Millimeter wave spectral line surveys and line mapping studies of NGC6334 I and I(N)

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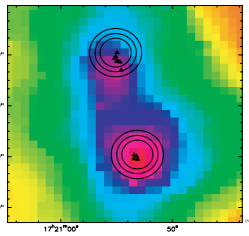
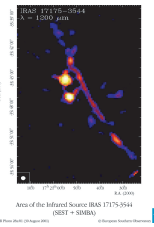
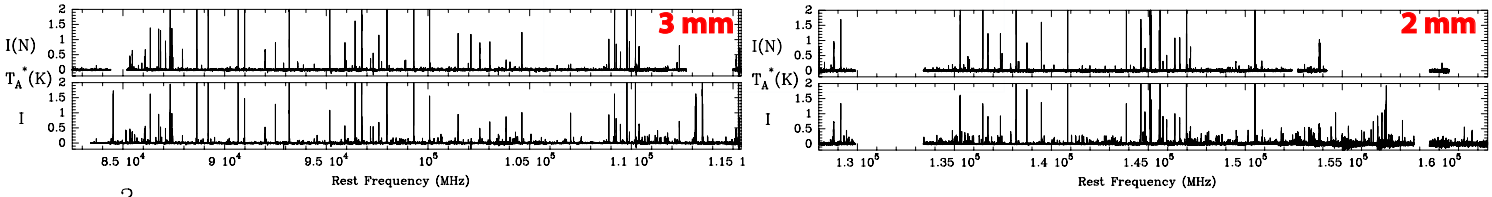
The core NGC 6334 I has shown to be extremely rich in molecular line emission with its multifaceted chemistry being driven by the young stellar cluster emerging from it. NGC 6334 I(N) presumably is a much younger object but has recently been found to contain at least one (proto)star (Megeath & Tieftrunk 1999, ApJ 526, L113). It is likely to be in the earliest stages of forming an entire cluster of stars (Hunter et al. 2006, ApJ 649, 888). To study the molecular composition of evolved vs. "embryonic" cores in detail, a comprehensive spectral line survey towards both sources has been performed employing the Swedish-ESO Submillimeter Telescope, SEST, covering the 83 to 115GHz, 130 to 160 GH, and 211 to 267 GHz bands.

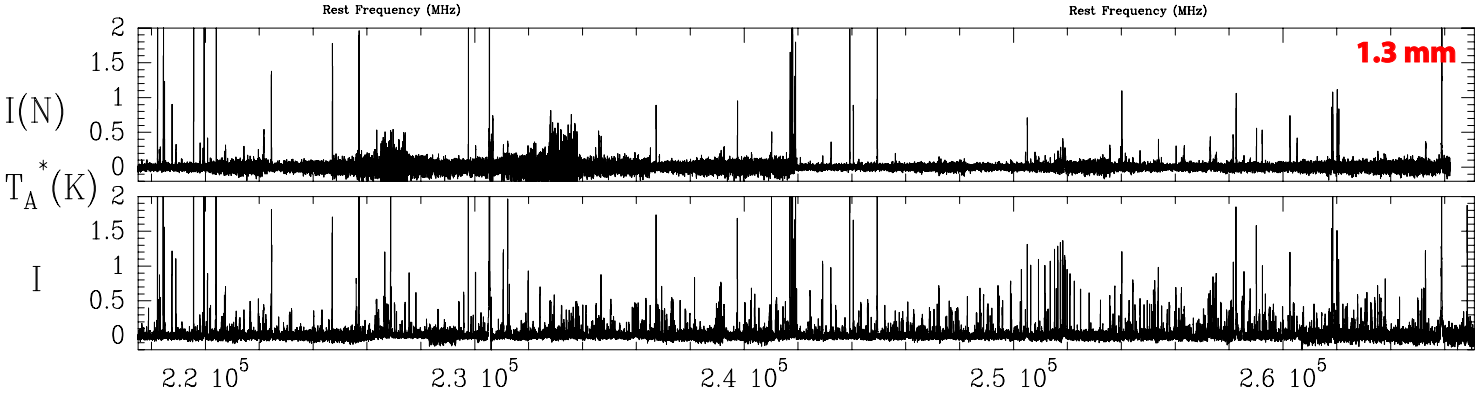


Mopra HCN(1-0) transition (color, this study)
SEST beam-sizes shown at the targeted positions.
Black triangles identify SMA continuum sources from Hunter et al. (2006).



