

# *Catskills Astronomy Club News*

**6/1/04**

## ***Club News:***

The observation sessions scheduled for May 15<sup>th</sup> and 22<sup>nd</sup> were canceled due to poor weather.

June observation sessions are scheduled for the 12<sup>th</sup> and 19<sup>th</sup>.

On June 8<sup>th</sup> Venus will transit the sun for the first time in 122 years. The transit will be occurring at sunrise on the 8<sup>th</sup> and will end at 7:25 AM. Any member who is able to view this is encouraged to submit their observations and images for the next newsletter.

Anyone interested in submitting an astronomical observation or photograph for the newsletter, please contact John at [kocis@verizon.net](mailto:kocis@verizon.net).

Each month the photo section of our newsletter will highlight the telescopes and equipment of club members. If you have a photo of your scope or equipment and a brief description of it that you would like to contribute please send it to John at [kocis@verizon.net](mailto:kocis@verizon.net).

The club has a selection of astronomy books, Stardate audio CDs, a Macintosh computer with astronomy software, and a Meade eight inch reflector for members to borrow. Please contact John at 791-5240 or [kocis@verizon.net](mailto:kocis@verizon.net) if you are interested in borrowing any of these.

## ***Astronomy News:***

Here are some articles from various NASA sources that might be of interest.

Press Release: 2004-136

May 31, 2004

### **Spitzer Space Telescope Sets Infrared Eyes On Dark Matter**

Ten years ago, a group of astronomers set out to find invisible, or dark, matter in the outer fringes of our galaxy. Long postulated to make up a significant chunk of our universe, dark matter may be partly made up of massive, celestial objects hiding in the halos of galaxies. The astronomers spent six years scanning a large patch of sky and sensed something, but they weren't sure if they were really seeing dark matter or a different class of nearby objects getting in the way.

Now, NASA's Spitzer Space Telescope has set its infrared eyes on this mystery matter and verified that at least one of 17 invisible objects observed years ago lies within the body of our Milky Way galaxy, thereby supporting the latter hypothesis. More observations are needed to draw definitive conclusions; nonetheless, the findings illustrate the power of Spitzer to finally put together the pieces of this decade-old puzzle.

"Historically, searches for unseen matter have been part of the justification for Spitzer," said Dr. Michael Werner, the Spitzer project scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif., and an investigator for the new research. "We are very excited about these initial results."

Matter as we know it doesn't add up to all the matter in the universe. At least 10 times more unseen, or dark, matter exists than known matter. Most dark matter is exotic, made up of something other than everyday atoms. But the rest of it may take the form of celestial objects that are too faint to see because they're very cool. These objects, referred to as "massive compact halo objects," or "machos," are thought to be lurking in the far reaches, or halos, of galaxies. They might include black holes and failed stars called brown dwarfs.

Beginning in 1992, Dr. Charles Alcock, who was then at the Lawrence Livermore National Laboratory, Calif., and is now at the University of Pennsylvania, Philadelphia, and his colleagues went on a hunt for machos. Rather than scan for the objects themselves, the team looked for the objects' gravitational tug on starlight emanating from behind them. In this technique, called gravitational microlensing, a lens object (the invisible matter) causes the source object (a star) to brighten for a brief period of time. Alcock and his team surveyed 12 million stars for these events in the nearby Large Magellanic Cloud, which lies on the far side of our galaxy halo. They detected 17.

But, based on the predicted numbers of faint stars in our galaxy, the astronomers had expected to see much fewer than 17. Either there is a significant amount of dark matter in the galaxy halo, or there is invisible matter in our own galaxy that cannot yet be understood. Either way, the findings challenged scientific descriptions of matter.

