

## ***Catskills Astronomy Club News***

***4/1/05***

### ***Club News:***

The Northeast Astronomy Forum will be held at Rockland County Community College on April 16<sup>th</sup> and 17<sup>th</sup>. Our club has been offered a free space for a table on the balcony for the show. Right now it looks like we will be there on Saturday the 16th. Last year we went on Saturday. Anyone wishing to volunteer to man the table can contact John at kocis@verizon.net. The table worked out well for us last year and gave the club some exposure. We handed out observing schedules, newsletters, as well a NASA literature.

The March 5<sup>th</sup> observation session was canceled due to Walnut Mountain Park being snowed in. The March 12<sup>th</sup> observation session was canceled due to poor weather. The April observation sessions are scheduled for the 2<sup>nd</sup> and the 9<sup>th</sup>. Anyone interested in submitting an astronomical observation or photograph for the newsletter, please contact John at kocis@verizon.et.

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.

The club has 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 if you are interested in borrowing any of these.

### ***Astronomy News:***

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

News Release: 2005-038

March 2, 2005

#### ***Mars Rovers Break Driving Records, Examine Salty Soil***

On three consecutive days, NASA's Mars Exploration Rover Opportunity accomplished unprecedented feats of martian motion, covering more total ground in that period than either Opportunity or its twin, Spirit, did in their first 70 days on Mars.

Spirit, meanwhile, has uncovered soil that is more than half salt, adding to the evidence for Mars' wet past. The golf-cart-size robots successfully completed their three-month primary missions in April 2004 and are continuing extended mission operations.

Opportunity set a one-day distance record for martian driving, 177.5 meters (582 feet), on Feb. 19. That was the first day of a three-day plan transmitted to the rover as a combined set of weekend instructions. During the preceding week, engineers at NASA's Jet Propulsion Laboratory had sent Opportunity and Spirit an upgrade of the rovers' software, onboard intelligence the rovers use for carrying out day-to-day commands.

The new record exceeded a two-week old former best by 13 percent. As on all previous long drives by either rover, the traverse began with "blind" driving, in which the rover followed a route determined in advance by rover planners at JPL using stereo images. That portion lasted an hour and covered most of the day's distance. Then Opportunity switched to "autonomous" driving for two and a half hours, pausing every 2 meters (6.6 feet) to look ahead for obstacles as it chose its own route ahead.

The next day, Opportunity used its new software to start another drive navigating for itself. "This is the first time either rover has picked up on a second day with continued autonomous driving," said Dr. Mark Maimone, rover mobility software engineer at JPL. "It's good to sit back and let the rover do the driving for us."

Not only did Opportunity avoid obstacles for four hours of driving, it covered more ground than a football field. Opportunity has a favorable power situation, due to relatively clean solar panels and increasing minutes of daylight each day as spring approaches in Mars' southern hemisphere. This allows several hours of operations daily.

On the third day of the three-day plan, the robotic geologist continued navigating itself and drove even farther, 109 meters (357 feet), pushing the three-day total to 390 meters (nearly a quarter mile). In one long weekend, Opportunity covered a distance equivalent to more than half of the 600 meters that had been part of each rover's original mission-success criteria during their first three months on Mars.

Opportunity has now driven 3,014 meters (1.87 miles) since landing; Spirit even farther, 4,157 meters (2.58 miles). Opportunity is heading south toward a rugged landscape called "etched terrain," where it might find exposures of deeper layers of bedrock than it has seen so far. Spirit is climbing "Husband Hill," with a pause on a ridge overlooking a valley north of the summit to see whether any potential targets below warrant a side trip.

As Spirit struggled up the slope approaching the ridgeline, the rover's wheels churned up soil that grabbed scientists' attention. "This was an absolutely serendipitous discovery," said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the rovers' science instruments. "We said, 'My gosh, that soil looks very bright. Before we go away, we should at least take a taste.'"

The bright patch of disturbed soil, dubbed "Paso Robles," has the highest salt concentration of any rock or soil ever examined on Mars. Combined information gained from inspecting it with Spirit's three spectrometers and panoramic camera suggests its main ingredient is an iron sulfate salt with water molecules bound into the mineral. The soil patch is also rich in phosphorus, but not otherwise like a high-phosphorus rock, called "Wishstone," that Spirit examined in December. "We're still trying to work out what this means, but clearly, with this much salt around, water had a hand here," Squyres said.

