

1-0 S(1) line at 2.122 microns. An 11" aperture was used for the survey. Of the 6 emission-line stars and 16 HH objects surveyed, we have definite detections of the H₂ line toward two stars and 8 HH objects. Preliminary maps will be presented of extensive H₂ emission toward the stars RCrA and LkH 234 and toward HH objects HH 99B, HH 104A, and GGD 32.

References

Elias, J. H. 1980, Ap. J., 241, 728.

77.17

High Resolution Imaging of the L1551-IRS5 Molecular Outflow

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The bipolar outflow L1551-IRS5 was fully mapped in the ¹²CO J=2-1 spectral line sampled every 12" using the Five College Radio Astronomy Observatory 14m telescope. More than 6000 spectra have been obtained, covering an area of ~14'x6'. These data have been used to reconstruct images of the outflow at different radial velocities with an angular resolution of ~20" for strong features, using a maximum entropy algorithm. These images are consistent with a model in which the outflowing molecular gas, located in a shell, is initially accelerated out to a distance of a few arcmin from the presumed source of the outflow, IRS5, and is in free flight thereafter. Observations of the J=2-1 transition of CS have been obtained and a similar reconstruction technique has been used to obtain images of the CS emission which traces the dense gas around IRS5. Neither disk-like structure nor rotation was found, but instead high density gas is found coincident with the north limb of the blue-shifted outflow lobe, and with the south limb of the red-shifted outflow lobe. High velocity CS emission is also found coincident with the brightest CO emission in the blue and red lobes.

77.18

The Large-Scale Structure of Bipolar Flows : Hollow Shells versus Filled Cones

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Although many molecular flows have an obvious bipolar geometry, a major uncertainty is whether the high-velocity molecular gas fills the observed lobes or traces the surface of an expanding hollow shell. In order to discriminate between these two possibilities, we extend our theoretical study of CO line formation in bipolar flows to hollow shell geometries. We compute NLTE populations for the first 10 rotational levels of CO, assuming that statistical equilibrium has been established in the flow and that only collisions and absorption of local or cosmic background photons contribute to the high-velocity CO excitation. Several velocity fields and density distribution are investigated. The resulting profiles and maps of CO emission are presented and contrasted with our previous computations for the filled cone model. Both models are then compared with recent high-resolution observations of the L1551-IRS5 outflow and used to put constraints on the physical properties and large-scale structure of this bipolar flow.

77.19

Instrumentation, data acquisition and reduction for the detection of circumstellar material.

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Multicolor photometry for the disk around Beta-Pictoris has been obtained at the 22 meter ESO telescope. We discuss the stellar-coronograph used, data acquisition procedures and the

associated data reduction techniques. The combination of these methods has enabled the measurements to extend to within 3 arcseconds (50 AU) of the central star, two times closer than preceding measurements.

* Data gathered at the European Southern Observatory

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77.20

Multi-color, high spatial resolution imaging of the Beta Pictoris circumstellar disk*

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The circumstellar disk of the main sequence dwarf β Pic was imaged at sub arcsecond angular resolution through B, V, R and Gunn i filters using the ST ScI coronagraph and an RCA CCD at the focus of the ESO 2.2 meter telescope on La Silla, Chile. With the aid of a similar image of the control star δ Hyi taken in an identical experimental configuration, the edge-on β Pic disk is made clearly visible running in the NE-SW direction. It can be easily followed from approximately 3 arcseconds out to 20 arcseconds from the A5V, $m_V=3.85$ central star. At β Pictoris' distance of 16.4 parsecs, these angular distances correspond to 50 and 350 AU linear separations from the star, respectively. We discuss the astrophysical implications of the measured variation of disk brightness with distance from the star as a function of color. The results set interesting constraints on the composition and structure of the hypothesized protoplanetary system.

* Data gathered at the European Southern Observatory

¹ Affiliated to the Astrophysics Division Space Science Department of ESA.

77.21

The Infrared and Ultraviolet Excesses of T Tauri Stars

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We consider the possibility that the IR and UV excesses of T Tau stars can be explained by accretion via a viscous disk, as first proposed by Lynden-Bell and Pringle (MNRAS 168:603; see also Rucinski AJ 90:2321; Adams, Lada, and Shu ApJ, in press). We find that accretion at rates of $10^{-6} M_{\odot} \text{ yr}^{-1}$ can account for the IR excesses of T Tau stars with extreme emission (such as RW Aur); radiation from a turbulent, optically thick boundary layer at the inner edge of the disk is responsible for the large UV-optical excesses and strong chromospheric emission lines observed in these objects. The IR excesses of normal T Tau stars (e.g., GG Tau), including those with flat far-IR continua, can be produced by a disk in hydrostatic equilibrium (i.e., a disk with a vertical height H increasing as $H \sim R^{3/8}$) which reprocesses radiation from the central star. Emission from an optically thin boundary layer is sufficient to power the UV excesses of these objects with modest accretion rates ($10^{-7} M_{\odot} \text{ yr}^{-1}$).

77.22

Disk Accretion in V1057 Cyg

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We report new observations which show that V1057 Cyg rotates more slowly at infrared wavelengths than in the optical region. Spectra taken of the 2 micron CO bands with the KPNO 4M FTS show that the rotational broadening of these lines is about two-thirds that observed at 6000 angstroms. We previously