

An aerial photograph of a mountain range. The foreground shows a valley with a network of roads and some small structures. The middle ground features a large, rounded mountain peak. The background shows more distant mountain ranges under a clear blue sky with some light clouds. The overall scene is bright and clear.

Cores, Envelopes, and Disks Studied with the Submillimeter Array (SMA)

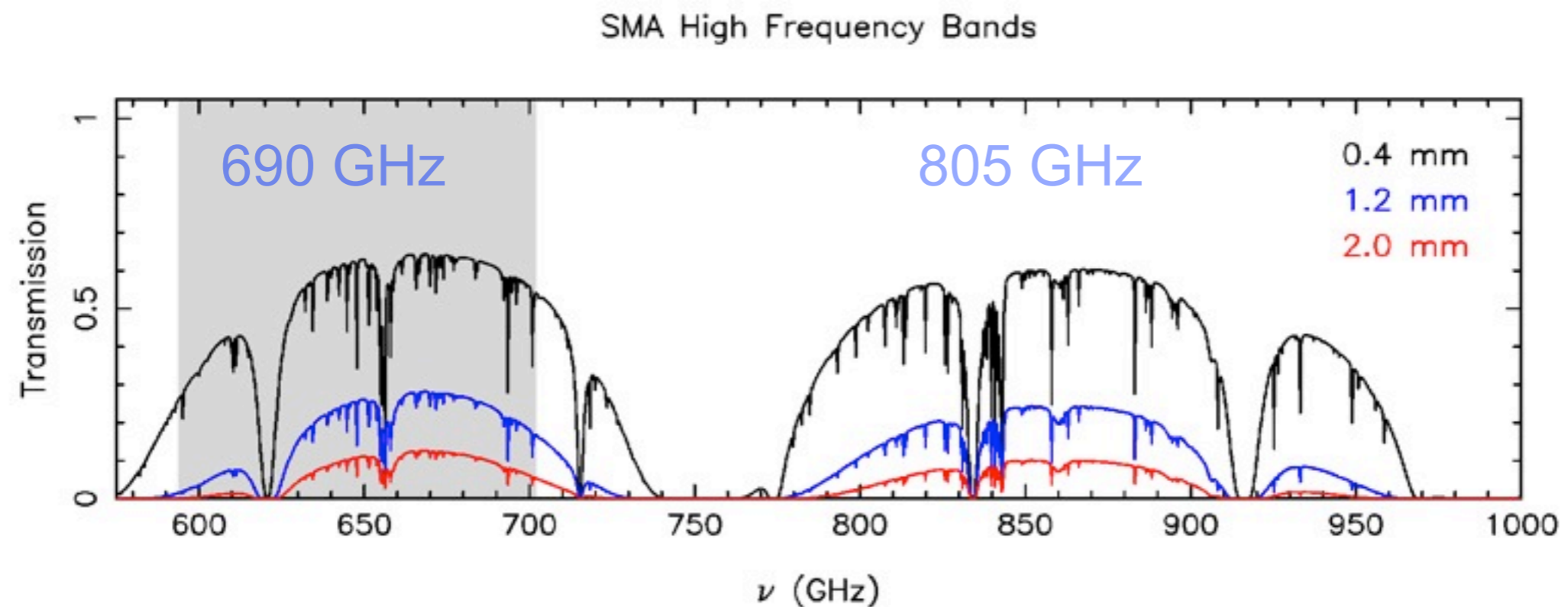
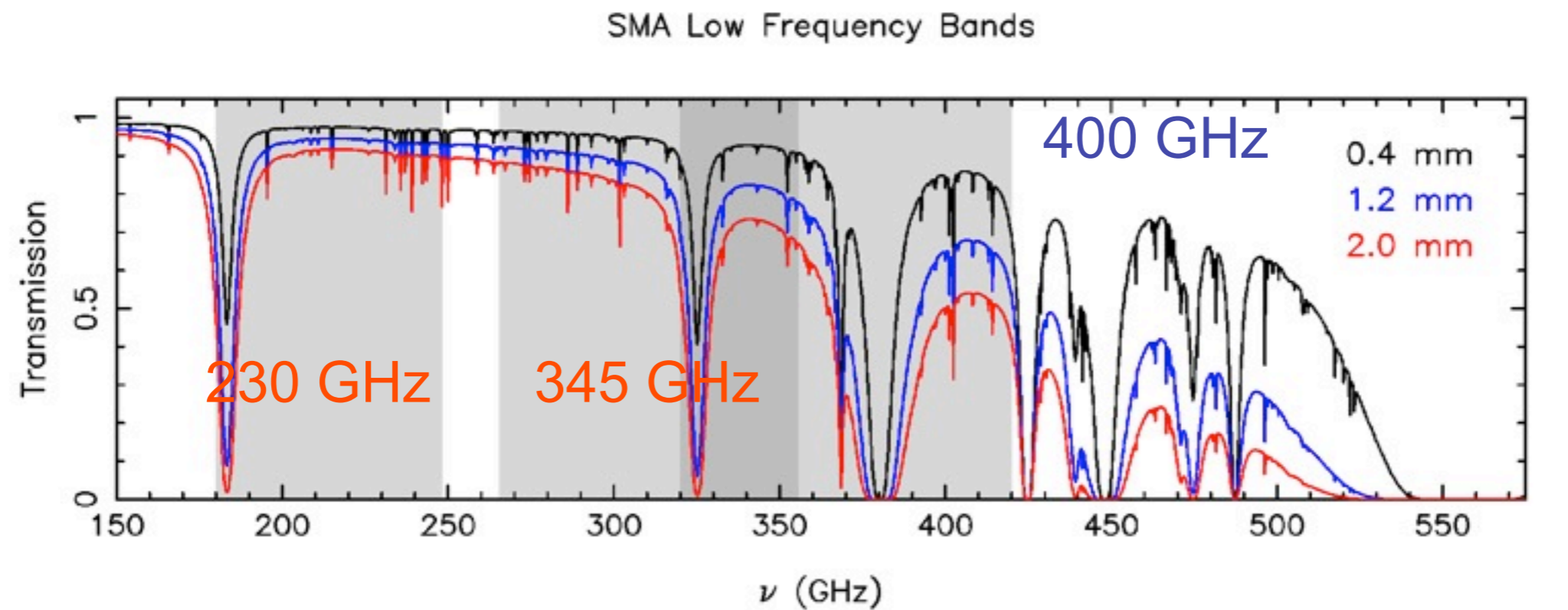
Naomi Hirano (ASIAA, Taiwan)



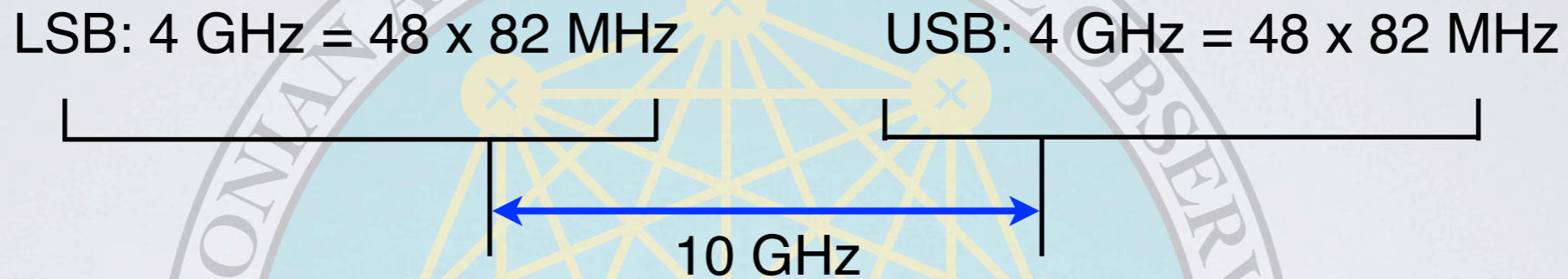
Since 2003



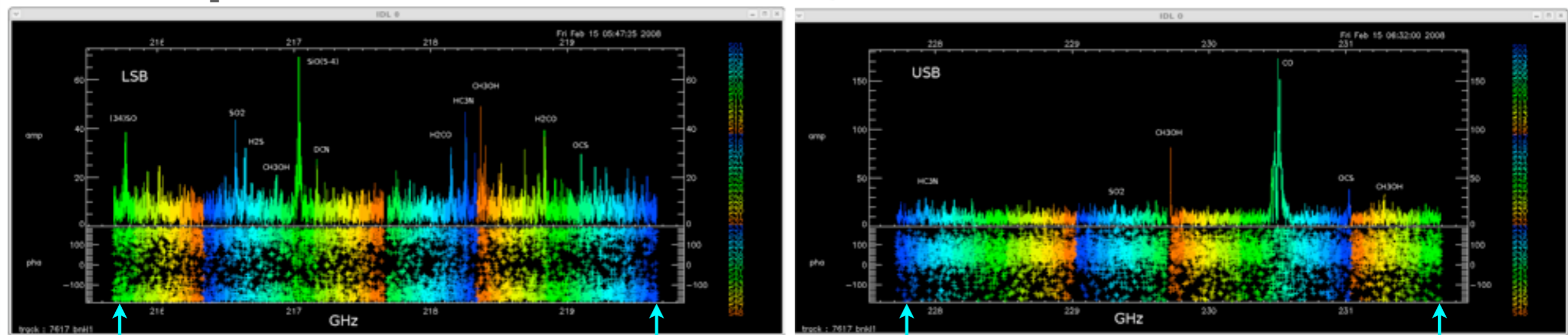
Receiver Bands/Atmosphere



The Capability of wide bandwidth



The spectra from Orion KL



215.7 GHz

219.7 GHz

227.7 GHz

231.7 GHz

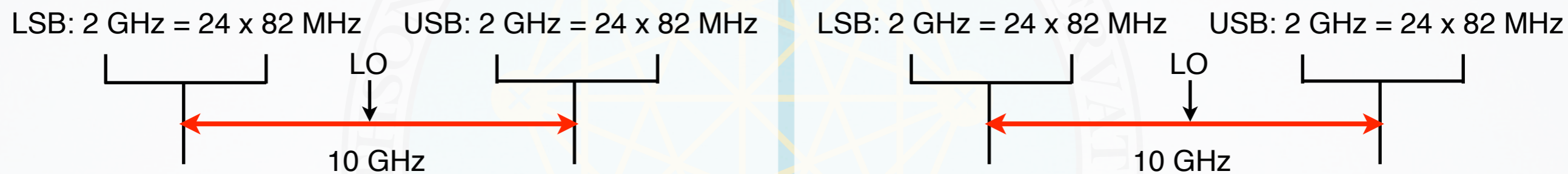
4 GHz + 4 GHz can be observed at the same time.