Meanwhile, scientists are re-calibrating data from both rovers' alpha particle X-ray spectrometers. These instruments are used to assess targets' elemental composition. The sensor heads for the two instruments were switched before launch. Therefore, data that Opportunity's spectrometer has collected have been analyzed using calibration files for Spirit's, and vice-versa. Fortunately, because the sensor heads are nearly identical, the effect on the elemental abundances determined by the instruments was very small. The scientists have taken this opportunity to go back and review the results for the mission so far and re-compute using correct

calibration files. "The effect in all cases was less than the uncertainties in results, so none of our science conclusions are affected," Squyres said.

JPL, a division of the California Institute of Technology in Pasadena, has managed NASA's Mars Exploration Rover project since it began in 2000. Images and additional information about the rovers and their discoveries are available on the Internet at [http://www.nasa.gov/vision/universe/solarsystem/mer\\_main.html](http://www.nasa.gov/vision/universe/solarsystem/mer_main.html) and <http://marsrovers.jpl.nasa.gov> .

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NEWS RELEASE: 2005-036

March 1, 2005

### **NASA's Spitzer Space Telescope Exposes Dusty Galactic Hideouts**

How do you hide something as big and bright as a galaxy? You smother it in cosmic dust. NASA's Spitzer Space Telescope saw through such dust to uncover a hidden population of monstrously bright galaxies approximately 11 billion light-years away.

These strange galaxies are among the most luminous in the universe, shining with the equivalent light of 10 trillion suns. But, they are so far away and so drenched in dust, it took Spitzer's highly sensitive infrared eyes to find them.

"We are seeing galaxies that are essentially invisible," said Dr. Dan Weedman of Cornell University, Ithaca, N.Y., co-author of the study detailing the discovery, published in today's issue of the *Astrophysical Journal Letters*. "Past infrared missions hinted at the presence of similarly dusty galaxies over 20 years ago, but those galaxies were closer. We had to wait for Spitzer to peer far enough into the distant universe to find these."

Where is all this dust coming from? The answer is not quite clear. Dust is churned out by stars, but it is not known how the dust wound up sprinkled all around the galaxies. Another mystery is the exceptional brightness of the galaxies. Astronomers speculate that a new breed of unusually dusty quasars, the most luminous objects in the universe, may be lurking inside. Quasars are like giant light bulbs at the centers of galaxies, powered by huge black holes.

Astronomers would also like to determine whether dusty, bright galaxies like these eventually evolved into fainter, less murky ones like our own Milky Way. "It's possible stars like our Sun grew up in dustier, brighter neighborhoods, but we really don't know. By studying these galaxies, we'll get a better idea of our own galaxy's history," said Cornell's Dr. James Houck, lead author of the study.

The Cornell-led team first scanned a portion of the night sky for signs of invisible galaxies using an instrument on Spitzer called the multiband imaging photometer. The team then compared the thousands of galaxies seen in this infrared data to the deepest available ground-based optical images of the same region, obtained by the National Optical Astronomy Observatory Deep Wide-Field Survey. This led to identification of 31 galaxies that can be seen only by Spitzer. "This large area took us many months to survey from the ground," said Dr. Buell Jannuzi, co-principal investigator for the Deep Wide-Field Survey, "so the dusty galaxies Spitzer found truly are needles in a cosmic haystack."

Further observations using Spitzer's infrared spectrograph revealed the presence of silicate dust in 17 of these 31 galaxies. Silicate dust grains are planetary building blocks like sand, only smaller. This is the furthest back in time that silicate dust has been detected around a galaxy. "Finding silicate dust at this very early epoch is important for understanding when planetary systems like our own arose in the evolution of galaxies," said Dr. Thomas Soifer, study co-author, director of the Spitzer Science Center, Pasadena, Calif., and professor of physics at the California Institute of Technology, also in Pasadena.

This silicate dust also helped astronomers determine how far away the galaxies are from Earth. "We can break apart the light from a distant galaxy using a spectrograph, but only if we see a recognizable signature from a mineral like silicate, can we figure out the distance to that galaxy," Soifer said.

