



Astronomy Club News
June, 2006
John Kocijanski.... Editor

Jim McKeegan..... President
John Kocijanski.... Vice-President
Lisa Brody..... Treasurer
Bud Wertheim..... Secretary

The club attended the Northeast astronomy Forum at Rockland Community College in Suffern, NY on May 6th. We had a table on the balcony of the fieldhouse near the entrance and were able to catch people as they came in. We gave out club information as well as NASA outreach materials. A number of people expressed interest in the club. The image below shows the line to purchase blemished Televue eyepieces and other products at the beginning of the day.



The May 27th observation session was held at Walnut Mountain Park in Liberty. Seven people attended. The sky conditions were clear but windy conditions made the seeing poor. We were able to observe a variety of deep sky objects including many galaxies. The larger telescopes showed a great view of the Sombrero Galaxy

(M104) in Virgo. Its prominent dust lane was easily seen. Early in the evening we observed Jupiter. A shadow transit of its moon Europa was seen as well as the Great Red Spot.

Plans are in the works for another dinner and a movie indoor meeting at Morgan Outdoors in Livingston Manor, NY for June 24th. More details will be worked out in the near future. After the indoor meeting the outdoor observation session will be held if the skies are clear.

The July 29th dark sky observation session will be hosted by Dana Duke at the Big Twig recording studio in Roscoe, NY. More details will be worked out in the near future.

The observation sessions scheduled for May 20th was canceled due to poor weather.

June observation sessions are scheduled for the 17th and 24th.

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: 2006-080

May 31, 2006

NASA-Funded Study Says Saturn's Moon Enceladus Rolled Over

Saturn's moon Enceladus – an active, icy world with an unusually warm south pole – may have performed an unusual trick for a planetary body. New research shows Enceladus rolled over, literally, explaining why the moon's hottest spot is at the south pole.

Enceladus recently grabbed scientists' attention when the Cassini spacecraft observed icy jets and plumes indicating active geysers spewing from the tiny moon's south polar region.

"The mystery we set out to explain was how the hot spot could end up at the pole if it didn't start there," said Francis Nimmo, assistant professor of Earth sciences, University of California, Santa Cruz.

The researchers propose the reorientation of the moon was driven by warm, low-density material rising to the surface from within Enceladus. A similar process may have happened on Uranus' moon Miranda, they said. Their findings are in this week's journal Nature.

"It's astounding that Cassini found a region of current geological activity on an icy moon that we would expect to be frigidly cold, especially down at this moon's equivalent of Antarctica," said Robert Pappalardo, co-author and planetary scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "We think the moon rolled over to put a deeply seated warm, active area there." Pappalardo worked on the study while at the University of Colorado.

Rotating bodies, including planets and moons, are stable if more of their mass is close to the equator. "Any redistribution of mass within the object can cause instability with respect to the axis of rotation. A reorientation will tend to position excess mass at the equator and areas of low density at the poles," Nimmo said. This is precisely what happened to Enceladus.

Nimmo and Pappalardo calculated the effects of a low-density blob beneath the surface of Enceladus and showed it could cause the moon to roll over by up to 30-degrees and put the blob at the pole.

Pappalardo used an analogy to explain the Enceladus rollover. "A spinning bowling ball will tend to roll over to put its holes -- the axis with the least mass -- vertically along the spin axis. Similarly, Enceladus apparently rolled over to place the portion of the moon with the least mass along its vertical spin axis," he said.

The rising blob (called a "diapir") may be within either the icy shell or the underlying rocky core of Enceladus. In either case, as the material heats up it expands and becomes less dense, then rises toward the surface. This rising of warm, low-density material could also help explain the high heat and striking surface features, including the geysers and "tiger-stripe" region suggesting fault lines caused by tectonic stress.

Internal heating of Enceladus probably results from its eccentric orbit around Saturn. "Enceladus gets squeezed and stretched by tidal forces as it orbits Saturn, and that mechanical energy is transformed into heat energy in the moon's interior," added Nimmo.

Future Cassini observations of Enceladus may support this model. Meanwhile, scientists await the next Enceladus flyby in 2008 for more clues.

This research was supported by grants from NASA. The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of Caltech, manages the mission for NASA's Science Mission Directorate. The Cassini orbiter was designed, developed and assembled at JPL.

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

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Jet Propulsion Laboratory, Pasadena, Calif.
Image Advisory: 2006-075

May 10, 2006

Spitzer Telescope Sees Trail of Comet Crumbs

NASA's Spitzer Space Telescope has snapped a picture of the bits and pieces making up Comet 73P/Schwassman-Wachmann 3, which is continuing to break apart on its periodic journey around the sun. The new infrared view shows several chunks of the comet riding along its own dusty trail of crumbs.