That's where Spitzer comes in. Because it can see objects that are too cool to be seen with other telescopes, it may be able to detect the heat from many of these invisible lenses. To test this ability, a group of astronomers, including Alcock and Werner, and led by Dr. Hien Nguyen of JPL, used Spitzer to observe the macho event referred to as MACHO-LMC-5. This event is the only one of its type that could be seen by NASA's Hubble Space Telescope. Data obtained by Alcock and others using Hubble beginning in 2001, and most recently analyzed by Dr. Andrew Gould of Ohio State University, Columbus, suggest that the lens object for MACHO-LMC-5 is a low-mass star about 1,500 light-years away within our galaxy's disc.

The new Spitzer data for this event independently confirm this finding. "By luck, Hubble was able to see the lens in one of 15 events it looked at, whereas Spitzer should be able to see many more, if these microlensing events are indeed caused by nearby cool objects," Nguyen said.

Nitya Kallivayalil, a graduate student at the University of Pennsylvania, with critical insight from Dr. Daniel Stern of JPL, carefully measured the brightness of the lens using the Spitzer data. Dr. Brian M. Patten of the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass., used these measurements to establish that the lens is a very low mass, faint star. "The data are fantastic," said Kallivayalil. "When Brian showed us that they confirmed the nature of the star, we were ecstatic."

Added Patten, "With this new capability, we'll be able to determine the properties of many more lenses, and determine their contribution to dark matter in our galaxy."

The team of astronomers recently collected data for four additional macho events and have plans to study nine more. For more information about the Spitzer Space Telescope, visit [www.spitzer.caltech.edu](http://www.spitzer.caltech.edu).

The Spitzer Space Telescope is managed by JPL for NASA's Office of Space Science, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. JPL is a division of Caltech.

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News Release: 2004-132

May 26, 2004

### **Mars Exploration Rover Mission Status**

NASA's solar-powered Mars Exploration Rover Opportunity is beginning on Thursday what controllers expect to be frequent use of an overnight "deep sleep" mode to stretch the robot's power supply.

Opportunity has managed only one to two hours of activity on many recent days while it has been examining a stadium-sized impact crater from vantage points around the rim. Shutting down more completely overnight will conserve enough battery charge to add several hours of science operations during the day, according to Jim Erickson, Mars Exploration Rover deputy project manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

There is a calculated tradeoff - an increased risk that, without an overnight heater running, one of the six scientific instruments might be disabled by the cold. The susceptible instrument is Opportunity's miniature thermal emission spectrometer, called the Mini-TES. It makes infrared observations used for identifying minerals from afar to help the science team decide where to send the rover. Its observations also provide close-up evaluation of rock and soil targets, and thermal information about surface materials and the atmosphere. "The Mini-TES gives us vital insight into the minerals in rocks and the role of liquid water in their formation, so this choice is a carefully considered decision to weigh the risk of losing this capability against the benefit of continuing and increasing Opportunity's ability to do all the other exploration-oriented things this rover can do," said Dr. Jim Garvin, lead scientist for Mars and lunar exploration at NASA Headquarters, Washington, D.C.

Both Opportunity and its twin rover, Spirit, have already provided several weeks of bonus operations after successfully completing their primary missions: three months of examining geological evidence about past environments at their landing sites.

As the Mars' southern-hemisphere winter advances and dust accumulates on the solar panels, the amount of electricity the rovers can generate is decreasing. The decline is more serious for Opportunity because the robotic arm of that rover has a heater with a malfunctioning switch. The switch cannot be turned off. A properly functioning thermostat turns the heater off during the day, but the heater stays on overnight even when it's not needed. The amount of energy wasted was not enough to hinder Opportunity from succeeding in its primary mission, but is now sapping about one-third of the rover's diminished amount of solar-generated electricity.

"Deep sleep gives us a way to turn that heater off overnight," said Opportunity Mission Manager Matt Wallace of JPL. The capability to do so results from a software upgrade transmitted to both rovers in April. The first use of deep sleep, on Opportunity on May 6, verified its benefit to the useful power supply.

Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the rovers' science instruments, said, "Deep sleep is going to buy us back a huge amount of capability to drive farther, take more pictures, use the arm more." The deep sleep mode turns off a heater for the miniature thermal emission spectrometer as well as the troublesome heater in the arm. The spectrometer's heater uses less power but provides important protection. Scientists and engineers decided not to use deep sleep again after May 6 until the spectrometer had completed high-priority observations from two different overlook points of the crater informally named "Endurance." Those observations were completed Tuesday.

Tests on Earth indicate the spectrometer's beam splitter, a disc of potassium bromide salt about the size of a four-coin stack of quarters, would become ruined somewhere in the temperature range of minus 50 to minus 60 degrees Celsius (minus 58 to minus 76 degrees Fahrenheit).

Dr. Phil Christensen of Arizona State University, Tempe, lead scientist for the instrument, said, "The thermal models predict that with deep sleep, we'll go to about minus 48 Celsius. That has me concerned because it's getting close." The May 6 deep sleep did no damage, but next time the temperature could go lower, and it probably will drop lower during deep sleep later in the martian winter. Christensen concurs with the decision to take that risk in order for the rover to have adequate power for its other activities. "We always knew that as dust built up and we ran low on power, eventually there would come a time when we couldn't use the Mini-TES heater," he said. "We're getting to that point sooner because of the stuck heater on the arm."

Meanwhile, engineers and scientists are assessing how well Opportunity would be able to climb out of Endurance Crater. The assessment will aid in deciding whether to send the rover into the crater for up-close examination of rock layers there. Opportunity may complete a circuit around the crater's rim by mid-June and be ready for a decision about entering the crater.

Spirit, halfway around Mars, resumed normal operations May 23 after engineers diagnosed a software glitch that halted the rover's activities on May 21. The symptoms resembled a problem seen about a week earlier, where again the computer encountered a conflict between two onboard tasks. However the errors are understood and the two incidents are unrelated. If they recur, neither pose a threat to the rovers' health. Spirit is now less than 700 meters (0.4 miles) from the base of the "Columbia Hills," having traveled more than 2.5 kilometers (1.5 miles) since landing. Controllers are optimistic that Spirit will reach the base of the hills by mid-June.

JPL, a division of the California Institute of Technology, manages the Mars Exploration Rover project for NASA's Office of Space Science, Washington, D.C. Additional information about the project is available from JPL at <http://mars.jpl.nasa.gov/mer> and from Cornell University at <http://athena.cornell.edu>.

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News Release: 2004-130    May 26, 2004

### **NASA Releases Mission Requirements For Proposed Jupiter Mission**

NASA has issued its mission design requirements to three industry teams for a proposed mission to Jupiter and its three icy moons. The requirements are also the first product formulated by NASA's new Office of Exploration Systems in Washington.

The Jupiter Icy Moons Orbiter is a spacecraft with an ambitious proposed mission that would orbit three planet-sized moons of Jupiter -- Callisto, Ganymede and Europa -- that may harbor vast oceans beneath their icy surfaces. The mission would be powered by a nuclear reactor and launched sometime in the next decade.

Associate Administrator retired Rear Adm. Craig E. Steidle of NASA's Office of Exploration Systems said, "The Jupiter Icy Moons Orbiter requirements represent our new way of doing business, tracing exploration strategies to the technology maturation programs that will enable this exciting mission and the other missions that make up Project Constellation."

The Request for Proposal was released this week to the three previously qualified industry teams led by Boeing, Huntington Beach, Calif.; Lockheed Martin, Denver; and Northrop Grumman, Redondo Beach, Calif. These three companies are currently working under study contracts investigating conceptual designs for the mission. The proposals are due July 16, 2004.

The scope of the initial contract is to co-design the spacecraft through the preliminary design with the government team. A contract modification will be issued after preliminary design to implement the design, to integrate and test the spacecraft and to integrate the spacecraft with the reactor module and mission module. JPL would be responsible for delivering the mission module, which would include instruments procured competitively via a NASA announcement of opportunity. The launch vehicle will be supplied by NASA. The Department of Energy's Office of Naval Reactors would be responsible for the reactor module. To ensure the technologies demonstrated are consistent and coordinated with the Vision for Space Exploration, Project Constellation is managed within the Office of Exploration Systems.

