

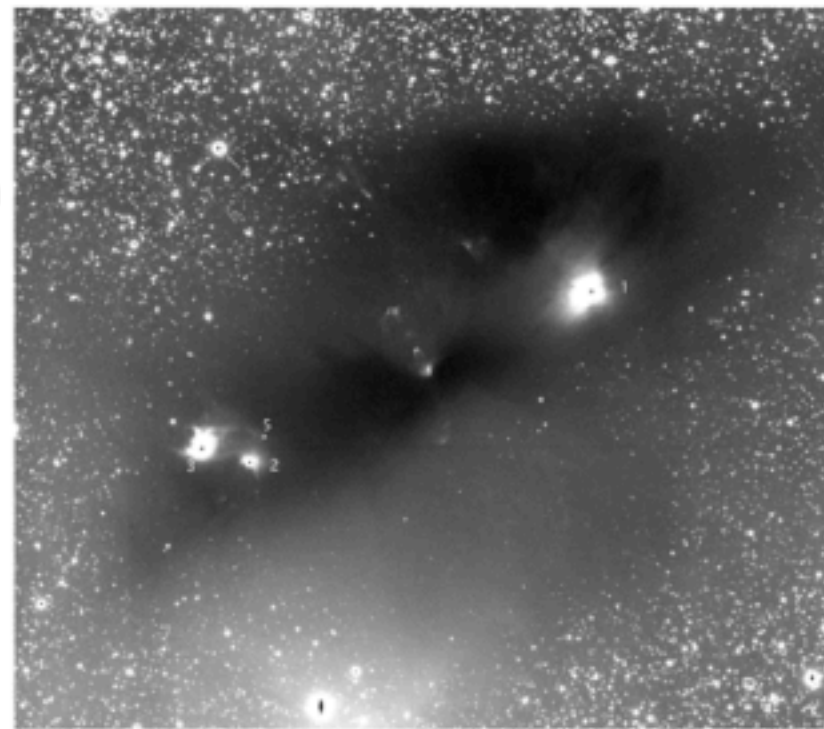
Isolated Star Formation in the Bok Globule B62

Hsin-Fang Chiang (Institute for Astronomy & NASA Astrobiology Institute, Univ of Hawaii)
 Bo Reipurth (U. Hawaii), Per Friberg (Joint Astronomy Centre), Michael Connelley (U. Hawaii)

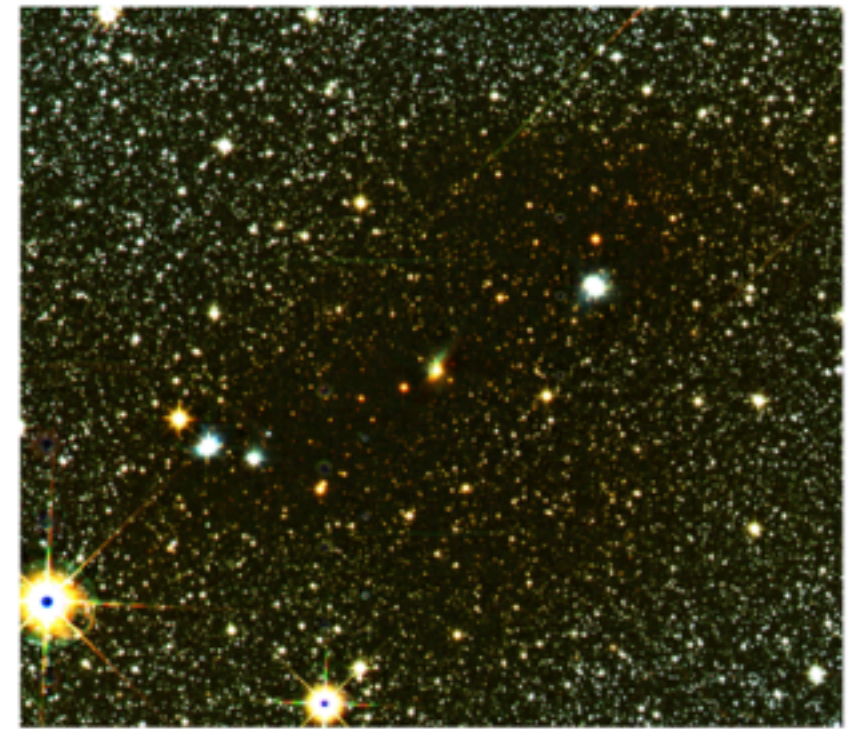
We present a study of the nearby isolated star forming region B62, a well-defined Bok globule in northern Ophiuchus. On large scales, we identify the H-alpha emission line stars, several of which are associated with compact reflection nebulae, together with two large Herbig-Haro flows, named HH 1000 and HH 1001. On small scales, we focus on the young stellar object IRAS 17130-2053 located near the center of the globule. This embedded Class I source is found to be a binary in our near-infrared images, and drives the bipolar Herbig-Haro flow HH 1000 as well as a molecular outflow. We present new interferometric observations by the Submillimeter Array and study the molecular environment in multiple dense gas tracers with high resolution.