Dual band mode

2 receivers, 2 GHz (each) mode

low freq. receiver

high freq. receiver



Rx230 or Rx345 & Rx400 (Rx690)

ex.

CO 3-2 & SiO 8-7 in Rx 345 + CO 3-2 & SiO 8-7 in Rx400

CO 2-1 in Rx230 + CO 3-2 in Rx400

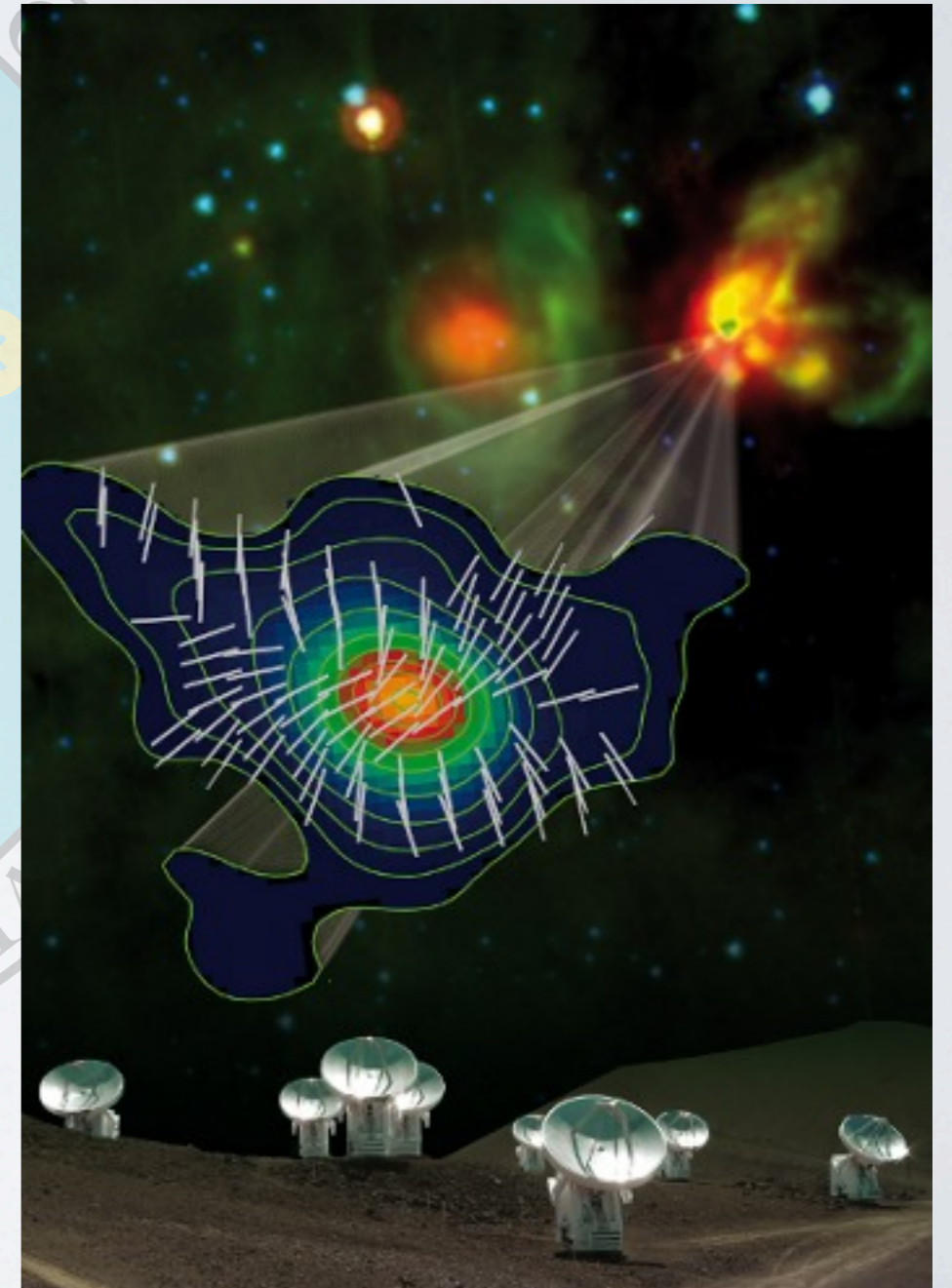
Polarization mode

Continuum & lines

Dual receiver (Rx 345 + Rx 400) mode @ 330–355 GHz is now available!!

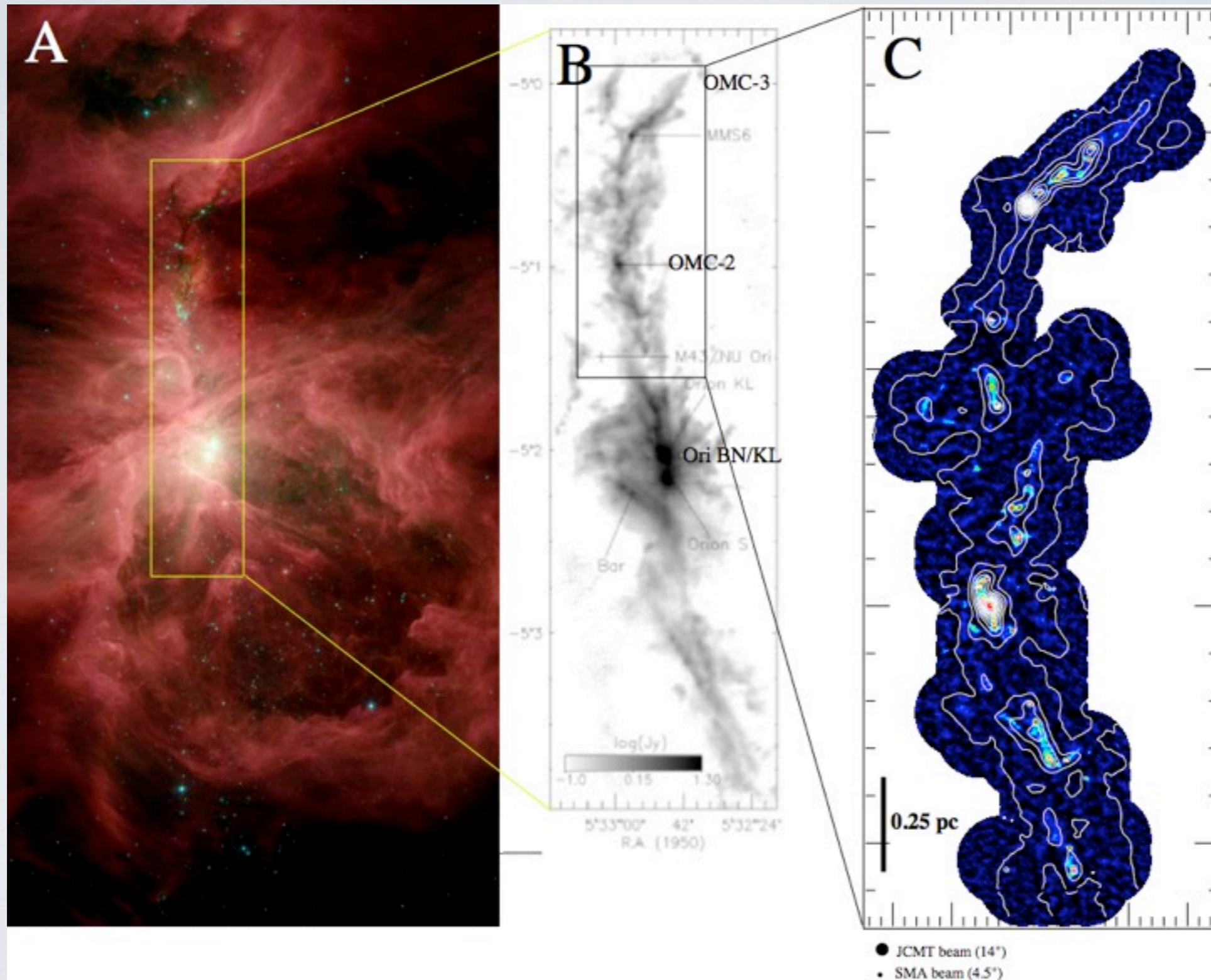
**using quarter-wave plates
230/(690), 342, 240/400 GHz**