"Spitzer has revealed a trail of meteor-sized debris filling the comet's orbit," said Dr. William T. Reach of NASA's Spitzer Science Center at the California Institute of Technology, Pasadena. Reach and his team recently observed the comet using Spitzer. The picture can be viewed at <http://www.spitzer.caltech.edu/Media/releases/ssc2006-13/ssc2006-13a.shtml> .

Comet 73P/Schwassman-Wachmann 3 consists of a collection of fragments that file along like ducks in a row around the sun every 5.4 years. This year, the bunch will pass by Earth beginning on May 12 before swinging by the sun on June 6. The fragments won't get too close to Earth, about 7.3 million miles, or 30 times the distance between Earth and the moon, but they should be visible through binoculars in the countryside night

skies.

The icy comet began falling apart in 1995 during one of its tropical trips to the sun. Astronomers believe that its crusty outer layer cracked due to the heat, allowing fresh ice to evaporate and split the comet apart.

During the past six weeks, amateur and professional astronomers have been watching the comet fall apart before their telescopes' eyes. Spitzer viewed the broken comet from its quiet perch up in space May 4 to May 6, covering a portion of the sky that allowed it to spot 45 of the 58 known fragments.

The observatory's infrared view also provides the first look at the dusty trail left by the disintegrating comet after it splintered apart in 1995. The trail is made up of comet dust, pebbles and rocks that occasionally rain down on Earth in what is called the Tau Herculid meteor shower. From May 19 to June 19, as Earth passes through the outskirts of the trail, only a weak meteor shower is expected, with just a few "shooting stars" visible in the night sky. A larger meteor shower might occur in 2022 if Earth crosses near the comet's wake as predicted.

Spitzer's infrared eyes were able to see the dusty comet bits lining the trail because the dust is warmed by sunlight and glows at infrared wavelengths. Most of the dust particles, specifically the millimeter-sized nuggets, had never been seen before. Reach said that these particles probably represent the natural deterioration of the comet over the years, a process commonly observed in intact comets.

The comet dust also adds up to more evidence for the "icy dirtball" theory of comets. In recent years, more and more astronomers are coming to think of comets not as snowballs coated in dust, but as dirtballs crusted with ice.

"By measuring the brightness and extent of the debris trail, we are trying to find out whether most of the comet's mass disintegrates into vapors from evaporating ice, the house-sized chunks seen in images from the Hubble Space Telescope, or the meteor-sized debris seen in the Spitzer images," said Reach.

Reach and his team will continue to study the Spitzer data for clues to how the comet broke up. Their infrared data will tell them the sizes of the major fragments, which might indicate whether the comet did, as believed, crack under the thermal stress.

Comet 73P/Schwassman-Wachmann 3 should be dimly visible through binoculars on a clear night between the Cygnus and Pegasus constellations from May 12 to May 28. For more information about viewing the comet or the meteors, visit http://science.nasa.gov/headlines/y2006/24mar_73p.htm . None of the comet's fragments pose a danger to Earth. For more information, see http://www.nasa.gov/mission_pages/hubble/Comet_73P.html

Members of Reach's team include: Dr. Michael Kelley of the University of Minnesota, Twin Cities; Dr. Carey M. Lisse of the Johns Hopkins University's Applied Physics Laboratory, Laurel, Md.; Dr. Mark Sykes of Planetary Science Institute, Tucson, Ariz.; and Dr. Masateru Ishiguro of the Institute of Space and Astronautical Science, Japan.

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. Spitzer's multi-band imaging photometer, which made the observations, was built by Ball Aerospace Corporation, Boulder, Colo.; the University of Arizona, Tucson; and Boeing North American, Canoga Park, Calif. The instrument's principal investigator is Dr. George Rieke of the University of Arizona.

For more information about NASA and agency programs on the Web, visit <http://www.nasa.gov/home/> .

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News Release: 2006-071

May 4, 2006

Cassini Offers New Hints on Length of Saturn Day

We all know Earth rotates every 24 hours, but scientists have long had difficulty pinpointing how long the day is on Saturn. The magnetometer onboard the Cassini spacecraft has, for the first time ever, measured a periodic signal in Saturn's magnetic field, key information to finally understanding the length of a Saturn day and the evolution of this gaseous planet.