In this case, the galaxies were dated back to a time when the universe was only three billion years old, less than one-quarter of its present age of 13.5 billion years. Galaxies similar to these in dustiness, but much closer to Earth, were first hinted at in 1983 via observations made by the joint NASA-European Infrared Astronomical Satellite. Later, the European Space Agency's Infrared Space Observatory faintly recorded comparable, nearby objects. It took Spitzer's improved sensitivity, 100 times greater than past missions, to finally seek out the dusty galaxies at great distances.

The National Optical Astronomy Observatory Deep Wide-Field Survey used the National Science Foundation's 4-meter (13-foot) telescope at Kitt Peak National Observatory, located southwest of Tucson, Ariz.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington, D.C. Science operations are conducted at the Spitzer Science Center. JPL is a division of Caltech. The infrared spectrograph was built by Ball Aerospace Corporation, Boulder, Colo., and Cornell; its development was led by Houck. The multiband imaging photometer was built by Ball Aerospace Corporation, the University of Arizona, Tucson, Ariz., and Boeing North American, Canoga Park, Calif.; its development was led by Dr. George Rieke of the University of Arizona.

The Infrared Astronomical Satellite was a joint effort between NASA, the Science and Engineering Research Council, United Kingdom and the Netherlands Agency for Aerospace Programmes, the Netherlands.

Artist's conceptions, images and additional information about the Spitzer Space Telescope are available at <http://www.spitzer.caltech.edu>.

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News Release: 2005-050

March 22, 2005

## **NASA'S Spitzer Marks Beginning of New Age of Planetary Science**

NASA's Spitzer Space Telescope has for the first time captured the light from two known planets orbiting stars other than our Sun. The findings mark the beginning of a new age of planetary science, in which "extrasolar" planets can be directly measured and compared.

"Spitzer has provided us with a powerful new tool for learning about the temperatures, atmospheres and orbits of planets hundreds of light-years from Earth," said Dr. Drake Deming of NASA's Goddard Space Flight Center, Greenbelt, Md., lead author of a new study on one of the planets.

"It's fantastic," said Dr. David Charbonneau of the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass., lead author of a separate study on a different planet. "We've been hunting for this light for almost 10 years, ever since extrasolar planets were first discovered." The Deming paper appears today in Nature's online publication; the Charbonneau paper will be published in an upcoming issue of the Astrophysical Journal.

So far, all confirmed extrasolar planets, including the two recently observed by Spitzer, have been discovered indirectly, mainly by the "wobble" technique and more recently, the "transit" technique. In the first method, a planet is detected by the gravitational tug it exerts on its parent star, which makes the star wobble. In the second, a planet's presence is inferred when it passes in front of its star, causing the star to dim, or blink. Both strategies use visible-light telescopes and indirectly reveal the mass and size of planets, respectively.

In the new studies, Spitzer has directly observed the warm infrared glows of two previously detected "hot Jupiter" planets, designated HD 209458b and TrES-1. Hot Jupiters are extrasolar gas giants that zip closely around their parent stars. From their toasty orbits, they soak up ample starlight and shine brightly in infrared wavelengths.

To distinguish this planet glow from that of the fiery hot stars, the astronomers used a simple trick. First, they used Spitzer to collect the total infrared light from both the stars and planets. Then, when the planets dipped behind the stars as part of their regular orbit, the astronomers measured the infrared light coming from just the stars. This pinpointed exactly how much infrared light belonged to the planets. "In visible light, the glare of the star completely overwhelms the glimmer of light reflected by the planet," said Charbonneau. "In infrared, the star-planet contrast is more favorable because the planet emits its own light."

The Spitzer data told the astronomers that both planets are at least a steaming 1,000 Kelvin (727 degrees Celsius, 1340 Fahrenheit). These measurements confirm that hot Jupiters are indeed hot. Upcoming Spitzer observations using a range of infrared wavelengths are expected to provide more information about the planets' winds and atmospheric compositions.

The findings also reawaken a mystery that some astronomers had laid to rest. Planet HD 209458b is unusually puffy, or large for its mass, which some scientists thought was the result of an unseen planet's gravitational pull. If this theory had been correct, HD 209458b would have a non-circular orbit. Spitzer discovered that the planet does in fact follow a circular path. "We're back to square one," said Dr. Sara Seager, Carnegie Institution of Washington, Washington, co-author of the Deming paper. "For us theorists, that's fun."