870 μm dust continuum emission
from the massive star forming
region G31.41

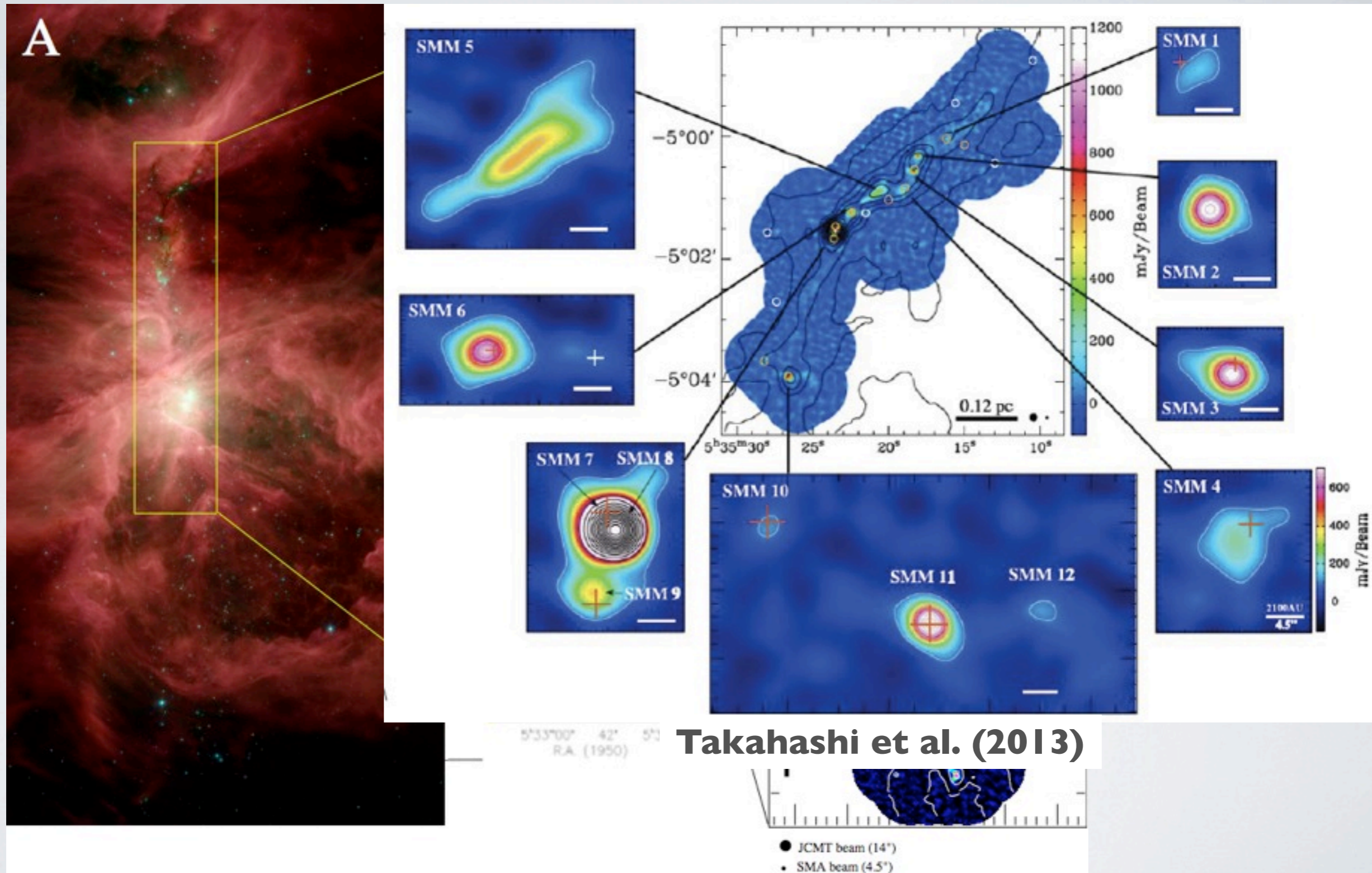


Josep Miquel Girart (CSIC-IEEC), Nimesh Patel (Harvard-Smithsonian Center for Astrophysics) and Manel Carrillo

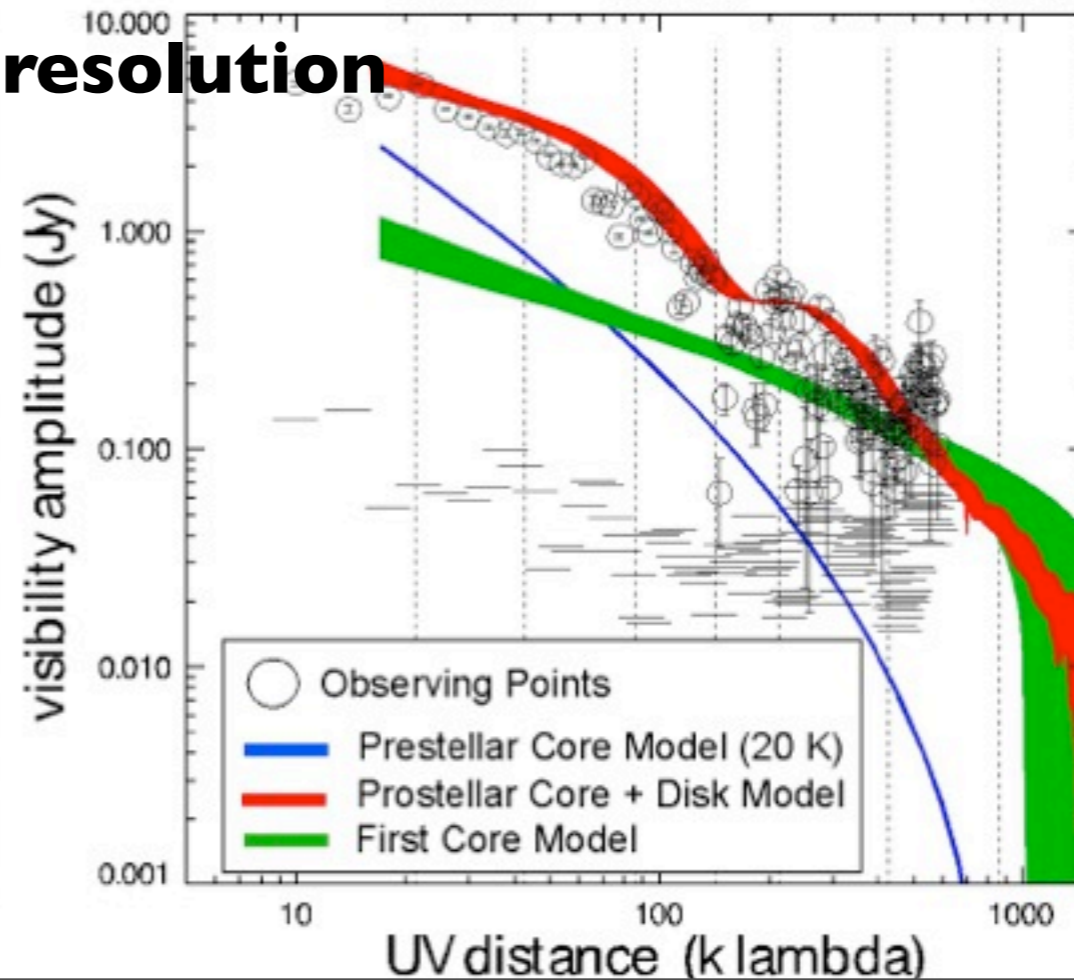
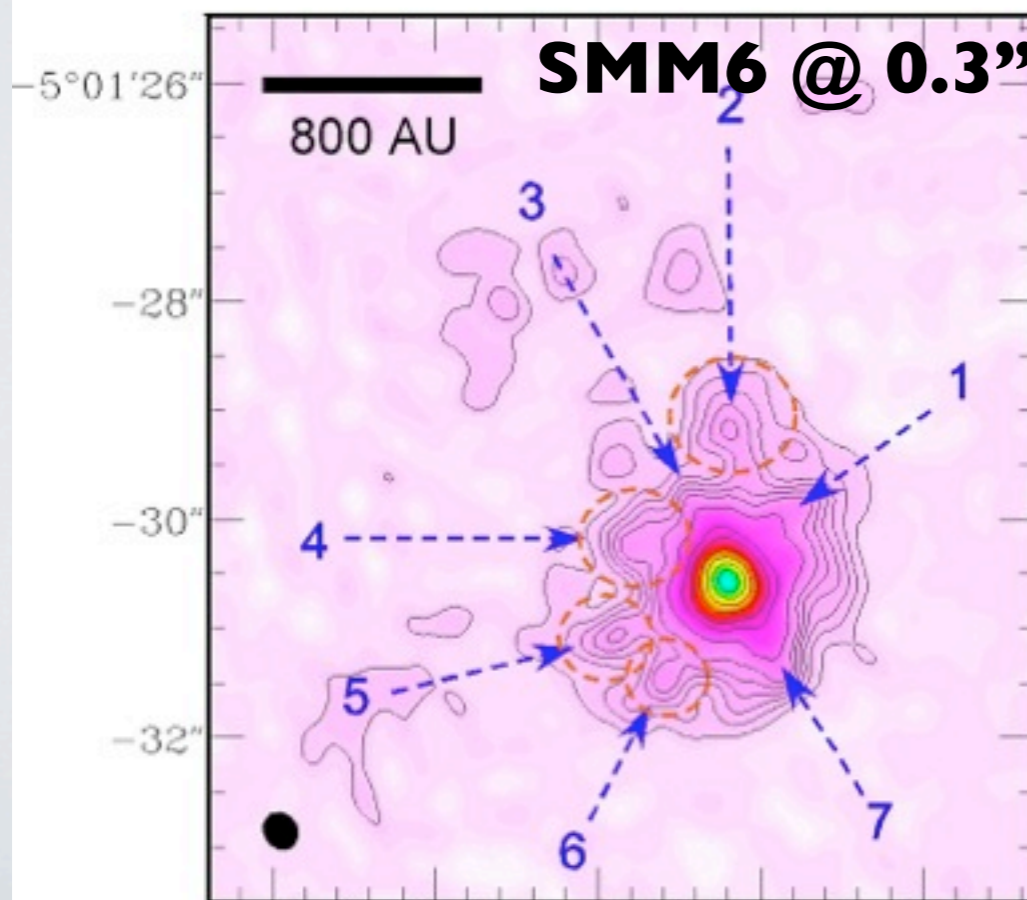
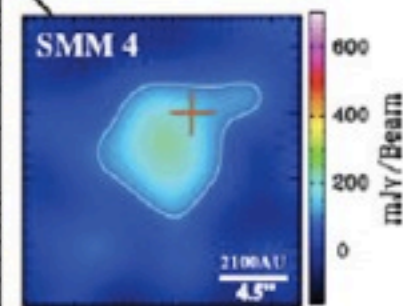
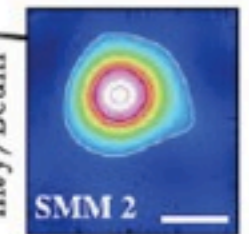
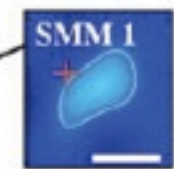
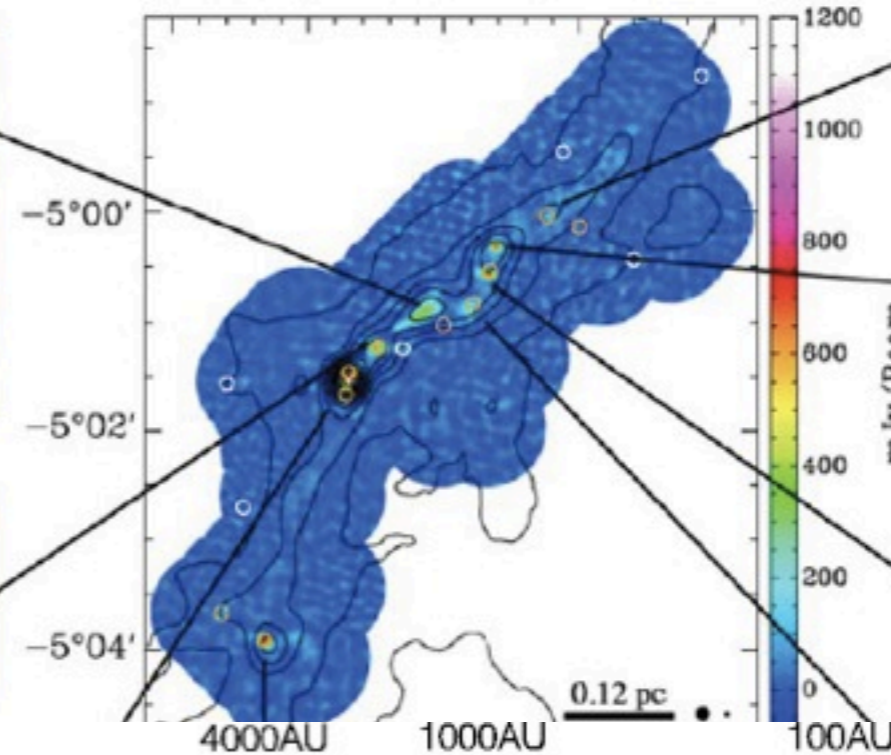
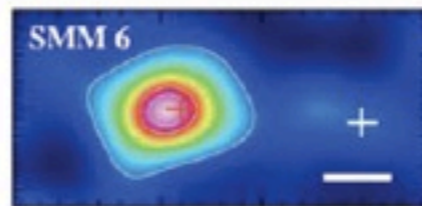
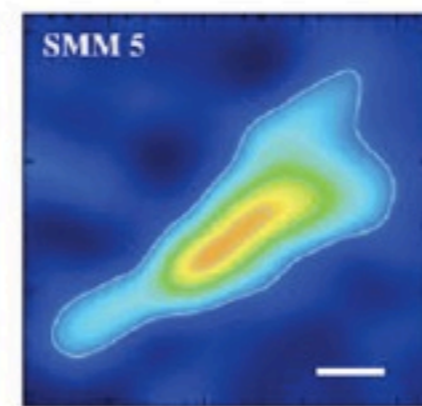
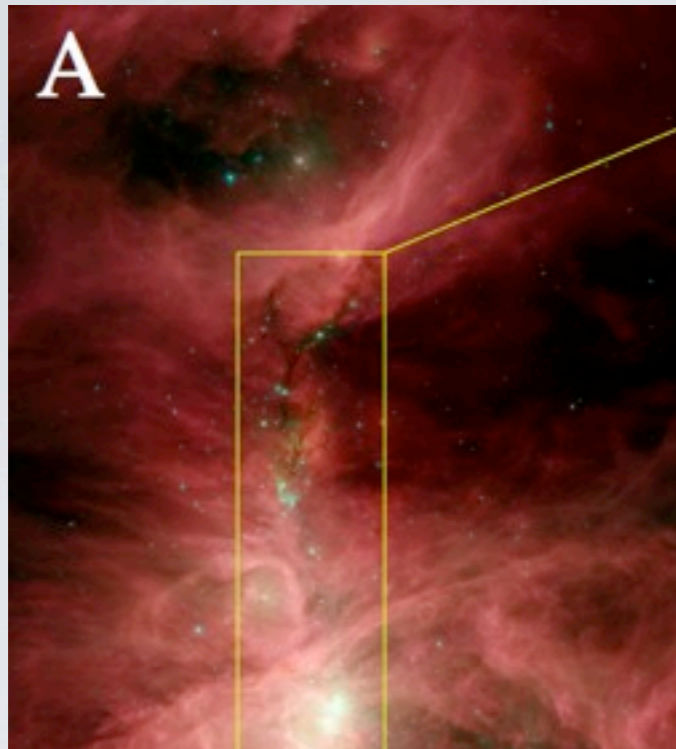
Cores in Orion Molecular cloud