The latest research suggests a Saturn day is 10 hours, 47 minutes, 6 seconds (plus or minus 40 seconds). That's 8 minutes slower than NASA Voyager results from the early 1980s, and slower than previous estimates from another Cassini instrument. The magnetometer results provide the best estimate of the Saturn day to date, because it can see deep inside Saturn. These Cassini results are in the May 4 issue of the journal *Nature*.

"Measuring the rotation period of a rocky planet like Earth is easy, but measurements for planets made of gas, such as Saturn, pose problems," said the lead author of the paper, Dr. Giacomo Giampieri, a researcher at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

Planets rotate around their "spin" axes as they orbit about the sun. Rocky planets like Earth and Mars have rotation periods that are easy to measure because we can see surface features as they go by, such as the continents as viewed from space. Gaseous planets do not have a solid surface to track.

The magnetic field is generated deep inside Saturn's liquid metallic core by flowing electric currents. By measuring the field, researchers can determine the length of the day on Saturn.

"Making this measurement has been one of the most important science goals for the mission," said Professor Michele Dougherty of Imperial College London. "Finding a distinct periodic rhythm in the magnetic field helps us understand the internal structure of Saturn that in turn will help us understand how it formed."

Knowing the length of a day or how fast the planet rotates is critical to understanding the internal structure of the planet and modelling the weather patterns on Saturn.

On approach to Saturn, Cassini's radio and plasma wave instrument measured radio signals and predicted that the day on Saturn was 10 hours, 45 minutes, 45 seconds. That was considered a very good estimate at the time.

Since the Voyager days scientists have been seeing changes in the period of radio observations. They knew that it was virtually impossible to slow down or speed up a mass as large as Saturn. As Cassini's measurements of the rhythms of natural radio signals from the planet continued to vary, scientists began to realize these signals were probably not a direct measurement of the internal rotation rate. Suddenly the length of Saturn's day became uncertain. Measurements of the magnetic field help scientists "see" deep inside Saturn and may have finally solved this puzzle.

"Our magnetic field measurements have remained constant since Cassini entered orbit almost two years ago, while radio measurements since the Voyager era have shown large variability. By monitoring the magnetic field over the rest of the mission, we will be able to solve this puzzle," Giampieri.

In addition to Giampieri the other authors are: Michele Dougherty, from Imperial College, London; Edward Smith also from JPL; and Christopher Russell from the University of California, Los Angeles.

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. The Cassini orbiter was designed, developed and assembled at JPL. The magnetometer team is based at Imperial College in London, working with team members from the United States and several European countries.

For images and more information, visit: <http://www.nasa.gov/cassini> and <http://saturn.jpl.nasa.gov> .

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News Release: 2006-066

April 26, 2006

Pieces of NASA'S Next Mars Mission are Coming Together

NASA's Phoenix Mars Lander, the next mission to the surface of Mars, is beginning a new phase in preparation for a launch in August 2007.

As part of this "assembly, test and launch operations" phase, Phoenix team members are beginning to add complex subsystems such as the flight computer, power systems and science instruments to the main structure of the spacecraft. The work combines efforts of Lockheed Martin Space Systems, Denver; the University of Arizona, Tucson; and NASA's Jet Propulsion Laboratory, Pasadena, Calif.

"All the subsystems and instruments from a wide range of suppliers are tested separately, but now we are beginning the vital stage of assembling them together and testing how they will function with each other," said JPL's Barry Goldstein, project manager for Phoenix.

Phoenix will land near the red planet's north polar ice cap to analyze scooped-up samples of icy soil.

"We know there is plenty of water frozen into the surface layer of Mars at high latitudes. We've designed Phoenix to tell us more about this region as a possible habitat for life," said the University of Arizona's Peter Smith, principal investigator for the mission.

Phoenix is the first mission of NASA's Mars Scout Program of competitively proposed, relatively low-cost missions to Mars. The program is currently soliciting proposals for a 2011 Scout mission.

The Phoenix proposal, selected in 2003, saves expense by using a lander structure, subsystem components and protective aeroshell originally built for a 2001 lander mission that was canceled while in development. The budget for the Phoenix mission, including launch, is \$386 million.

The spacecraft will land using descent thrusters just prior to touchdown, rather than airbags like those used by the current Mars Exploration Rovers. As Phoenix parachutes through Mars' lower atmosphere in May 2008, a descent camera will take images for providing geological context about the landing site.

The robotic arm being built for Phoenix will be about 2 meters (7 feet) long, jointed at the elbow and wrist, and equipped with a camera and scoop. It will dig as deep as about 50 centimeters (20 inches) and deliver samples to instruments on the spacecraft deck that will analyze physical and chemical properties of the ices and other materials. A stereo color camera will examine the landing site's terrain and provide positioning information for the arm. The Canadian Space Agency is providing a suite of weather instruments for Phoenix.