Spitzer is ideally suited for studying extrasolar planets known to transit, or cross, stars the size of our Sun out to distances of 500 light-years. Of the seven known transiting planets, only the two mentioned here meet those criteria. As more are discovered, Spitzer will be able to collect their light – a bonus for the observatory, considering it was not originally designed to see extrasolar planets. NASA's future Terrestrial Planet Finder coronagraph, set to launch in 2016, will be able to directly image extrasolar planets as small as Earth.

Shortly after its discovery in 1999, HD 209458b became the first planet detected via the transit method. That result came from two teams, one led by Charbonneau. TrES-1 was found via the transit method in 2004 as part of the NASA-funded Trans-Atlantic Exoplanet Survey, a ground-based telescope program established in part by Charbonneau.

Artist's concepts and additional information about the Spitzer Space Telescope are available at <http://www.spitzer.caltech.edu/Media> .

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center, at the California Institute of Technology in Pasadena. Caltech manages JPL for NASA. For more information contact Nancy Neal Jones, Goddard Space Flight Center, 301/286-0039; or David Aguilar, Harvard-Smithsonian Center for Astrophysics, 617/495-7462.

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Press Release: 2005-046

March 16, 2005

### ***Cassini Finds an Atmosphere on Saturn's Moon Enceladus***

The Cassini spacecraft's two close flybys of Saturn's icy moon Enceladus have revealed that the moon has a significant atmosphere. Scientists, using Cassini's magnetometer instrument for their studies, say the source may be volcanism, geysers, or gases escaping from the surface or the interior.

When Cassini had its first encounter with Enceladus on Feb. 17 at an altitude of 1,167 kilometers (725 miles), the magnetometer instrument saw a striking signature in the magnetic field. On March 9, Cassini approached to within 500 kilometers (310 miles) of Enceladus' surface and obtained additional evidence.

The observations showed a bending of the magnetic field, with the magnetospheric plasma being slowed and deflected by the moon. In addition, magnetic field oscillations were observed. These are caused when electrically charged (or ionized) molecules interact with the magnetic field by spiraling around the field line. This interaction creates characteristic oscillations in the magnetic field at frequencies that can be used to identify the molecule. The observations from the Enceladus flybys are believed to be due to ionized water vapor.

"These new results from Cassini may be the first evidence of gases originating either from the surface or possibly from the interior of Enceladus," said Dr. Michele Dougherty, principal investigator for the Cassini magnetometer and professor at Imperial College in London. In 1981, NASA's Voyager spacecraft flew by Enceladus at a distance of 90,000 kilometers (56,000 miles) without detecting an atmosphere. It's possible detection was beyond Voyager's capabilities, or something may have changed since that flyby.

This is the first time since Cassini arrived in orbit around Saturn last summer that an atmosphere has been detected around a moon of Saturn, other than its largest moon, Titan. Enceladus is a relatively small moon. The amount of gravity it exerts is not enough to hold an atmosphere very long. Therefore, at Enceladus, a strong continuous source is required to maintain the atmosphere.

The need for such a strong source leads scientists to consider eruptions, such as volcanoes and geysers. If such eruptions are present, Enceladus would join two other such active moons, Io at Jupiter and Triton at Neptune. "Enceladus could be Saturn's more benign counterpart to Jupiter's dramatic Io," said Dr. Fritz Neubauer, co-investigator for the Cassini magnetometer, and a professor at the University of Cologne in Germany.

Since the Voyager flyby, scientists have suspected that this moon is geologically active and is the source of Saturn's icy E ring. Enceladus is the most reflective object in the solar system, reflecting about 90 percent of the sunlight that hits it. If Enceladus does have ice volcanoes, the high reflectivity of the moon's surface might result from continuous deposition of icy particles originating from the volcanoes.

Enceladus' diameter is about 500 kilometers (310 miles), which would fit in the state of Arizona. Yet despite its small size, Enceladus exhibits one of the most interesting surfaces of all the icy satellites.

For images and information on the Cassini mission visit <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini> .

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 Science Mission Directorate, Washington, D.C. The Cassini orbiter was designed, developed and assembled at JPL.