Cores in Orion Molecular cloud

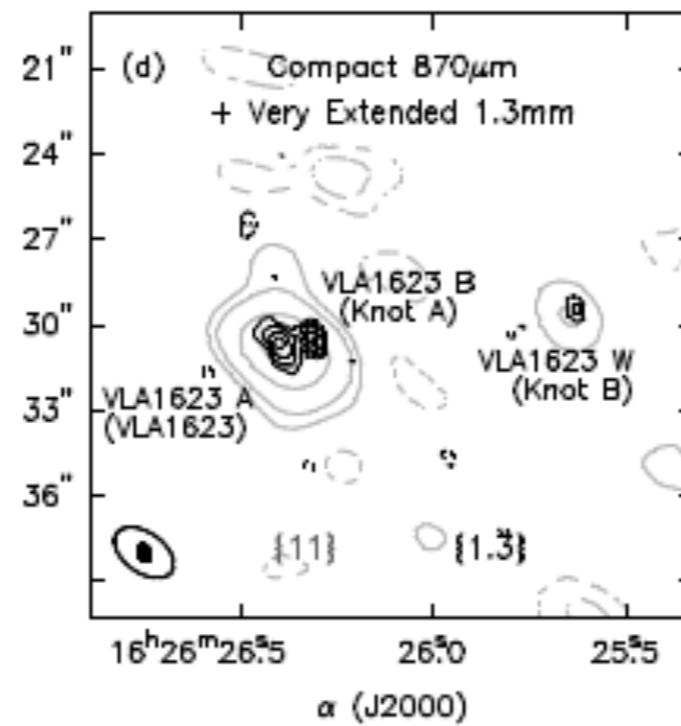
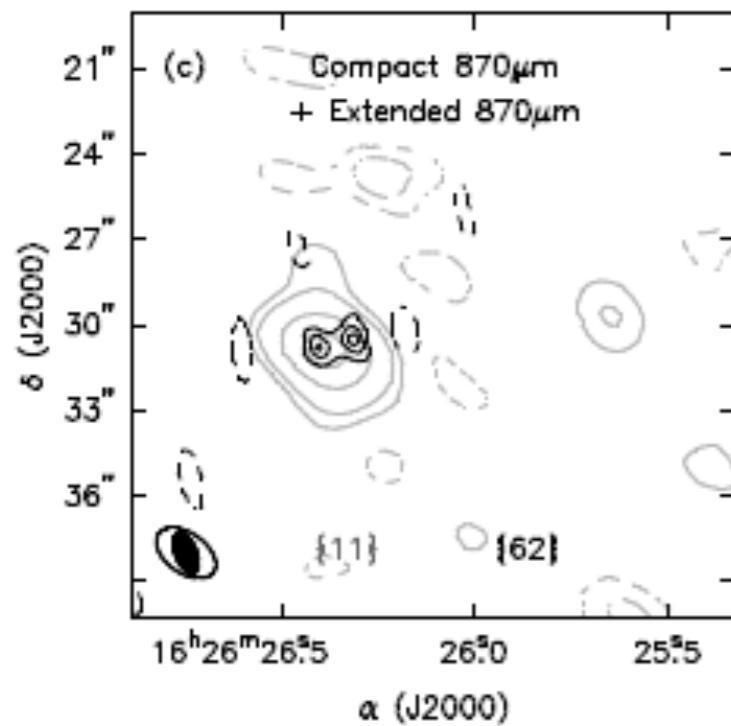
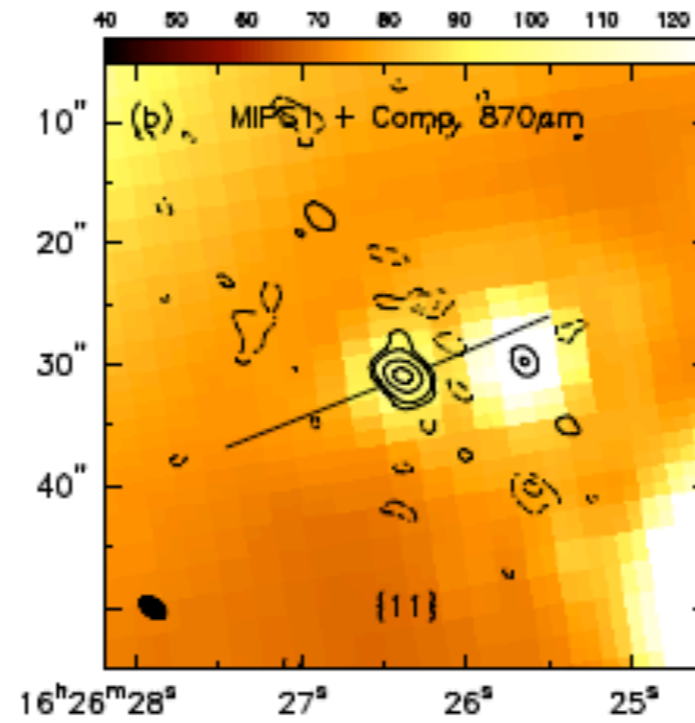
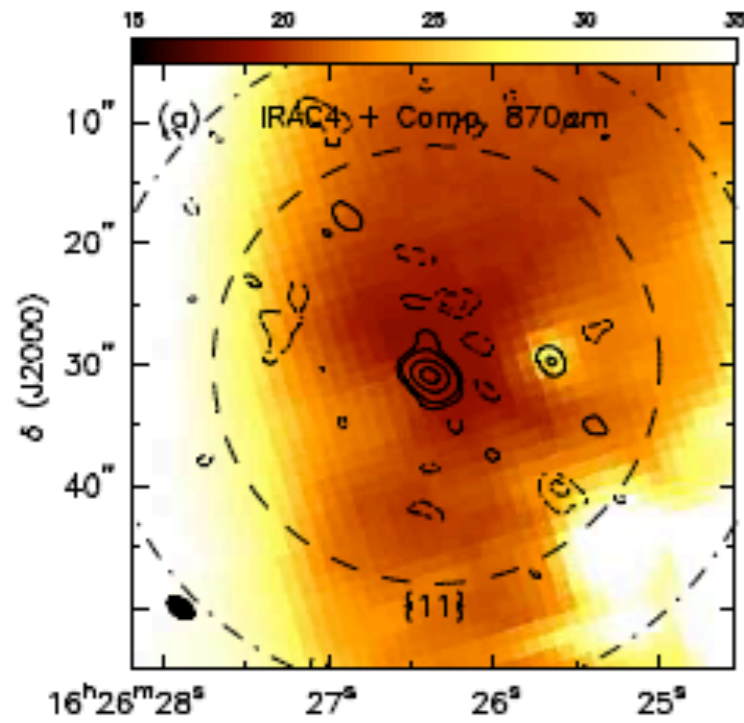