"The propulsion system and the wiring harness have been added to the vehicle," said Ed Sedivy, Phoenix program manager for Lockheed Martin. "We will be loading flight software onto the flight computer in the next few days. The flight software is much more mature than typical for a planetary program at this stage. As soon as the flight computer is mated up, we can apply external power to the vehicle."

Navigation components, such as star trackers, and communication subsystems will become part of the spacecraft in coming weeks, followed by science instruments in the summer.

Phoenix will be shipped to NASA's Kennedy Space Center, Florida, in May 2007, for final preparations leading up to launch. Before that, testing in Colorado will subject the spacecraft to expected operational environments. This includes thermal and vacuum tests simulating the 10-month trip to Mars and conditions on Mars' surface. Meanwhile, the mission is preparing a test facility in Tucson for practicing and testing procedures for operating the spacecraft on Mars.

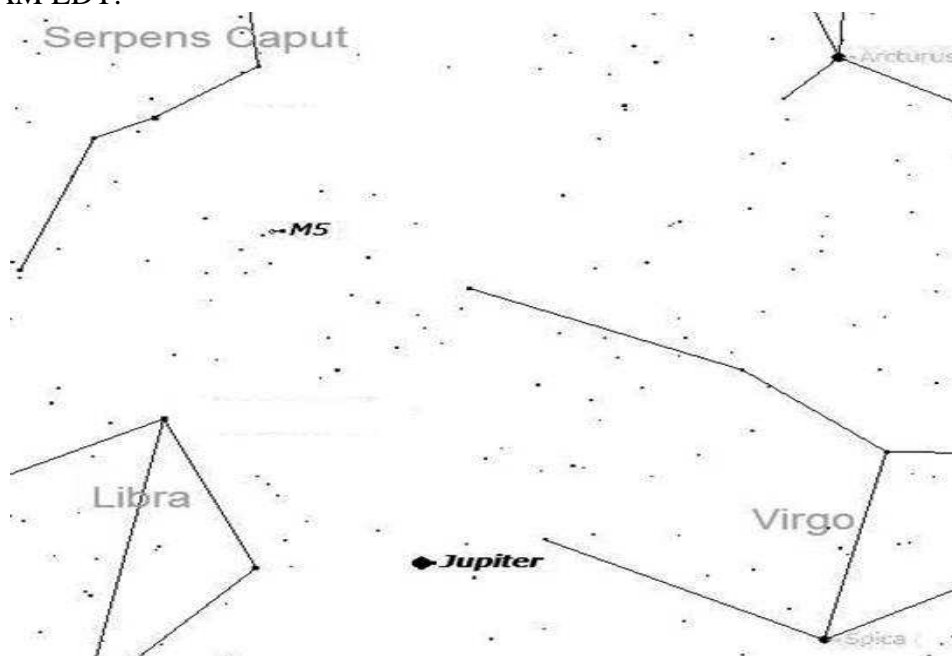
JPL, a division of the California Institute of Technology, Pasadena, manages Phoenix for NASA's Science Mission Directorate.

For information about NASA and agency programs on the Web, visit <http://www.nasa.gov> . For information about the Phoenix Mission to Mars on the Web, visit <http://phoenix.jpl.arizona.edu>.

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Mid Evening Observing Highlights for June

Jupiter is very bright in the southern sky. The 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 bright star Spica is in the southwest. The Big Dipper can be seen in the northwestern sky. Scorpius is rising in the southeast. The prominent globular clusters M3 and M13 can be seen almost directly overhead. The globular cluster M5 is in the southern part of the sky. The image below shows the positions of M5, Jupiter, Spica, and Arcturus. New moon occurs on June 25th and full moon occurs on June 11th. The summer solstice begins on June 21st at 8:26 AM EDT.



Not a Moment Wasted

by Dr. Tony Phillips

The Ring Nebula. Check. M13. Check. Next up: The Whirlpool galaxy.

You punch in the coordinates and your telescope takes off, slewing across the sky. You tap your feet and stare at the stars. These Messier marathons would go much faster if the telescope didn't take so long to slew. What a waste of time!

Don't tell that to the x-ray astronomers.

"We're putting our slew time to good use," explains Norbert Schartel, project scientist for the European Space Agency's XMM-Newton x-ray telescope. The telescope, named for Sir Isaac Newton, was launched into Earth orbit in 1999. It's now midway through an 11-year mission to study black holes, neutron stars, active galaxies and other violent denizens of the Universe that show up particularly well at x-ray wavelengths.