"Although the Jupiter Icy Moons Orbiter mission may not launch until the next decade, the study of revolutionary new technologies in spacecraft design is underway in the areas of power conversion and heat rejection, electric propulsion, radiation hardened electronics and materials, and telecommunications," said Karla Clark, industry studies lead and deep space avionics project manager for the Jupiter Icy Moons Orbiter Mission.

Three cross-cutting science themes identified by the NASA-chartered science definition team would drive the proposed Jupiter Icy Moons Orbiter science investigations. The themes are to evaluate the degree to which subsurface oceans are present on these worlds; to study the chemical composition of the moons, including organic materials, and the surface processes that affect them; and to scrutinize the entire Jupiter system, particularly the interactions between Jupiter and the moons' atmospheres and interiors.

"The scientists have told us what they want," said John Casani, project manager for the Jupiter Icy Moons Orbiter mission at JPL. "When you consider the five-to-eight year trip to Jupiter, going from one moon to the next, not only flying by but orbiting each moon, this will require a unique nuclear power and electric propulsion system. The large amount of power required for electric propulsion could be used in orbit to power a significantly enhanced suite of instruments not even conceivable with previous power systems."

The Jupiter Icy Moons Orbiter mission is part of NASA's Project Prometheus, a program studying a series of initiatives to develop power systems and technologies for space exploration. The Jupiter Icy Moons Orbiter, managed by JPL, would be the first NASA mission utilizing nuclear electric propulsion, which would enable the spacecraft to orbit each of these icy worlds to perform extensive investigations of their makeup, history and potential for sustaining life. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the proposed Jupiter Icy Moons Orbiter mission for NASA's Office of Exploration Systems, Washington, D.C.

For more information visit:

<http://spacescience.nasa.gov/missions/prometheus.htm>

or:

<http://www.jpl.nasa.gov/jimo/index.cfm>

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News Release: 2004-134

May 28, 2004

### **Cassini-Huygens Mission Status Report**

The Cassini spacecraft successfully performed a critical six-minute trajectory correction maneuver May 27 to put it on course with its first encounter, Saturn's outermost moon Phoebe, set for June 11. The spacecraft is operating normally and is in excellent health.

"The maneuver is very critical for getting us into Saturn orbit because it is the first checkout of the bipropellant pressurization system after nearly five years of dormancy," said Todd Barber, propulsion engineer for Cassini at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "It sets the stage for Saturn orbit insertion on June 30."

During the course of its trip, Cassini has traveled 3.4 billion kilometers (2.1 billion miles). "We couldn't have asked for a smoother ride," said Robert T. Mitchell, program manager for the Cassini-Huygens mission at JPL. "All the instruments are performing well, and for almost seven years we have traveled without any major hitches. The excitement is building as we are getting ready to put Cassini in orbit around the ringed planet." The orbiter has relied on three radioisotope thermoelectric generators to power all the electrical components, including the 12 science instruments. The European-built Huygens probe on board Cassini carries six instruments.

"If the road to Saturn were a highway, the Cassini orbiter would have passed the sign along the road that says 'Saturnian County line,'" said Jeremy Jones, chief navigator for the Cassini-Huygens mission at JPL. "The next exits are Phoebe, 9 million kilometers (5.4 million miles) ahead, Saturn 19 million kilometers (12 million miles) ahead."

Phoebe is an oddly shaped moon with a dark surface. It orbits in the opposite direction from the motion of most other bodies in the solar system. The backwards-revolution leads scientists to believe that it is an object captured from distant Kuiper Belt, making it an interesting target. "The Phoebe flyby may offer the first glimpse of what the frigid bodies at the edge of the solar system look like," said Dr. Bonnie Buratti, scientist on the Cassini-Huygens mission at JPL. "These bodies, which include Pluto and its satellite Charon, are believed to be remnant objects left over from the formation of the planets 4.5 billion years ago."