Cores in Orion Molecular cloud



Takahashi et al. (2012)

VLA1623A, B, & W – Multiple YSOs

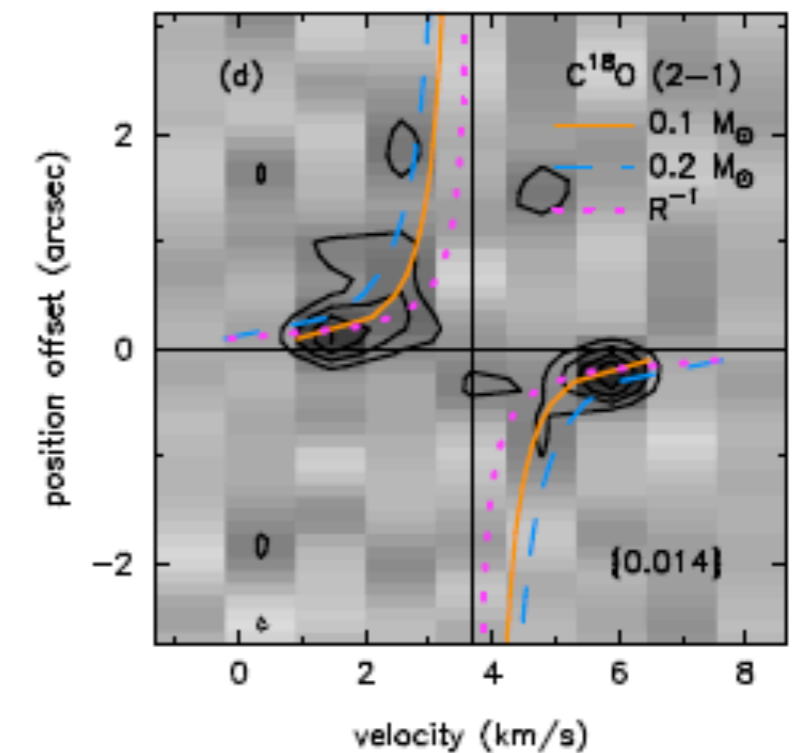
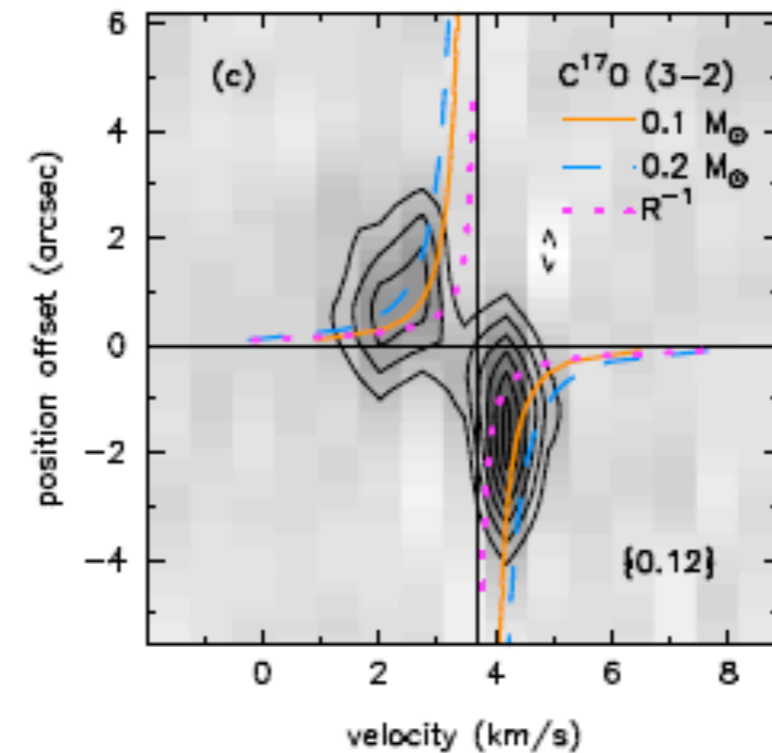
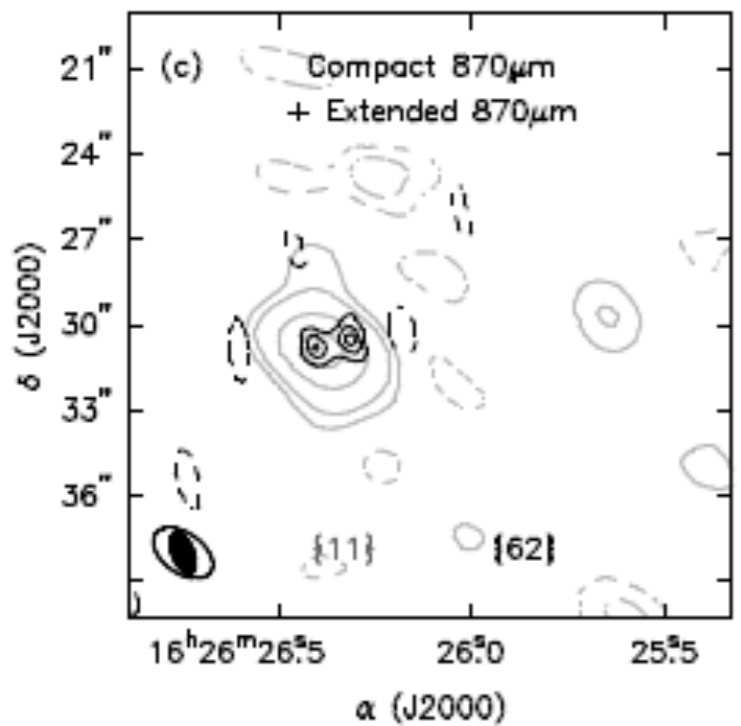
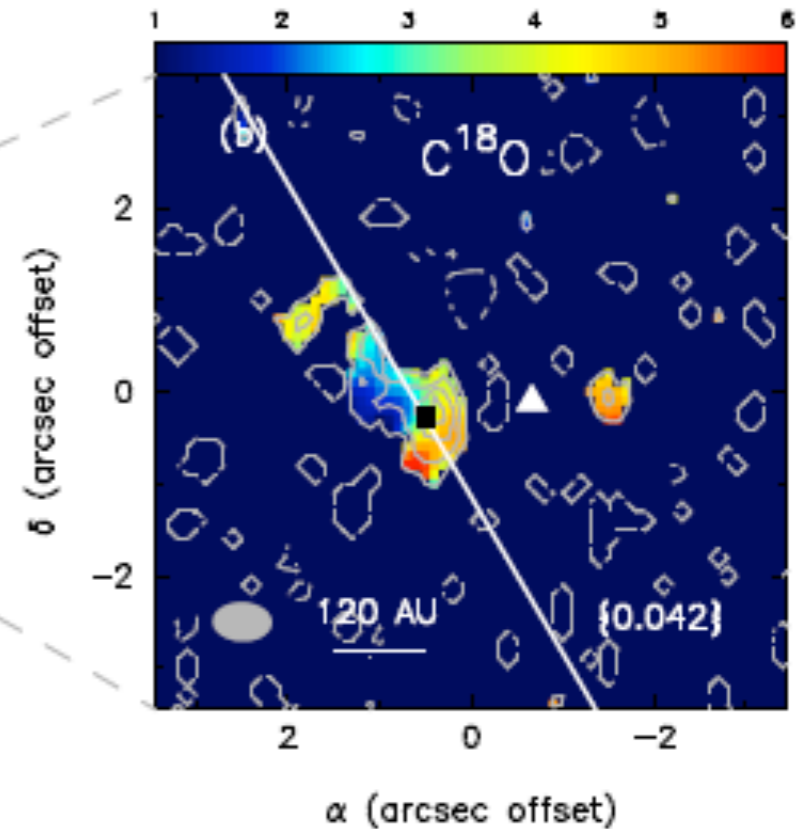
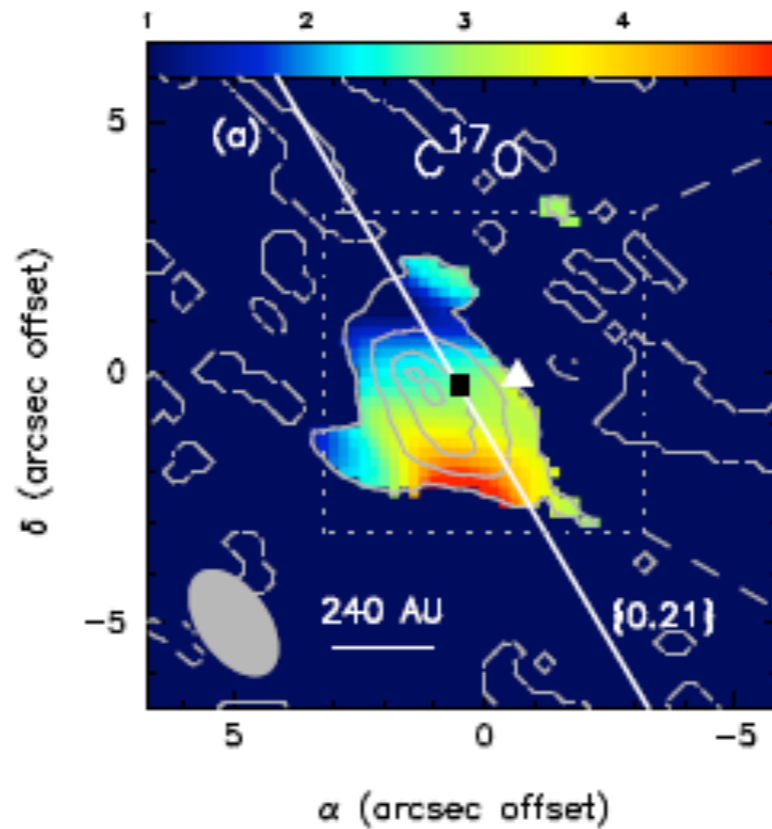
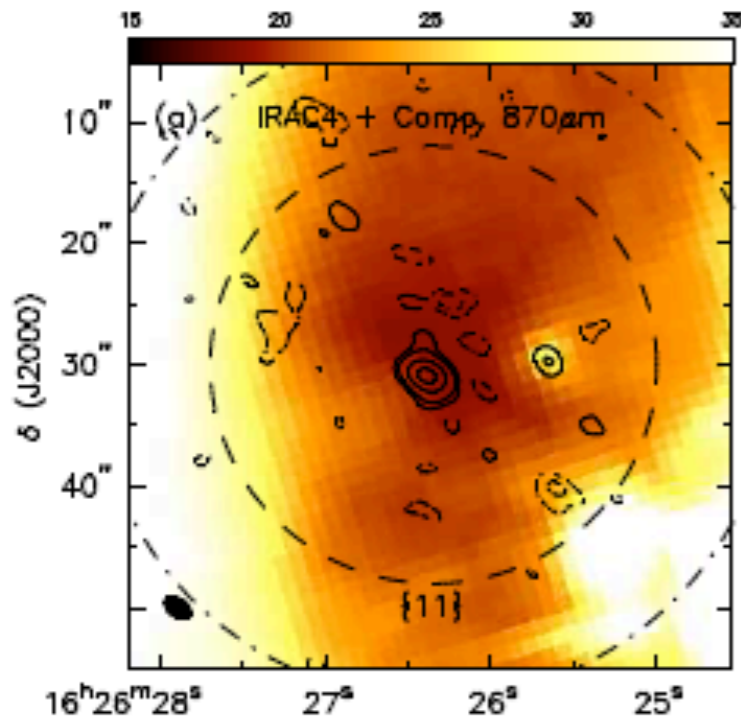


