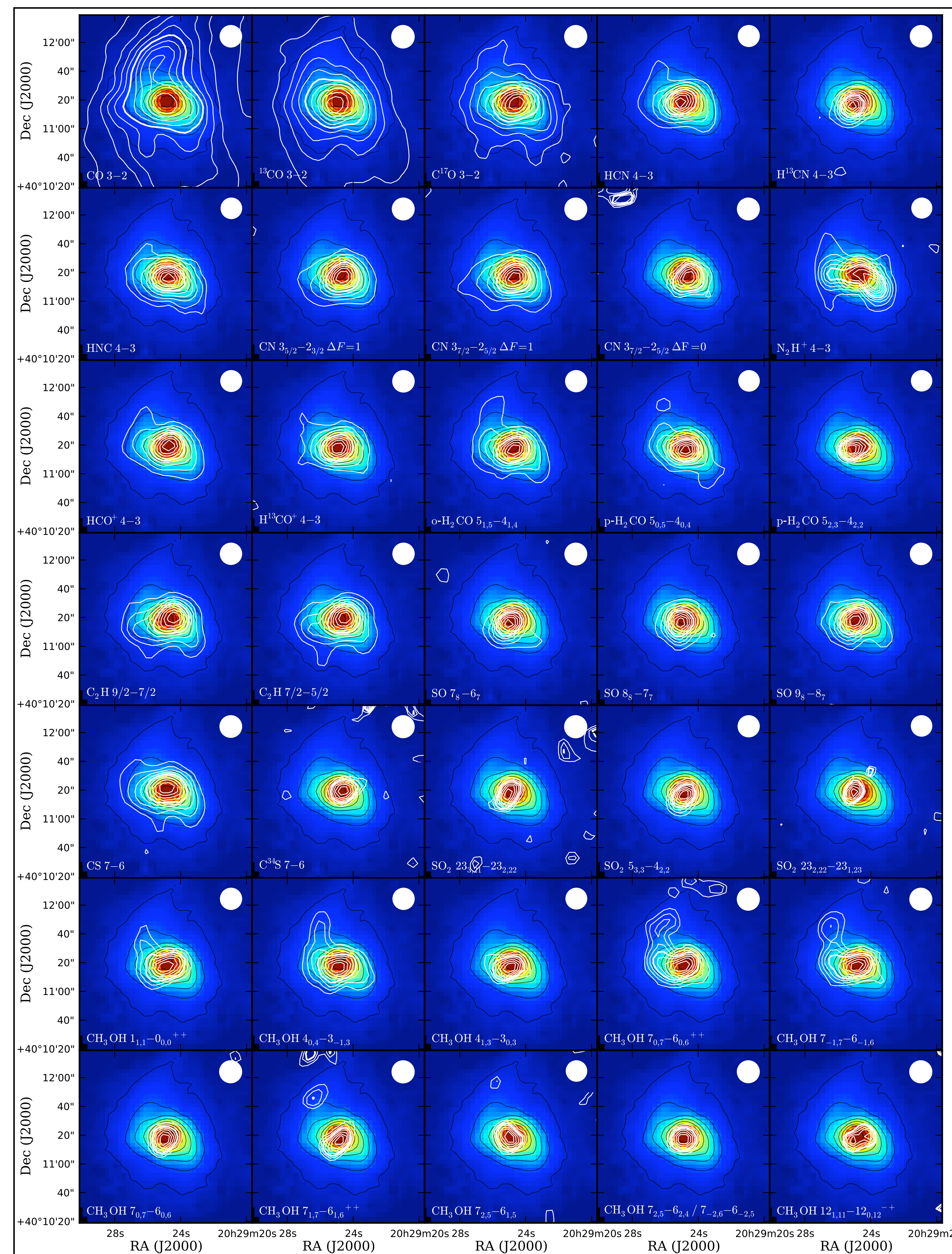


Physical structure of the molecular envelope of the high-mass star-forming region AFGL2591

Matthijs van der Wiel*, Floris van der Tak, Marco Spaans

(Kapteyn Astronomical Institute/SRON Netherlands Institute for Space Research, Groningen, NL)

& JCMT Spectral Legacy Survey team & Herschel/CHESSE KP team



- colorscale background: 850 micron continuum
- white contours: integrated line intensity per molecular transition

Herschel/HIFI

- unbiased spectral survey 490-1200 GHz in Herschel/HIFI 'CHESSE' Key Program
- data processing in progress..

goals using spectral lines already identified

- higher-J transitions of CO, ^{13}CO , C^{17}O , C^{18}O , HCO^+ , HCN, HNC, CS, H_2CO , SO \rightarrow probe high-temperature conditions
- simple molecules only seen at high frequencies, e.g. H_2O , HCl, CH, NO, C, C^+ \rightarrow constrain chemical balance

• overview figure showing substructure in AFGL2591's envelope at various scales

JCMT Spectral Legacy Survey

Spectral imaging survey of five objects, using HARP-B instrument at 15-m James Clerk Maxwell Telescope:

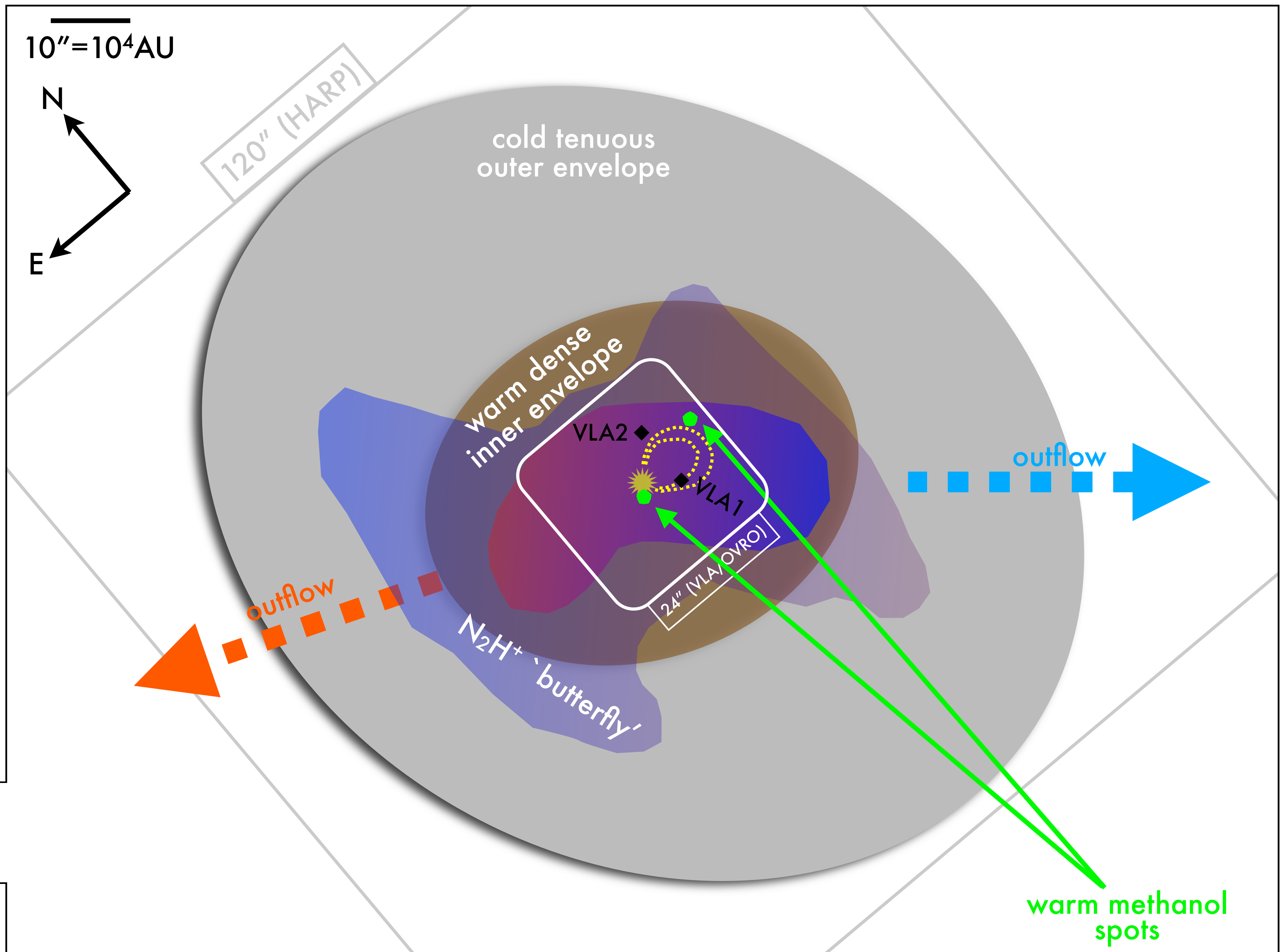
1. Orion Bar: photo-dissociation region
 2. NGC1333 IRAS4: low-mass star-forming region
 3. IRAS20126: intermediate-mass star-forming core
 4. AFGL2591: high-mass star-forming region
 5. W49: active star-forming region/starburst analog
- spectral coverage: 330-373 GHz (mainly >360 GHz for IRAS20126)
 - spectral resolution: 0.8 km/s
 - instantaneous mapping: 2x2 arcminute fields
 - one unbiased survey: spatial & spectral information, many molecular lines
 - in AFGL2591: 35 molecular transitions with extent beyond beam size

details AFGL2591

- relatively isolated core forming a $16 M_{\text{sun}}$ star
- distance ± 1 kpc: JCMT traces 10^4 – 10^5 AU scales
- spatial resolution: 15000 AU

results

- anisotropic morphology of molecular envelope
- large-scale envelope tilted w.r.t. small-scale envelope
- warm ($E_{\text{up}}=200\text{K}$) CH_3OH : two separate peaks
- spherical envelope model is too optically thick:
 - is the envelope flattened?
 - does it have outflow cavities?
 - is the envelope clumpy?



*) contact: wiel@astro.rug.nl