After the Phoebe flyby, Cassini will be on course for Saturn. On arrival date June 30 (July 1 Universal Time), Cassini will become the first orbiter around Saturn. "The two Voyager and Pioneer spacecraft flew by the planet and saw it from a

distance two or three days at a time. With Cassini, we will be in the city limits for four years," said Dr. Dennis Matson, project scientist for Cassini at JPL. "The difference is like driving by the Grand Canyon versus stopping, getting off and enjoying the sights for a while."

On arrival, Cassini will begin a 96-minute burn designed to put the spacecraft into Saturn's orbit. As part of getting the spacecraft into orbit, Cassini will twice cross between known gaps in the rings. As a precautionary measure, the spacecraft will use its antenna as a shield to protect it from tiny particle hits.

A prime target for Cassini and the piggyback Huygens probe built by the European Space Agency is the smoggy moon Titan. "In the 350 years since the discovery of Titan we have come to see it as a world with surprising similarities to our own, yet located almost 1.5 billion kilometers (900 million miles) from the Sun," said Dr. Jonathan Lunine, Huygens interdisciplinary scientist and professor of planetary science and physics at the University of Arizona, Tucson. "With a thick, nitrogen-rich atmosphere and possible hydrocarbon seas, Titan may harbor organic compounds important in the chain of chemistry that led to life on Earth."

Six months after reaching Saturn, Cassini will release the wok-shaped Huygens probe towards Titan on Dec. 24, 2004 (Dec. 25 Universal Time). The event will be by far the most distant descent of a robotic probe on another object in the solar system. On Jan. 14, 2005 (Jan. 15 Universal Time), Huygens will enter Titan's atmosphere, deploy its parachute, and begin its scientific observations of Titan.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency, and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's office of Space Science, Washington, D.C. JPL designed, developed and assembled the Cassini orbiter.

For the latest images and more information about the Cassini-Huygens mission, visit <http://saturn.jpl.nasa.gov> .

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News Release: 2004-133 May 27, 2004

### **Raw Ingredients For Life Detected in Planetary Construction Zones**

NASA has announced new findings from the Spitzer Space Telescope, including the discovery of significant amounts of icy organic materials sprinkled throughout several "planetary construction zones," or dusty planet-forming discs, which circle infant stars.

These materials, icy dust particles coated with water, methanol and carbon dioxide, may help explain the origin of icy planetoids like comets. Scientists believe these comets may have endowed Earth with some of its water and many of its biogenic, life-enabling materials.

Drs. Dan Watson and William Forrest of the University of Rochester, N.Y, identified the ices. They surveyed five very young stars in the constellation Taurus, 420 light-years from Earth. Previous studies identified similar organic materials in space, but this is the first time they were seen unambiguously in the dust making up planet-forming discs.

In another finding, Spitzer surveyed a group of young stars and found intriguing evidence that one of them may have the youngest planet detected. The observatory found a clearing in the disc around the star CoKu Tau 4. This might indicate an orbiting planet swept away the disc material, like a vacuum leaving a cleared trail on a dirty carpet. The new findings reveal the structure of the gap more clearly than ever before. Because CoKu Tau 4 is about one million years old, the possible planet would be even younger. As a comparison, Earth is approximately 4.5-billion years old.

"These early results show Spitzer will dramatically expand our understanding of how stars and planets form, which ultimately helps us understand our origins," said Dr. Michael Werner, Spitzer project scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif., which manages the mission.

Spitzer also discovered two of the farthest and faintest planet-forming discs ever observed. These discs surround two of more than 300 newborn stars uncovered for the first time in a stunning new image of the dusty stellar nursery called RCW 49. It is approximately 13,700 light-years from Earth in the constellation Centaurus.

