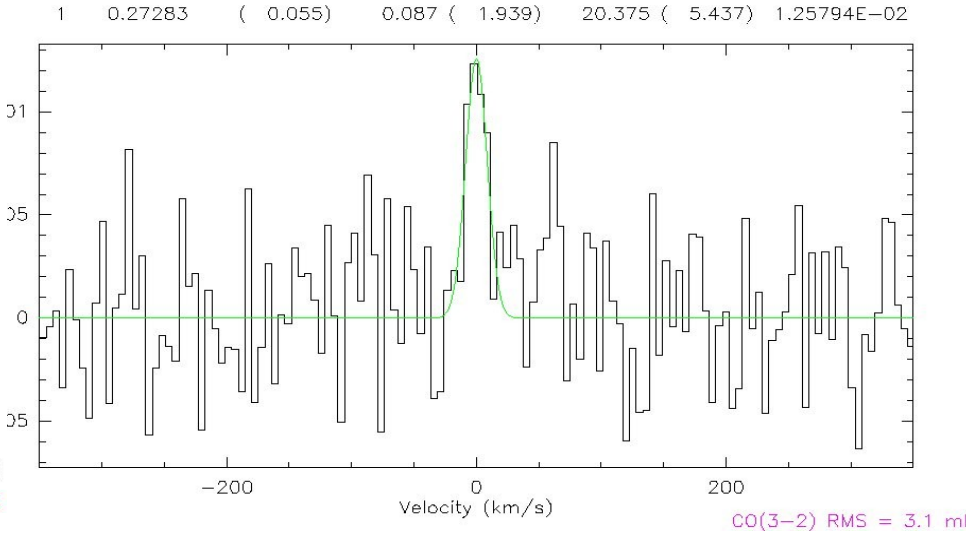


04 O:01-SEP-2010 R:01-SEP-2010
.0 Offs: +0.0 +0.0
Unknown tau: 0.416 Tsys: 460. Time: 5.85E+02min El: 53.8
N: 464 IO: 265.750 VO: 0.00 Dv: 10.44 Hel.
F0: 229655.434 Df: -8.000 Fi: 242155.137

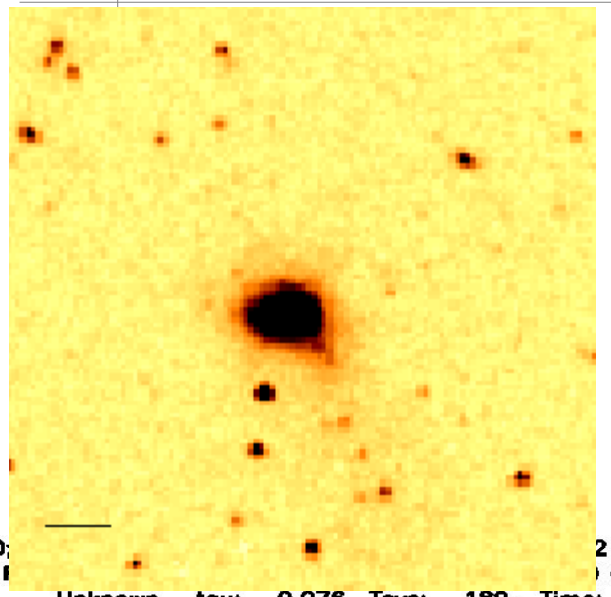
Unknown tau: 0.070 Tsys: 241. Time: 53. min El: 29.3
N: 163 IO: 298.257 VO: 1152. Dv: 5.312 LSR
F0: 344472.188 Df: -6.104 Fi: 335075.121



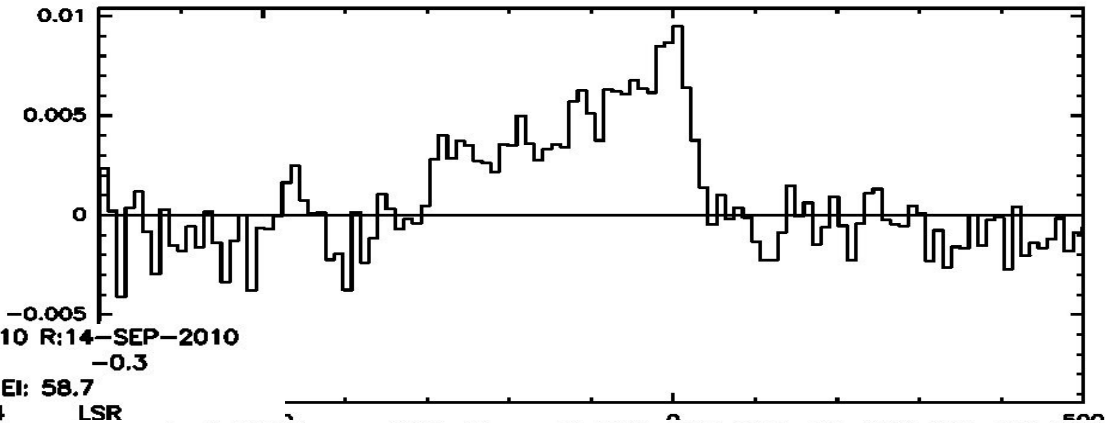
1 0.27283 (0.055) 0.087 (1.939) 20.375 (5.437) 1.25794E-02