Murillo & Lai 2013



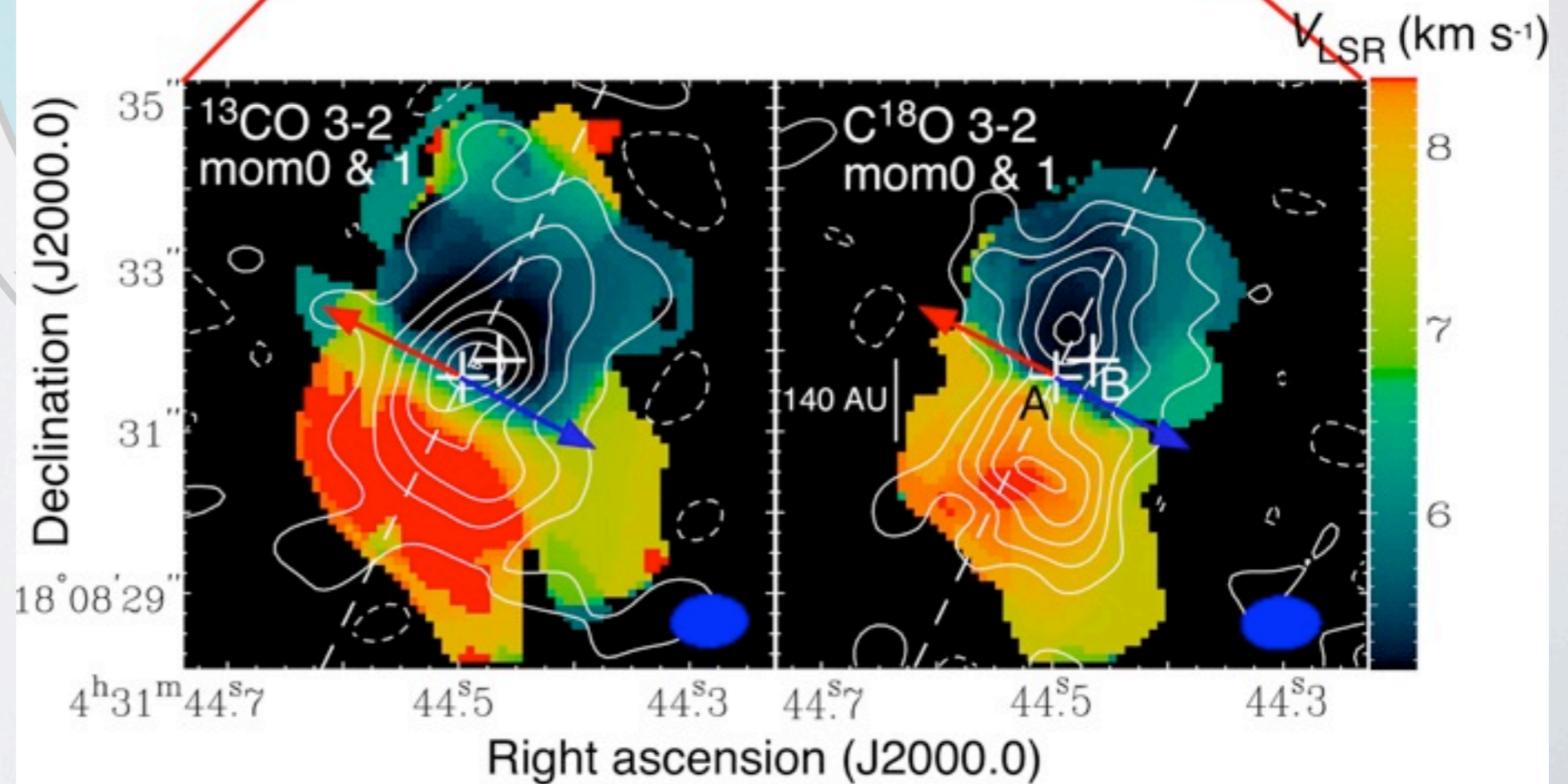
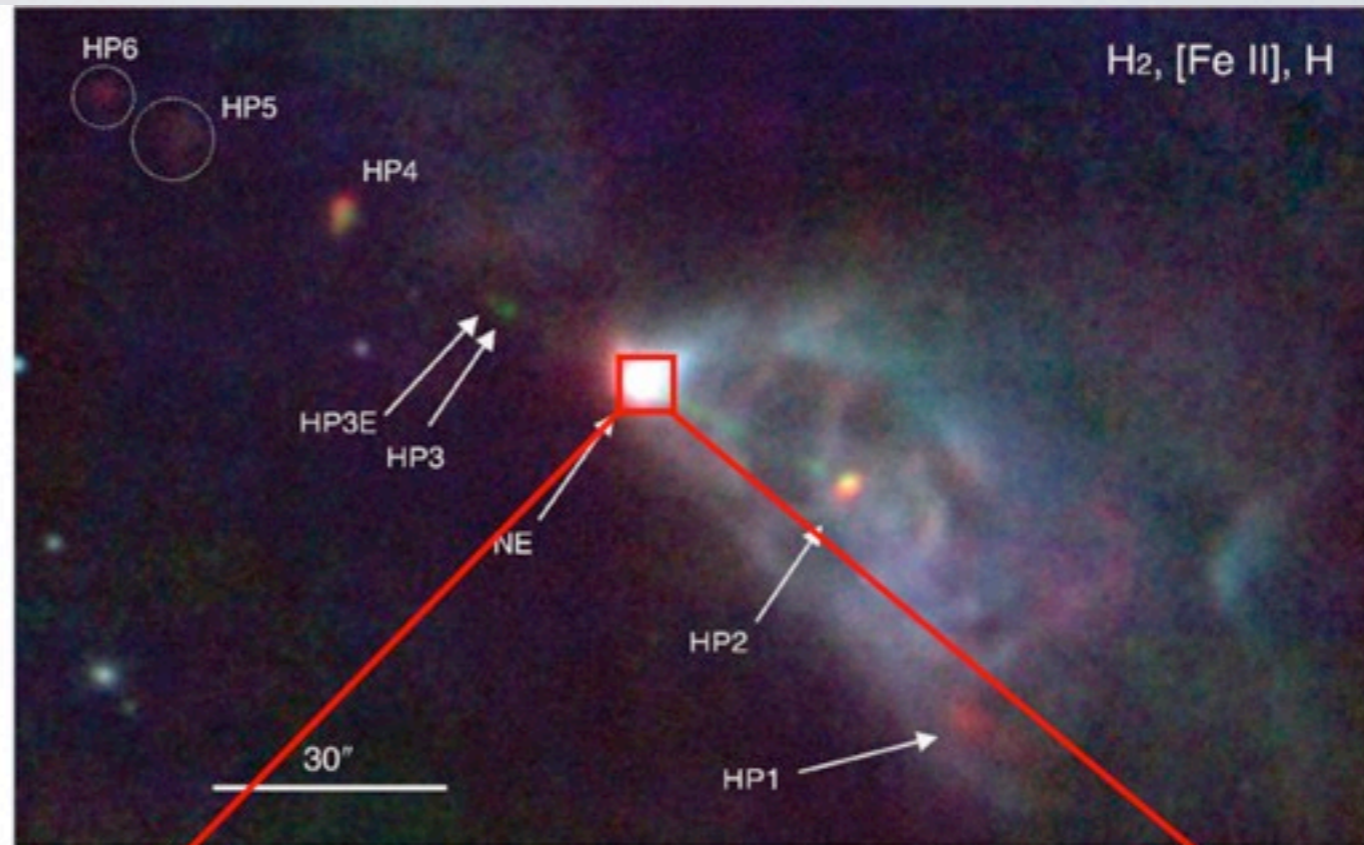
VLA I 623A, B, & W – Multiple YSOs