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News Release: 2005-039

March 4, 2005

### **Moonbeams Shine on Einstein, Galileo and Newton**

Thirty-five years after Moon-walking astronauts placed special reflectors on the lunar surface, scientists have used these devices to test Albert Einstein's general theory of relativity to unprecedented accuracy. The findings, which also confirm theories from Galileo Galilei and Isaac Newton, may help to explain physical laws of the universe and benefit future space missions.

"Our research with the Lunar Laser Ranging experiment probes the equivalence principle, a foundation of Einstein's general theory of relativity, with extreme accuracy," said Dr. James Williams, a research scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif. Galileo established this principle in 1604 when he dropped objects of various weights and composition from Italy's Leaning Tower of Pisa. All the objects were affected equally by gravity, so they fell at the same rate.

Newton published a supporting explanation in 1687 in his Principia, and Einstein extended the principle nearly 100 years ago. Einstein's premise, called the strong equivalence principle, holds that all forms of matter accelerate at the same rate in response to gravity. This principle became a foundation of Einstein's general theory of relativity.

The Lunar Laser Ranging experiment confirms that the Moon and Earth "fall toward" the Sun at

the same rate, even though Earth has a large iron core below its rocky mantle, while the Moon is mostly rocky with a much smaller core. The findings by Williams and Drs. Slava Turyshev and Dale Boggs, also of JPL, have been published in the Physical Review Letters.

"Lunar laser ranging can conduct very accurate tests of gravity and fundamental physics," said Williams, who pointed out that small variations in gravity are difficult to study because the force is weak, unless very large masses are used. The new results of this experiment provide a bonanza for modern physics.

"An important property of gravity is its universal effect on massive objects, despite their size and composition. This is why, as we understand more about gravity in the solar system, we learn a lot about gravitational and cosmological processes in the entire universe," said Turyshev.

"In addition to providing the most accurate test yet of the strong equivalence principle, our experiment also limits any possible changes in Newton's gravitational constant," said Turyshev. The gravitational constant deals with the attraction between objects in space, and some theories suggest that this attraction would change over time. If so, the general theory of relativity would need modification.

"This latest research shows no evidence of such a change. Both findings -- about the strong equivalence principle and the gravitational constant -- boost Einstein's theory," added Turyshev.

Great strides have been made over the past decade in refining the theories of Einstein, Galileo and Newton. The latest findings are twice as accurate as any previous results on the strong equivalence principle, and 10 times as accurate as anything previously published on the variation of Newton's gravitational constant

The JPL team tested the theories by beaming laser pulses to four Moon reflectors from McDonald Observatory in western Texas, and an observatory in southern France. The lunar reflectors bounced the laser beams straight back to Earth, where the roundtrip travel time was measured. Three of the reflectors were installed by the Apollo 11, 14 and 15 astronauts, and one built by France was carried on the unmanned Soviet Lunokhod 2 rover.

The current Moon reflectors require no power and still work perfectly after 35 years. As NASA pursues the vision of taking humans back to the Moon, and eventually to Mars and beyond, new, more precise laser ranging devices could be placed first on the Moon and then on Mars. To guide a spacecraft to a precise location on the Moon and to navigate trips on its surface, the Moon's orbit, rotation and orientation must be accurately known. Lunar laser ranging measurements are helping future human and robotic missions to the Moon.

