The featured attraction of last week's mission, however, was the testing of two backpacks, or Manned Maneuvering Units (MMUs), designed to let astronauts move and work in space on their own. In the works for more than a decade and a half, the MMUs are operated with hand controls that closely resemble those used to control the shuttle orbiter itself. Propelled by jets of nitrogen gas, with the right hand controlling the user's orientation in space and the left controlling movements from side to side, up and down, and forward and back, the units operated so well for McCandless and Brand that officials deemed the upcoming Solar Max rescue likely to go on schedule despite other difficulties. (A balloon jettisoned from the payload bay, intended to inflate as a rendezvous-practice target for the shuttle itself, burst instead, canceling the exercise. "A shame," said one official, "but we can do without it.") After checking out the MMU's handling characteristics, and without a safety line, McCandless guided himself over and around the shuttle, then flew out 150 feet and returned, while Brand tried various tasks on a work platform affixed to the shuttle. Brand then fitted McCandless with a "T-pad" docking unit similar to the fixture that will be used on the next flight to get a grip on Solar Max. The T-pad enabled McCandless to couple with a Shuttle Pallet Satellite at the end of the orbiter's robot manipulating arm, though a malfunction in the arm's wrist joint prevented him from trying it with a rotating target. The astronauts later put the MMU through further paces, boding well for the April rescue. *— J. Eberhart*

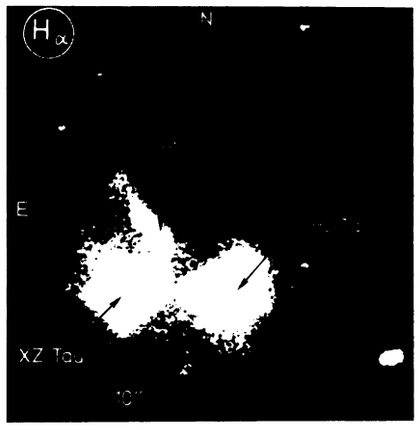
Stars are born, but will planets form?

The sparkling dream of astronomers is to find planets orbiting a star other than our own sun. When the Infrared Astronomy Satellite (IRAS) detected tiny particles around the stars Vega (SN: 8/13/83, p. 100) and Fomalhaut (SN: 12/24/83, p. 406) last year, astronomers bristled with excitement, not because anyone had actually seen planets, but because the dust offered a tantalizing possibility that planets, in theory, might have formed from the accretion of such particles.

Last week astronomers announced the discovery of debris around two new stars: HL Tau, residing 500 light-years away in the constellation Taurus, and R Mon, four times farther out in the constellation Monoceros. What is different about the new observations, made by Steven Beckwith at Cornell University in Ithaca, N.Y., and Benjamin Zuckerman at the University of California at Los Angeles, is that the combined mass of the particles making up the clouds that shroud each of the stars is far greater than that found in the two previous discoveries. Moreover, the clouds appear disk-shaped, much like our own solar system. Add to this the relatively young ages of HL Tau and R Mon (100,000 years versus Vega's one billion), and the astronomers conclude that they could be seeing a planetary system at a very early stage of cosmological evolution.

"We're quite certain," says Beckwith. "We see conditions which are very much like those expected for the primitive solar nebula before planets are formed .... We think there's a reasonable chance that they could form a solar system in the years to come." Whether planets are really brewing out there, however, is anyone's guess, and astronomers caution that much more experimental and theoretical work remains to be done.

Beckwith, Zuckerman and co-workers made their observations last fall with three large terrestrial telescopes. Speckle interferometry (SN: 6/26/82, p. 424) enhanced the resolution of their data, indicating that the debris around HL Tau, as seen from earth, covers an area of dimensions 80 by 160 astronomical units (AU), larger than previous studies had suggested. (For comparison, the distance from the sun to Pluto is 40 AU.)



Reinhard Mundt and Josef Fried

Astronomers chose to study HL Tau because it displayed activity characteristic of young stars. The jet of escaping hydrogen gas from HL Tau was also thought to indicate the presence of a disk-shaped cloud. The recent studies used different wavelengths than the hydrogen line (Hα), shown here to look much closer at the star and nearby debris.

By measuring the star light scattered by the dust at two infrared wavelengths — at least 25 percent of the measured light is due to scattering at 2.2 microns and 5 percent is scattered at 3.8 microns — they concluded that 1 micron particles constitute a cloud around HL Tau with a combined mass roughly that of the earth. The astronomers estimate that dust plus hydrogen gas in the HL Tau system has a total mass comparable of our solar system. Also, the total mass of R Mon dust, they say, is about five times the earth's mass. In contrast, the Vega results — millimeter-size particles adding up to a total of about one percent of the earth's mass — depended on the amount of re-radiated light because they were obtained by IRAS at longer wavelengths.

Beckwith and Zuckerman examined six stars in all but found evidence of solid debris only around HL Tau and R Mon. Data from one star are still being analyzed.

According to Charles Beichman of the Jet Propulsion Laboratory in Pasadena, Calif., both the Vega discovery and the recent findings are "pointing the way to a solution of one of the most important questions astronomers ask. It really concerns the existence of life elsewhere in the galaxy....It [would be] the discovery of the century to actually find planets. These observations aren't that but they're inching close to it." What is needed now, he says, is a new generation of space telescopes to study these and other stars in greater detail. *—S. Weisburd*

San Diego to curb light pollution

In recent years urbanization has reached out toward the sites of major telescopes in the United States. In response astronomers have mounted a drive to lessen the resultant light pollution, which is beginning seriously to interfere with observations. One of the important steps in the anti-pollution campaign is persuading cities to use low-pressure sodium streetlamps. On Feb. 7, San Diego, the largest city near the largest telescope in the United States (the 200-inch mirror on Palomar Mountain) became the most recent municipality to adopt the low sodium lights.

Last June the San Diego council had voted to replace the city's old mercury vapor lamps with high pressure sodium. Astronomers mounted an emergency campaign to get the decision changed (SN: 7/23/83, p. 58), because the high-pressure sodium lamps produce so many different wavelengths of light that their effect is ruinous to astronomical spectroscopy. The low-pressure sodium lamps produce only two frequencies, which are easily filtered out.

The debate became acrimonious largely over the opposition of one council member, who insisted that the low-pressure sodium lamps made people look like cadavers. Nevertheless, when it came to a vote, the council went 6 to 3 for low-pressure sodium even though a third of the city's lights had already been changed to high-pressure sodium.

The anti-light-pollution campaign began in Arizona, where it has had good success. In California, San Jose adopted low-pressure sodium lights years ago, and expects to save $1.8 million in operating costs this year as a result.

—D.E. Thomsen

Science Service, Inc. is collaborating with JSTOR to digitize, preserve, and extend access to *Science News*. www.jstor.org