Rotating envelope around VLA I 623A



Murillo & Lai 2013

A Keplerian Circumbinary Disk around the Protostellar System L1551NE



Takakuwa et al. 2012
ApJ, 752, 52



Protoplanetary Disks in Taurus

Cont. CO 2-1 HCO⁺ HCN CN

DM Tau

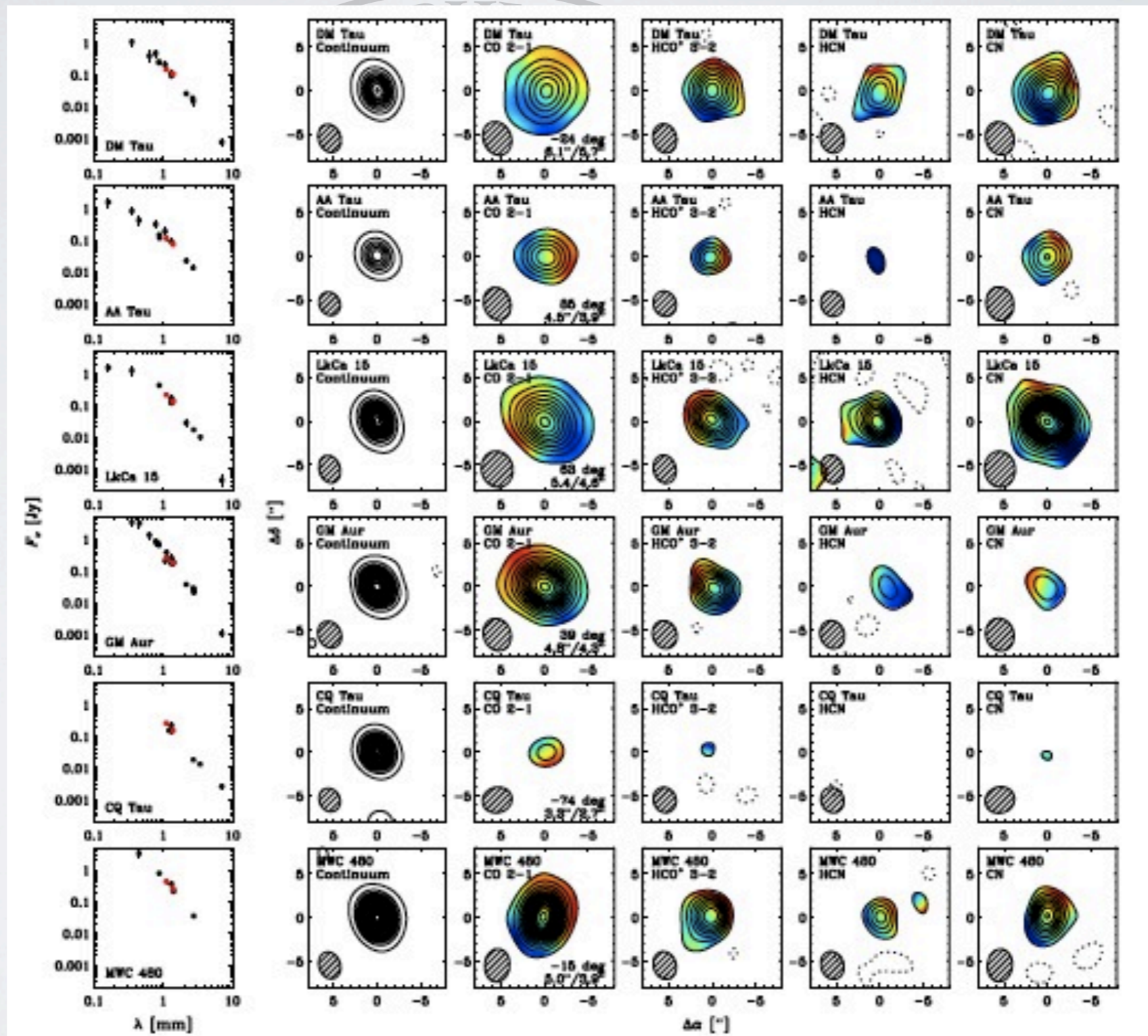
AA Tau

LkCa 15

GM Aur

CQ Tau

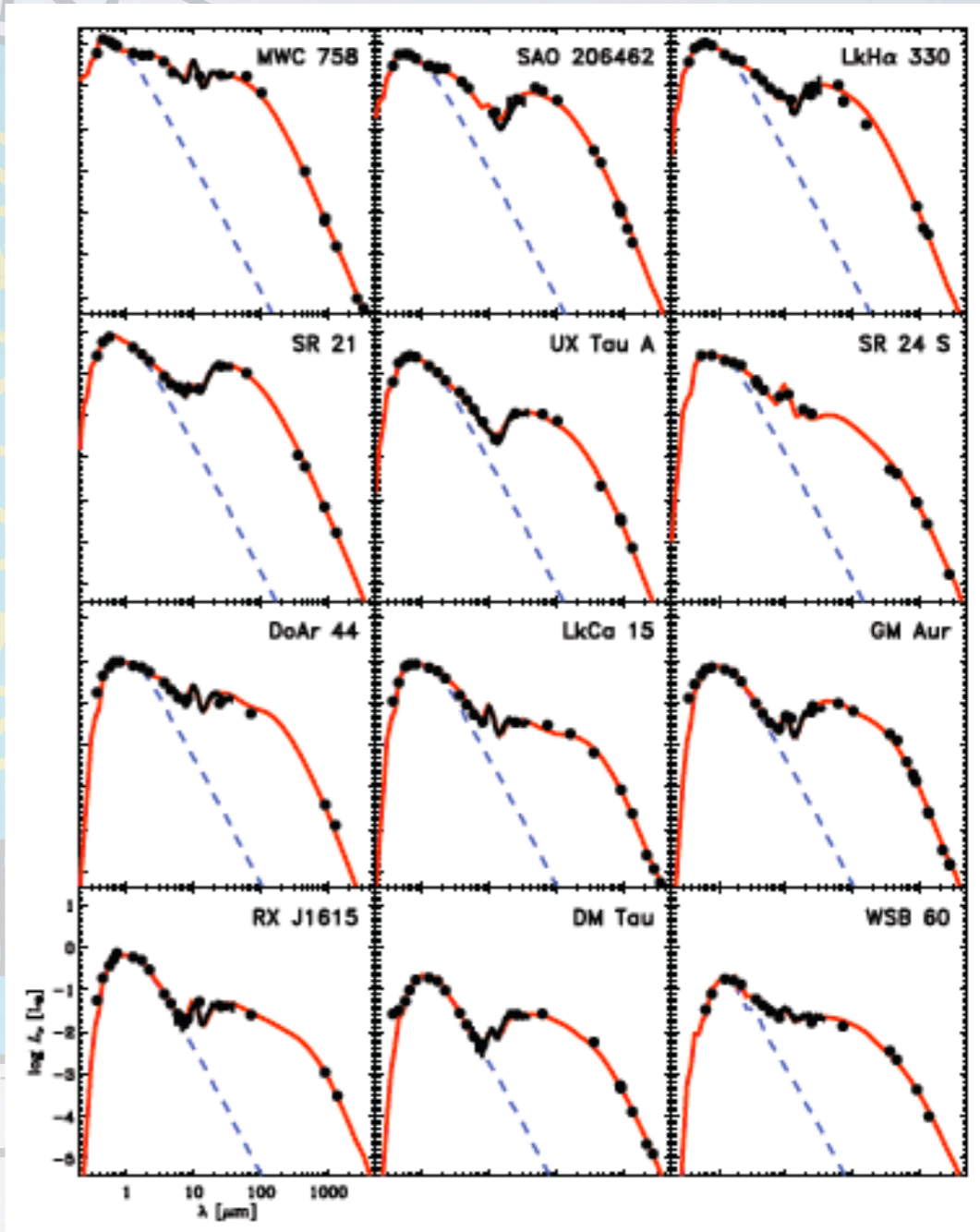
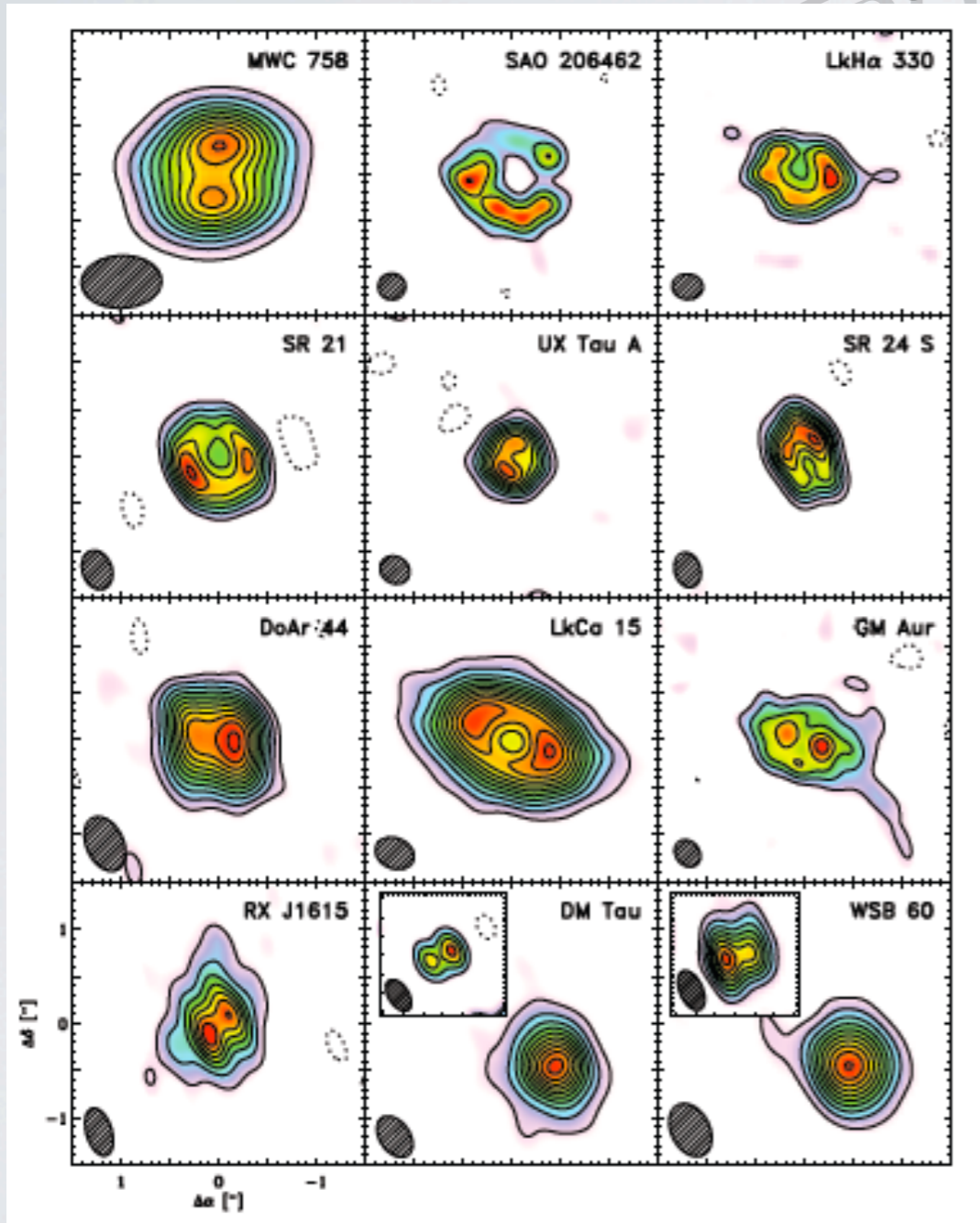
MWC 480