Equatorial BCD sample: UM 448

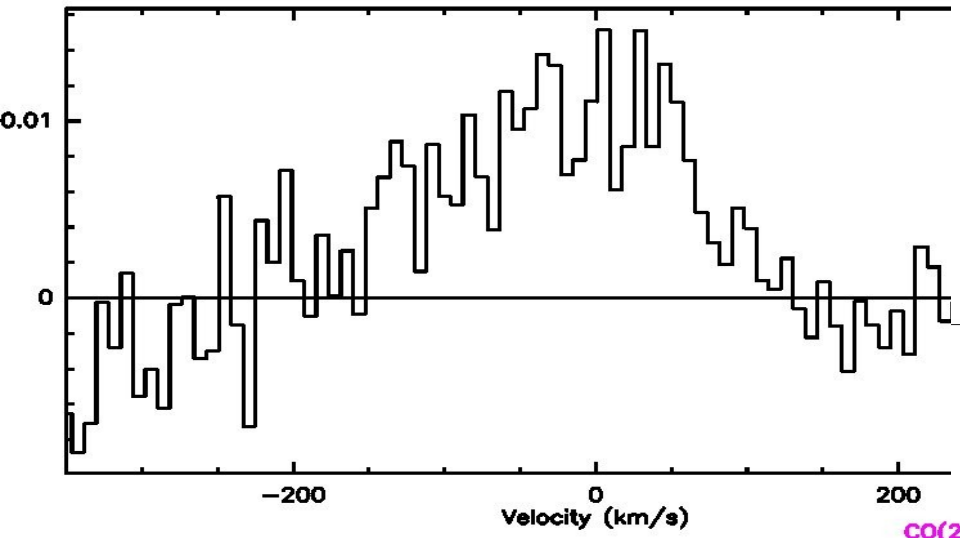


2827; 1 UM448 UM448 CO10 30MEOVUO-W02 O:06-SEP-2010 R:06-SEP-2010
RA: 11:42:12.40 DEC: 00:20:03.0 Eq 2000.0 Offs: +0.0 +0.0
Unknown tau: 0.207 Tsys: 388. Time: 9.05E+02min El: 49.9
N: 1006 IO: 565.500 V0: 0.00 Dv: 10.60 Hel.
F0: 113170.864 Df: -4.000 Fi: 94311.2329

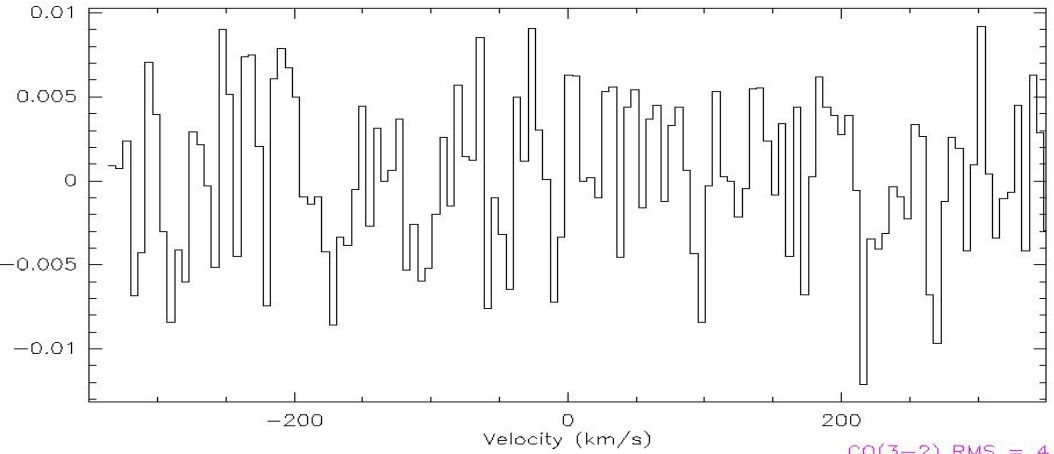


120; 2 O:03-APR-2010 R:14-SEP-2010
Offs: +0.1 −0.3
Unknown tau: 0.076 Tsys: 189. Time: 57. min El: 58.7
N: 163 IO: 757.599 V0: 5564. Dv: 8.084 LSR
F0: 226337.406 Df: −6.104 Fi: 222513.361