"Preliminary data suggest that all 300 or more stars harbor discs, but so far we've only looked closely at two. Both were found to have discs," said Dr. Ed Churchwell of the University of Wisconsin, Madison, Wis., principal investigator of the RCW 49 research, with Dr. Barbara Whitney of Space Science Institute, Boulder, Colo.

Planet-forming, or "protoplanetary," discs are a natural phase in a star's life. A star is born inside a dense envelope of gas and dust. Within this envelope, and circling the star, is a flat, dusty disc, where planets are born.

"By seeing what's behind the dust, Spitzer has shown us star and planet formation is a very active process in our galaxy," Churchwell said.

Spitzer's exquisitely sensitive infrared eyes can see planet-forming discs in great detail. "Previously, scientists could study only a small sample of discs, but Spitzer is already on its way toward analyzing thousands of discs," Werner said.

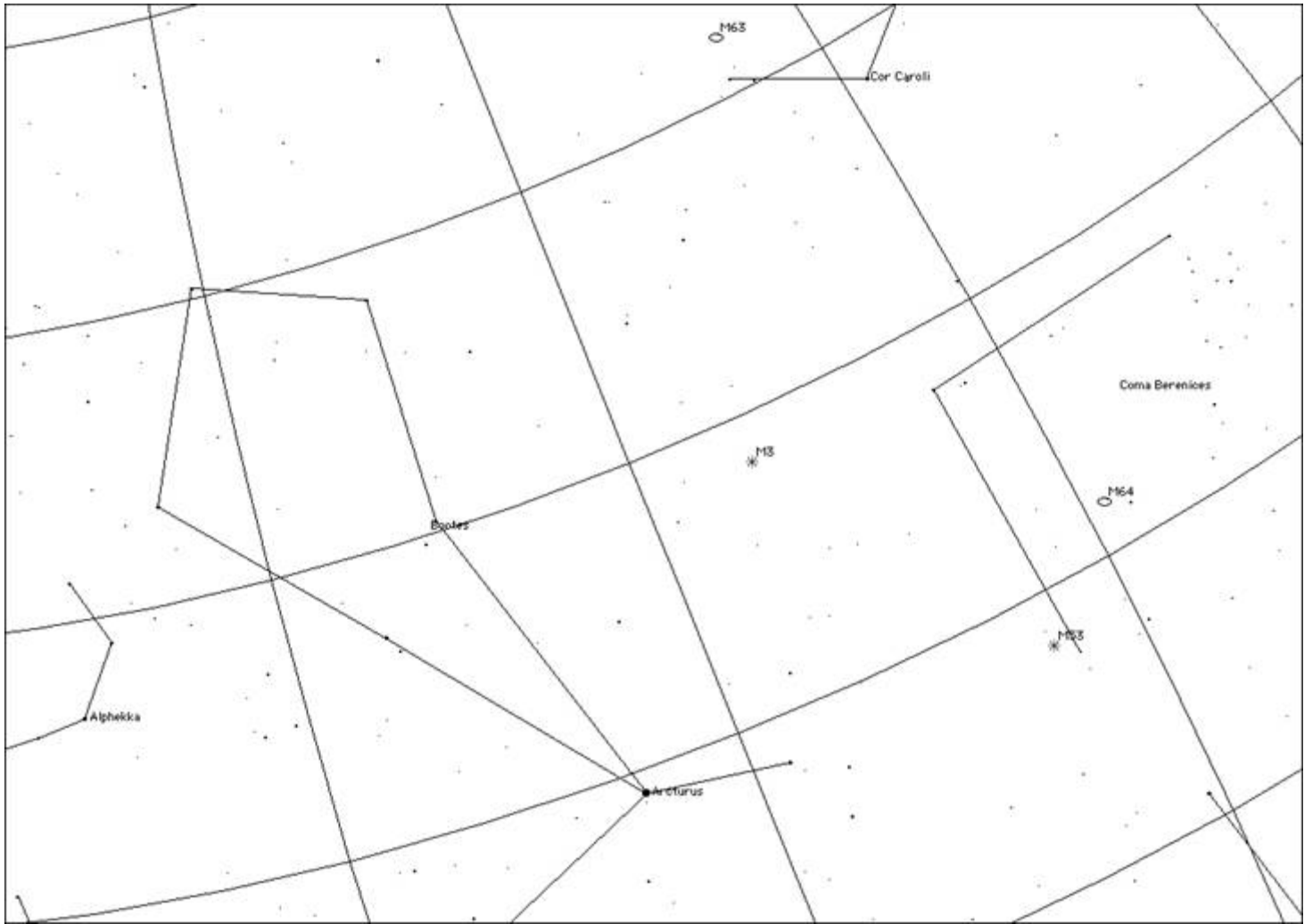
Spitzer's infrared spectrograph instrument, which breaks apart infrared light to see the signatures of various chemicals, was used to observe the organic ices and the clearing within CoKu Tau 4's disc. Spitzer's infrared array camera found the new stars in RCW 49. Papers on the research will appear in the September 1 issue of the journal *Astrophysical Journal Supplements*. For images and information about the research on the Internet, visit: <http://www.spitzer.caltech.edu> and <http://photojournal.jpl.nasa.gov>.