For the past four years, whenever XMM-Newton slewed from one object to another, astronomers kept the telescope's cameras running, recording whatever might drift through the field of view. The result is a stunning survey of the heavens covering 15% of the entire sky.

Sifting through the data, ESA astronomers have found entire clusters of galaxies unknown before anyone started paying attention to "slew time." Some already-known galaxies have been caught in the act of flaring—a sign, researchers believe, of a central black hole gobbling matter from nearby stars and interstellar clouds. Here in our own galaxy, the 20,000 year old Vela supernova remnant has been expanding. XMM-Newton has slewed across it many times, tracing its changing contours in exquisite detail.

The slew technique works because of XMM-Newton's great sensitivity. It has more collecting area than any other x-ray telescope in the history of astronomy. Sources flit through the field of view in only 10 seconds, but that's plenty of time in most cases to gather valuable data.

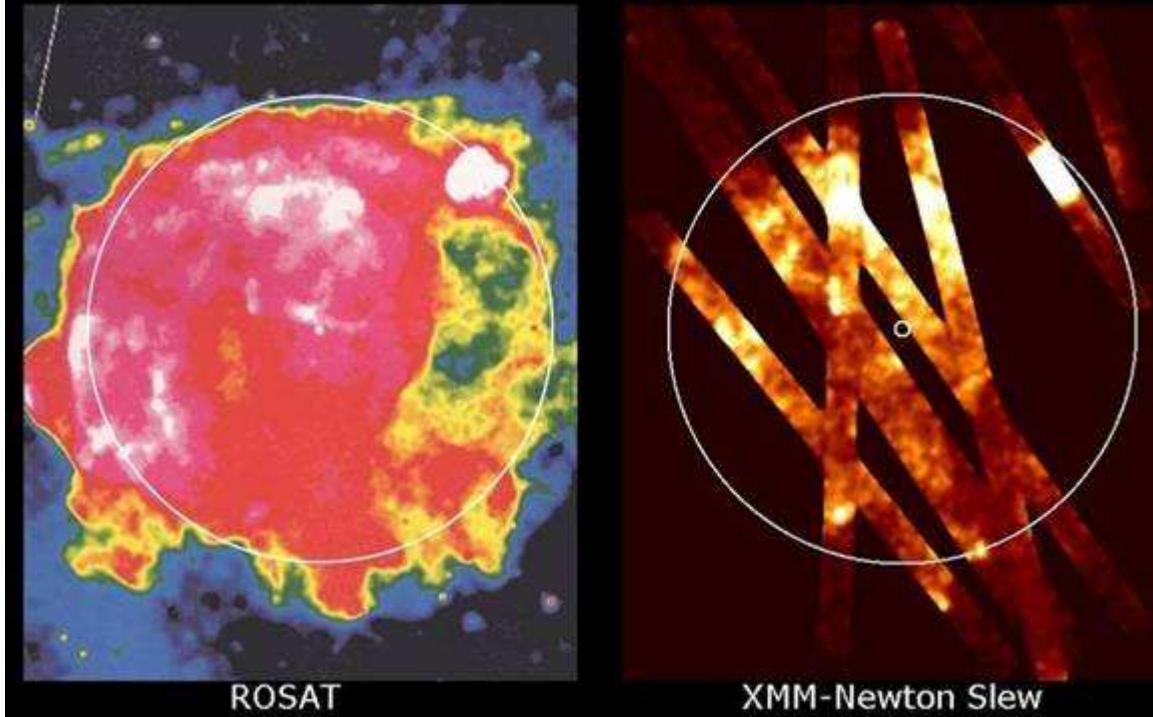
The work is just beginning. Astronomers plan to continue the slew survey, eventually mapping as much as 80% of the entire sky. No one knows how many new clusters will be found or how many black holes might be caught gobbling their neighbors. One thing's for sure: "There *will* be new discoveries," says Schartel.

Tap, tap, tap. The next time you're in the backyard with your telescope, and it takes off for the Whirlpool galaxy, don't just stand there. Try to keep up with the moving eyepiece. Look, you never know what might drift by.

See some of the other XMM-Newton images at <http://sci.esa.int> . For more about XMM-Newton's Education and Public Outreach program, including downloadable classroom materials, go to <http://xmm.sonoma.edu>. Kids can learn about black holes and play "Black Hole Rescue" at The Space Place, <http://spaceplace.nasa.gov/>, under "Games."

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

Vela Supernova Remnant



Caption:

The image on the left is the Vela Supernova Remnant as imaged in X-rays by ROSAT. On the right are some of the slew images obtained by XMM-Newton in its “slew” time.