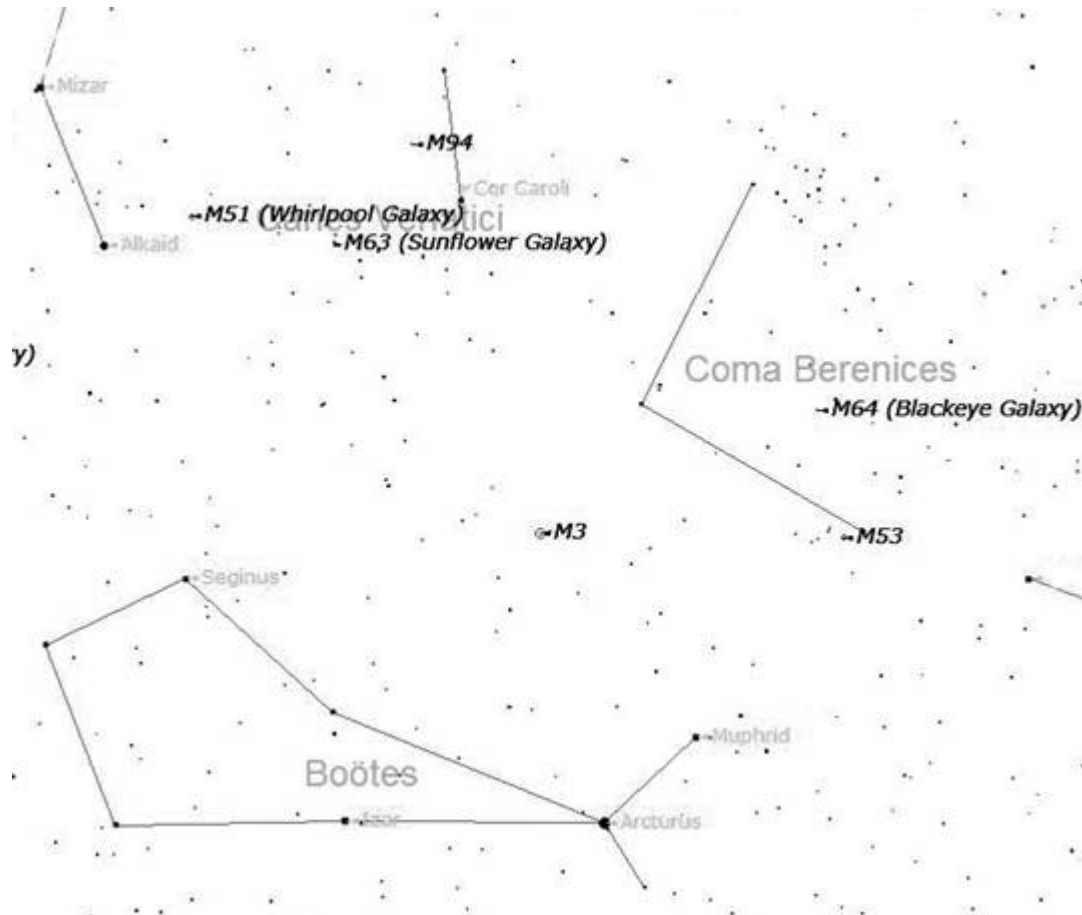
More information about the research is available online at <http://arxiv.org/abs/gr-qc/0411113> or <http://funphysics.jpl.nasa.gov/physics/index.html> .

The research was conducted under NASA's Astronomy and Physics Research and Analysis program, part of the agency's Science Mission Directorate, Washington, D.C. JPL, is a division of the California Institute of Technology, Pasadena.

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## *Mid Evening Observing Highlights for April*

Jupiter is high in the eastern sky in Leo. The open cluster M44 otherwise known as the Beehive Cluster in Cancer is high in the southern sky. Saturn is high in the western sky. Orion is setting in the west. The bright star Arcturus and the globular star cluster M3 are rising in the eastern sky. The bright star Spica is rising in the southeast. The constellations Virgo, Coma Berenices, Ursa Major, and Leo have many observable galaxies within their boundaries. New moon will occur on April 8<sup>th</sup> and full moon will occur on April 24<sup>th</sup>. On April 22<sup>nd</sup> the moon can be found in between Jupiter and the bright star Spica. The image below shows the location of M3 as well as some surrounding galaxies.



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

Barlow Bob is a member of the Rockland Astronomy Club.

## **THE AMATEUR ASTRONOMERS ASSOCIATION OF PRINCETON**

**PRESENTS THE 16<sup>TH</sup> ANNUAL  
JERSEY STARQUEST**

Held at the Hope Conference and Renewal Center, Hope, NJ (908) 459-4435  
Beginning at 5 PM Friday, **June 3<sup>th</sup>**, 2005 and running through 12 PM Sunday, **June 5<sup>th</sup>**  
Please note: This event will take place regardless of the weather conditions!

### **Featuring**

Stargazing at an amazing, dark sky location  
DOZENS OF ASTRONOMICAL TELESCOPES IN OPERATION  
AAAP sponsored "Deep Sky Observing" contest  
Free space available for astronomical swap meet  
Indoor cabin accommodations (First come, first served)  
Ample space for camping & RV's  
Hot showers for all  
Three catered meals  
Raffle & Door prizes

### **Scheduled Lecture Program**

Prominent Experts will conduct Saturday afternoon seminars.  
A keynote speaker will address the group after Saturday night dinner.