1; 3 UM448 CO(3-2) AP-H301-F102 O:09-JUN-2010 R:05-SEP-2010
RA: 11:42:12.40 DEC: 00:20:03.0 Eq 2000.0 Offs: −0.1 −0.4
Unknown tau: 0.109 Tsys: 248. Time: 33. min El: 45.4
N: 163 IO: 1095.21 V0: 5564. Dv: 5.390 LSR
F0: 339495.313 Df: −6.104 Fi: 339870.608

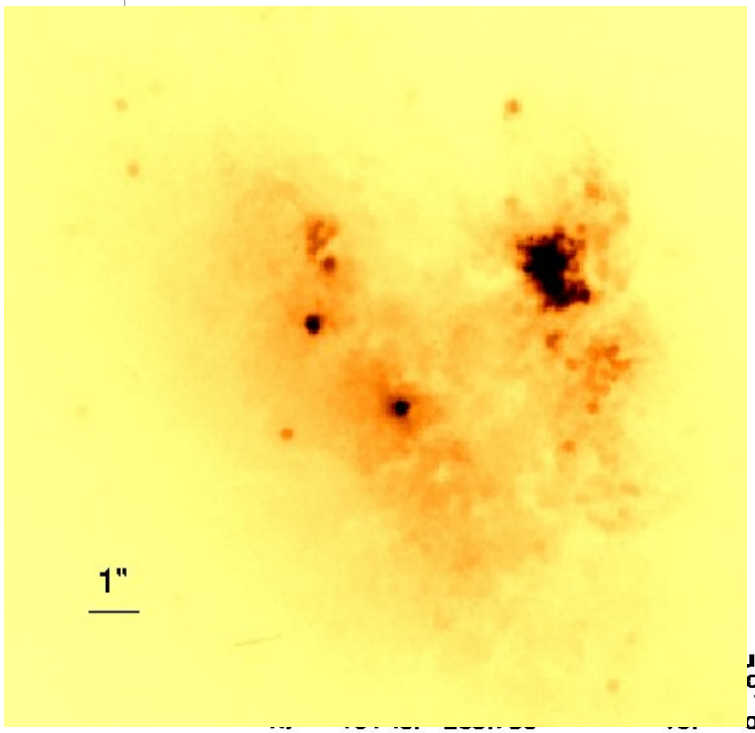


CO(2−1) RMS = 3.8 mK

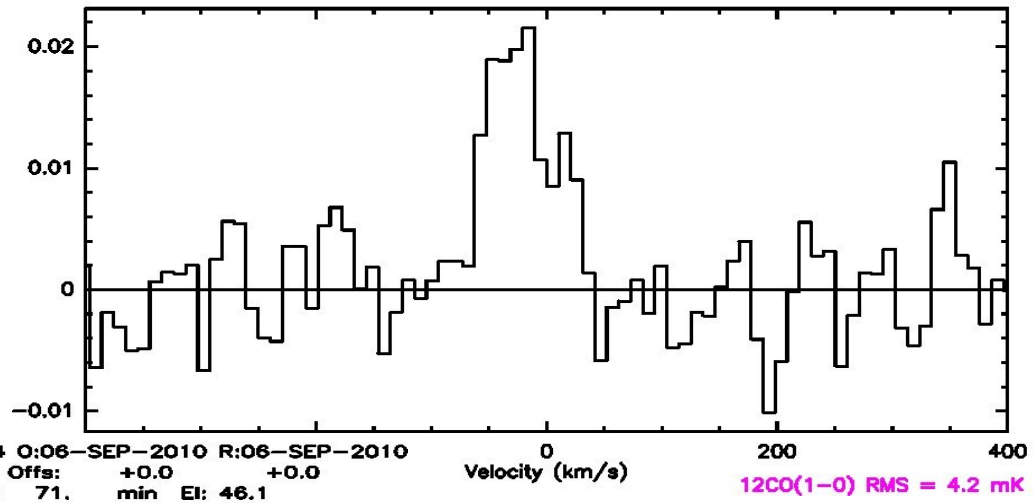


CO(3−2) RMS = 4.6 mK

Northern BCD sample: Haro 3



3; 2 HARO3 HARO3 CO10 30MEOVUO-W02 O:06-SEP-2010 R:14-SEP-2010
RA: 10:45:22.40 DEC: 55:57:37.0 Eq 2000.0 Offs: +0.0 +0.0
Unknown tau: 0.373 Tsys: 414. Time: 71. min El: 46.1
N: 929 I0: 531.500 V0: 0.00 Dv: 10.44 Hel.
F0: 114909.352 Df: -4.000 Fi: 96048.7231



J-W04 O:06-SEP-2010 R:06-SEP-2010
000.0 Offs: +0.0 +0.0
Time: 71. min El: 46.1
0.00 Dv: 10.44 Hel.
F0: 229814.315 Df: −8.000 Fi: 242314.732