• Bok Globule Barnard 62

- Dist ~ 225 pc (Reipurth & Gee 1986)
- Illuminated by an A7-8 star to the south passing through the globule
- Five H-alpha emission stars identified: H-alpha 1,2,3,5 are projected towards the dense globule and associated with reflection nebulae, while H-alpha 4 lies outside the globule
- H-alpha 1 and 3 are binaries
- Towards the center, the embedded Class I protostar IRAS 17130-2053

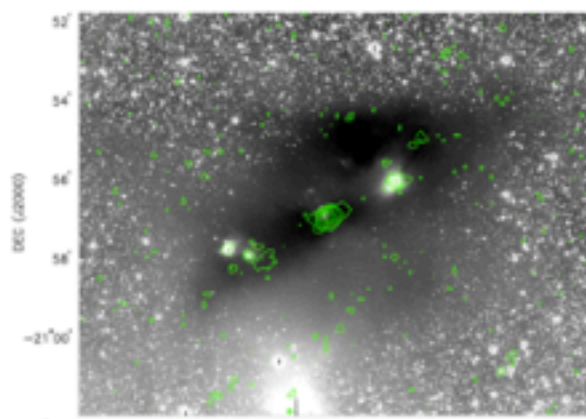


H-alpha image by Subaru SuprimeCam (7'x9')



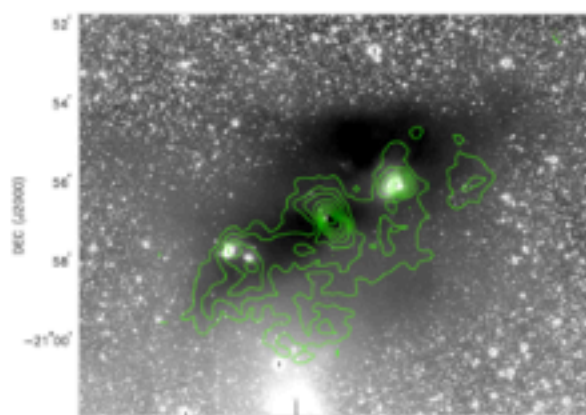
JHK false-color image by UKIRT WFCAM

Dust and Gas at Large Scales



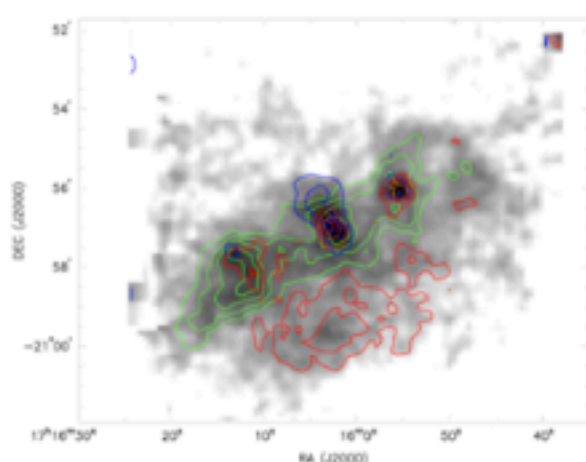
JCMST observations

Dust emission at 850 micron by SCUBA2



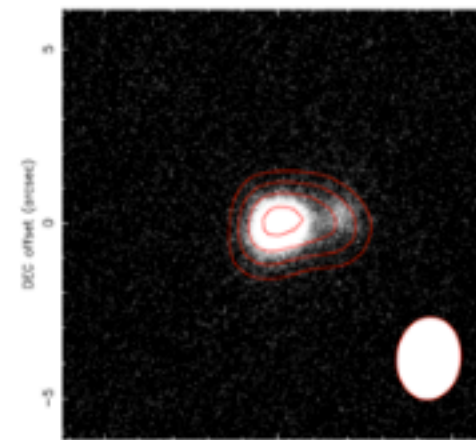
CO(3-2) contours overlaid on H-alpha image.