### **Other Planned Activities Include**

Solar Observing  
Demonstration of Laser Collimating  
Field Trip to AAAP Observatory at Jenny Jump  
CCD Demonstration  
Workshop on **learning to use your new telescope**

### **Plus**

Swimming (life guards provided), Fishing, Volleyball, Basketball, Hiking, Game room  
Boating on two lakes adjacent to property, and on the nearby  
Pequest, and Paulins Kill rivers— bring your own kayak or canoe.

### **Registration Fees**

Camping and RV -- \$35.00 per person (\$45 after May 20<sup>th</sup>)  
Bunkhouse -- \$45.00 per person (\$55 after May 20<sup>th</sup>)  
Family Registration Discount – After 2<sup>nd</sup> paying family member, subtract \$5.00 per child, 6-12  
Children under 6 years of age – Free

### **Meals**

**(THIS YEAR FOOD IS AVAILABLE ONLY ON SATURDAY)**  
**( Saturday; breakfast, lunch, and dinner. No meals provided on Friday or Sunday)**  
Adult -- \$30.00 per person  
Child (ages 6 – 12) -- \$25.00 per person  
Children under 6 years of age – Free

Please send the registration form and your check or money order (payable to AAAP) to:

Jersey Starquest Registration  
c/o Anthony Monticello  
270 Fieldboro Drive  
Lawrenceville, NJ 08648

Need more information? Send email to Anthony Monticello at [anthony\\_monticello@hotmail.com](mailto:anthony_monticello@hotmail.com)

*NASA Space Place*

**Utterly Alien**

by Dr. Tony Phillips

There's a planet in our solar system so cold that in winter its nitrogen atmosphere freezes and falls to the ground. The empty sky becomes perfectly clear, jet-black even at noontime. You can see thousands of stars. Not one twinkles.

The brightest star in the sky is the Sun, so distant and tiny you could eclipse it with the head of a pin. There's a moon, too, so *big* you couldn't blot it out with your entire hand. Together, moonlight and sunshine cast a twilight glow across the icy landscape revealing . . . what? twisted spires, craggy mountains, frozen volcanoes?

No one knows, because no one has ever been to Pluto.

"Pluto is an alien world," says Alan Stern of the Southwest Research Institute in Colorado. "It's the only planet never visited or photographed by NASA space probes."

That's about to change. A robot-ship called New Horizons is scheduled to blast off for Pluto in January 2006. It's a long journey: More than 6 billion kilometers (about 3.7 billion miles). New Horizons won't arrive until 2015.

"I hope we get there before the atmosphere collapses," says Stern, the mission's principal investigator. Winter is coming, and while it's warm enough now for Pluto's air to float, it won't be for long. Imagine seeing a planet's atmosphere collapse. New Horizons might!

"This is a flyby mission," notes Stern. "Slowing the spacecraft down to *orbit* Pluto would burn more fuel than we can carry." New Horizons will glide past the planet furiously snapping pictures. "Our best images will resolve features the size of a house," Stern says.

The cameras will also target Pluto's moon, Charon. Charon is more than half the size of Pluto, and the two circle one another only 19,200 kilometers (12,000 miles) apart. (For comparison, the Moon is 382,400 kilometers [239,000 miles] from Earth.) No wonder some astronomers call the pair a "double planet."

Researchers believe that Pluto and Charon were created billions of years ago by some terrific impact, which split a bigger planet into two smaller ones. This idea is supported by the fact that Pluto and Charon spin on their sides like sibling worlds knocked askew.

Yet there are some curious differences: Pluto is bright; Charon is darker. Pluto is covered with frozen nitrogen; Charon by frozen water. Pluto has an atmosphere; Charon might not. "These are things we plan to investigate," says Stern.

Two worlds. So alike, yet so different. So utterly alien. Stay tuned for New Horizons.

Find out more about the New Horizons mission at [pluto.jhuapl.edu/](http://pluto.jhuapl.edu/). Kids can learn amazing facts about Pluto at [spaceplace.nasa.gov/en/kids/pluto](http://spaceplace.nasa.gov/en/kids/pluto).

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



*New Horizons spacecraft will get a gravity assist from Jupiter on its long journey to Pluto-Charon. Credit: Southwest Research Institute (Dan Durda)/Johns Hopkins University Applied Physics Laboratory (Ken Moscati).*