JPL manages the Spitzer Space Telescope mission for NASA's Office of Space Science, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, Pasadena, Calif. JPL is a division of Caltech. Spitzer's infrared spectrograph was built by Cornell University, Ithaca, N.Y., and Ball Aerospace Corporation, Boulder, Colo. The instrument's development was led by Dr. Jim Houck of Cornell. Spitzer's infrared array camera was built by NASA Goddard Space Flight Center, Greenbelt, Md. The camera's development was led by Dr. Giovanni Fazio of Smithsonian Astrophysical Observatory, Cambridge, Mass.

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### ***Mid Evening Observing Highlights for June***

Bright star Arcturus is almost directly overhead. The keystone of Hercules is high in the east. Leo is setting in the west. The bright stars Vega, Deneb, and Altair are rising in the east. These three stars form the summer triangle. The bright star Antares is rising in the southeast. The Big Dipper can be seen in the northwestern sky. The globular cluster M3 and be seen almost directly overhead. New moon occurs on June 17th and full moon occurs on June 3rd. The summer solstice begins on June 20th at 8:57 PM EDT. Comet NEAT is still in the northwestern sky between Leo Minor and Ursa Major. Comet LINEAR can be seen low in the western sky in Hydra at the end of the month. The image below shows the location of M3 as well as the globular cluster M53 and the galaxies M62 and M63.



### *Observations and Photographs*

The image below was taken by John Kocijanski. It shows the Space Station passing by Jupiter and Leo on 5/13/04 at 9:34. It was taken with an Olympus OM1 35mm camera with a 28mm lens on a fixed tripod for about 10-20 seconds using Fuji 800 film. The exposure was ended just as the ISS moved past Jupiter to achieve a “different” look.



## ***BARLOW BOB'S CORNER***

Barlow Bob is a member of the Rockland Astronomy Club.

Here are a couple of images Barlow Bob forwarded that were taken of him at the NEAF solar observing session. The first shows Barlow Bob and his scope. The second shows the line for viewing through the new Coronado PST. The images were taken by Mike G.



*2004 Dues are due, make checks payable to **Catskills Astronomy Club**.*

*Send to: Bud Wertheim, Treasurer  
143 Covered Bridge Road  
Livingston Manor, NY 12758*

*We just paid our Insurance policy and our annual tithe to the Astronomical League which is now \$5.00 per member plus the club dues so we need to keep our bank balance high enough or the bank will start charging us for maintaining our account. Currently they are not charging us anything.*

*Individual dues are: \$28.50 new members  
23.50 renewal of individual membership  
33.50 new family membership  
30.50 renewal of family membership*

We have been trying to save postage by notifying about dues via this newsletter which is mainly sent electronically as email. Only two are currently posted through regular mail to members who are not online with computers.