Contour levels: [4,5,6,7,8,9,10] K km/s



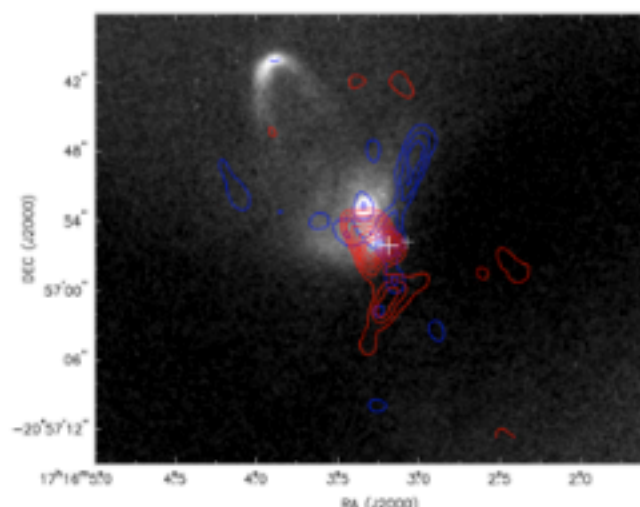
CO(3-2) flux density integrated over velocity ranges of
 -0.5 to 0.5 km/s (blue)
 0.5 to 1.5 km/s (green)
 1.5 to 2.5 km/s (red)

Dust and Gas at Small Scales

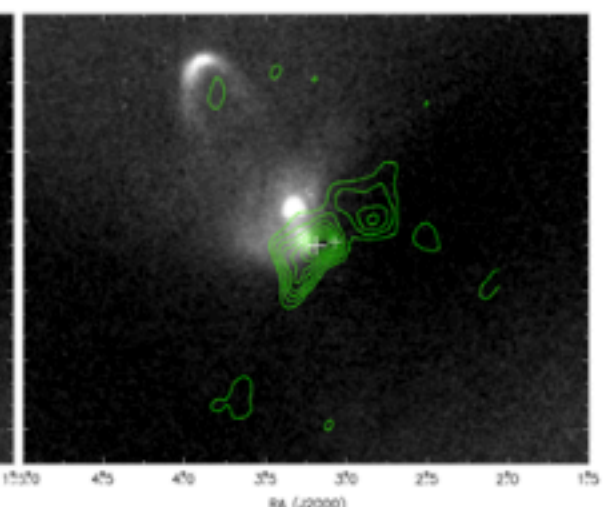


SMA dust continuum at 850 micron (contours starting at 2-sigma) overlaid on the L' image by IRTF NSFCam

- IRAS 17130-2053 is resolved into a close binary with a separation of 1.7" (380 AU) in NIR images
- Small-scale outflow detected by SMA in CO(3-2) and CO(2-1) lines with complex kinematics
- A flattened structure is seen in ¹³CO and C¹⁸O lines along the large-scale main ridge of the globule

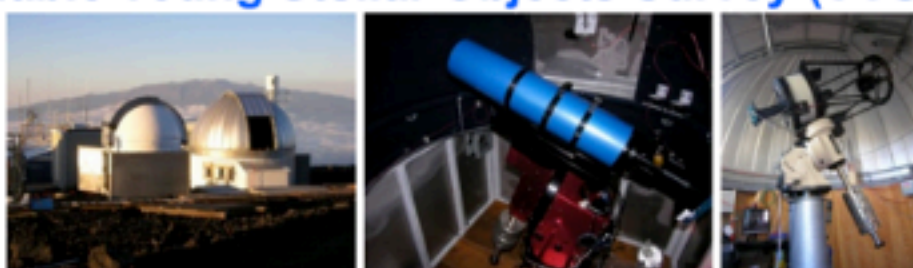


CO(3-2) overlaid on H-alpha
 blue: -1.5 to -0.8 km/s
 red: 1.6 to 2.3 km/s



¹³CO(2-1) overlaid on H-alpha
 Contours start at 3 sigma and increase in 2 sigma increments

Variable Young Stellar Objects Survey (VYSOS)



- Two robotic telescopes located at Mauna Loa Observatory (a 5-inch with 2.9° FOV 2.5" per pixel and a 20-inch with 30' FOV 0.5" per pixel)
- Continuously monitoring star forming regions along the Galactic Plane for their photometric variability
- Scientific goals: detect and monitor accretion events in early stellar evolution (e.g. FUor outbursts), eclipsing pre-main sequence binaries, occultations by circumstellar disks, transiting exoplanets, the pre-main sequence instability strip, etc.