Öberg et al. (2010)

Transition disks with central cavities

850 μm dust continuum images



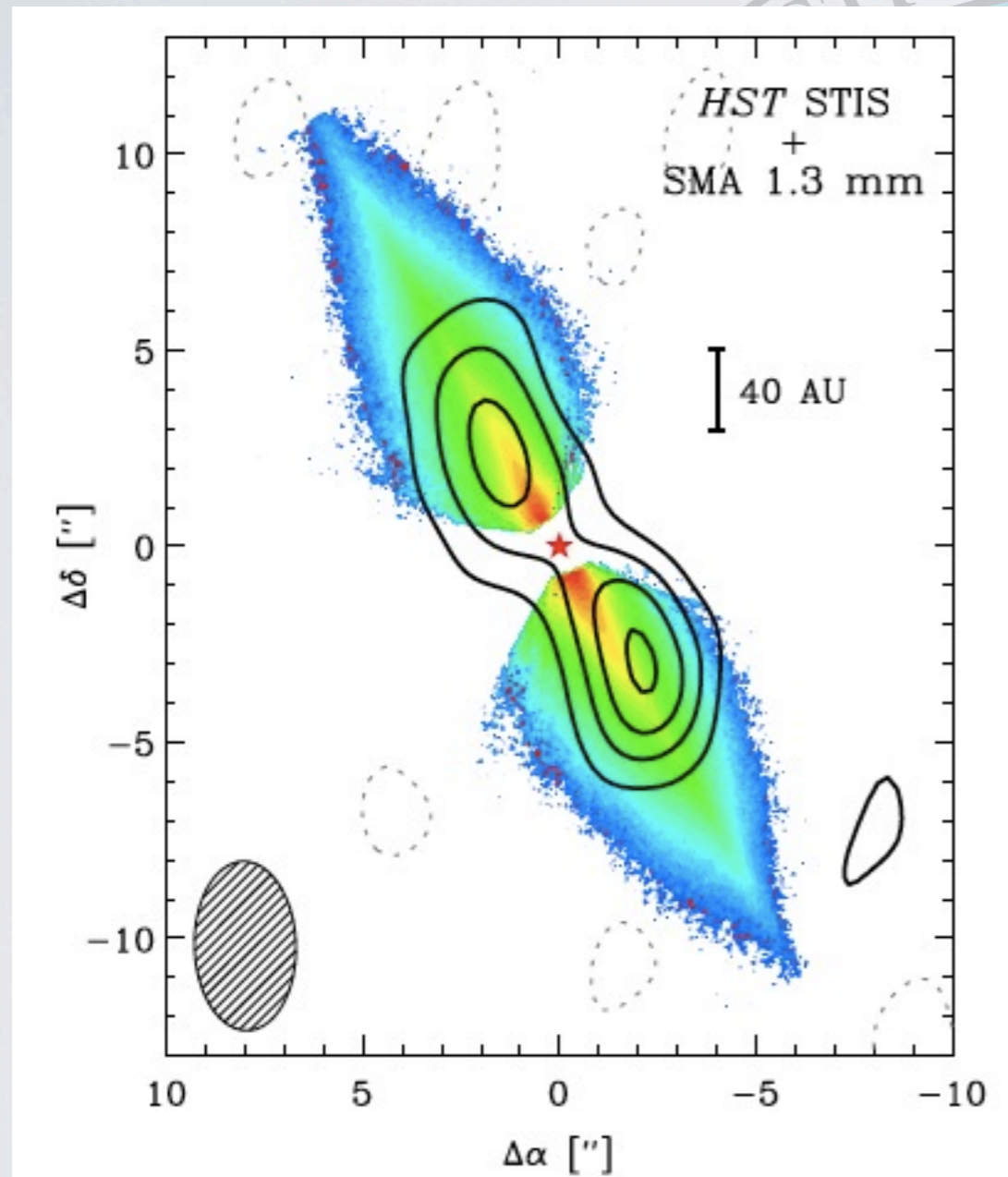
$R_{\text{cav}} \sim 15\text{--}75 \text{ AU}$

Andrews et al. 2011

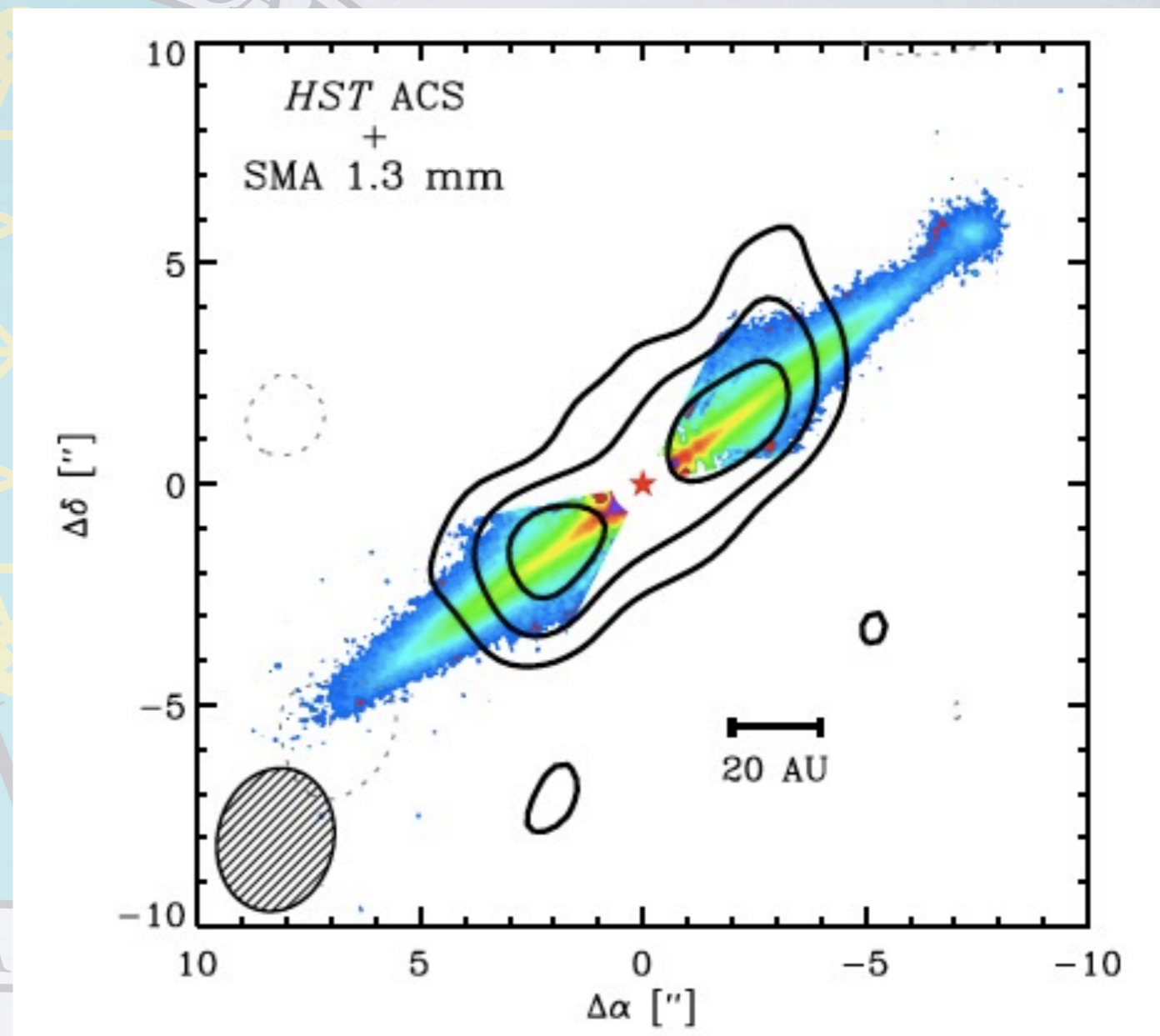
Debris Disks

Beta Pic

AU Mic



Wilner et al. (2011)



Wilner et al. (2012)

The New Capability

LSB: 4 GHz = 48 x 82 MHz

USB: 4 GHz = 48 x 82 MHz

LSB: 8 GHz

USB: 8 GHz

10 GHz

8 GHz + 8 GHz can be observed at the same time.

Coming soon!