Area of the Infrared Source IRAS 17175-3544 (SEST + SIMBA)





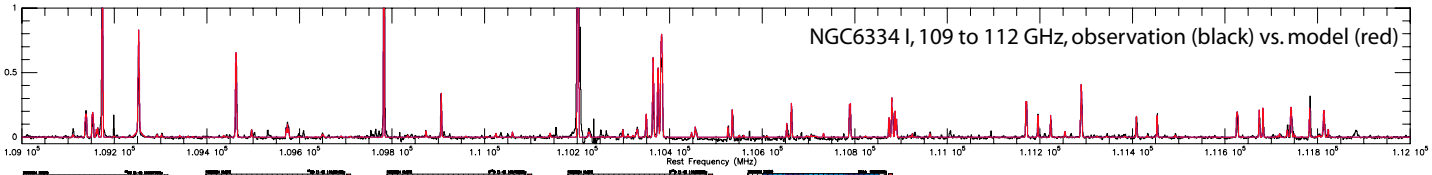
Analysis - Strategy:

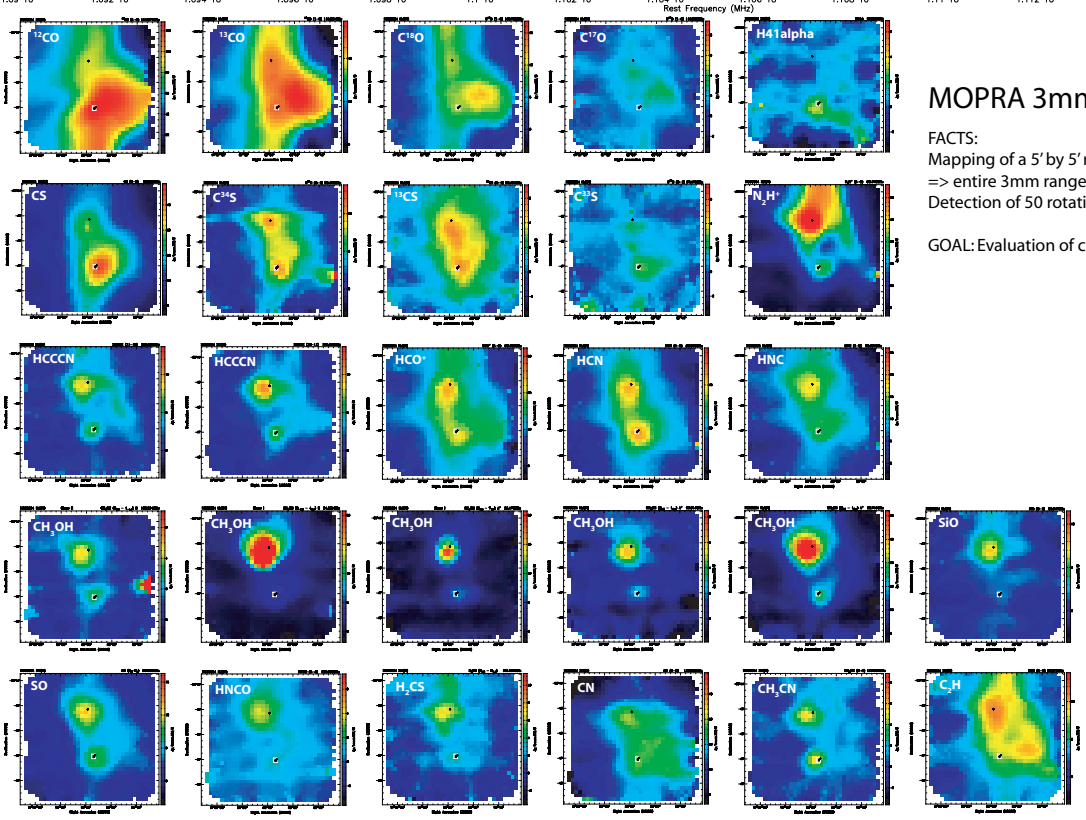
1) Iterative modeling of line emission
   XClass (CDMS, JPL)
   Parameters: Source size, T_{ex}, column density, line width and velocity
2) Comparison NGC6334 I vs. I(N)
3) Comparison against prototypical star-forming regions, e.g. SgrB2N and M (cf. Belloche et al.)
6) APEX, ATCA, SMA studies (ongoing)

Perspective: **HERSCHEL** and **ALMA** observations

Selected molecules detected in NGC6334 I :

2	3	4	5	6	7	8	9
CO	OCS	NH_2D	c-C_3H_2	CH_3OH	CH_3CCH	CH_3OCHO	C_2H_5OH
CS	HCO^+	HNCO	HC_3N	CH_3CN	HC_5N		CH_3OCH_3
SiO	HCN	H_2CS			CH_3CHO		C_2H_3CN
SO	C_2H	H_2CO					
CN	HCS^+						
	SO_2						
	HNC						
	N_2H^+						





MOPRA 3mm spectral line mapping

FACTS:
Mapping of a 5' by 5' region, 8 GHz frequency bandwidth per setup
=> entire 3mm range doable in just five setups
Detection of 50 rotational transitions from 19 different species

GOAL: Evaluation of chemical and excitation conditions