Astronomy Club News

August, 2005

John Kocijanski, Editor

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

The August 6th observation session was held. Three people attended. The sky condition started out poor but luckily the skies cleared to bring a nice night of observing. Chris Maier brought his new Televue NP101 refractor. A picture of it is shown below. It gave some great views of double stars and deep sky objects. It showed a nice view of the Veil Nebula in Cygnus. We also very several minor globular star clusters in Sagittarius.

The observation sessions scheduled for August 27th was canceled due to poor weather.

Our next observation sessions are on September 3rd and 10th. On the 10th we plan to have a solar observation session at Morgan Outdoors on 46 Main Street in Livingston Manor. Jim McKeegan will also be giving a talk. The starting time will be announced in the near future. Later that evening we will have a night observation session at Walnut Mountain Park in Liberty.

On September 17th High Point Scientific will have telescope show. Here is an announcement from the website. http://www.highpointscientific.com/store/dynamicIndex.asp

The Second Annual Telescope Show Saturday September 17th.

On Saturday September 17th High Point Scientific cordially invites you to the second annual telescope show. Check out the latest products from Meade, Celestron, Tele Vue, Coronado, Vixen, Universal Astronomics, and Bogen. Lunch will be served and as always there will be plenty of door prizes on hand. And oh yeah…..there will be special prices on just about everything.

Anyone interested in submitting an astronomical observation or photograph for the newsletter, please contact John at kocis@verizon.net.

The club has selection of astronomy books, 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: 2005-139 August 30, 2005

Cassini Finds Enceladus Tiger Stripes are Really Cubs

The Cassini spacecraft has discovered the long, cracked features dubbed "tiger stripes" on Saturn's icy moon Enceladus are very young -- between 10 and 1,000 years young.

These findings support previous results showing the moon's southern pole is active. The pole had episodes of geologic activity as recently as 10 years ago. These cracked features are approximately 130 kilometers long (80 miles), spaced about 40 kilometers (25 miles) apart and run roughly parallel to one another.

The cracks act like vents. They spew vapor and fine ice water particles that have become ice crystals. This crystallization process can be dated, which helped scientists pin down the age of the features.

"There appears to be a continual supply of fresh, crystalline ice at the tiger stripes, which could have been very recently resurfaced," said Dr. Bonnie Buratti. She is a team member of the Cassini visual and infrared mapping spectrometer at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "Enceladus is constantly evolving and getting a makeover."

This finding is especially exciting because ground-based observers have seen tiny Enceladus brighten as its south pole was visible from Earth. Cassini allows scientists to see close up that the brightening is caused by geologic activity. When NASA's Voyager 2 spacecraft flew over the moon's north pole in 1981, it did not observe the tiger stripes.

Cassini's visual and infrared mapping spectrometer shows water ice exists in two forms on Enceladus: in pristine, crystalline ice and radiation-damaged amorphous ice.

When ice comes out of the "hot" cracks, or "tiger stripes," at the south pole, it forms as fresh, crystalline ice. As the ice near the poles remains cold and undisturbed, it ages and converts to amorphous ice. Since this process is believed to take place over decades or less, the tiger stripes must be very young.

"One of the most fascinating aspects of Enceladus is that it is so very small as icy moons go, but so very geophysically active. It's hard for a body as small as Enceladus to hold onto the heat necessary to drive such large-scale geophysical phenomena, but it has done just that," said Dr. Bob Brown. Brown is a team leader for the visual and infrared mapping spectrometer at the University of Arizona, Tucson. "Enceladus and its incredible geology is a marvelous puzzle for us to figure out."

Adding to the already mounting evidence for an active body is the correlation of results from multiple instruments. Cassini's cameras provided detailed images of the south polar cap, in which the tiger stripe fractures were found to be among the hottest features.

The timing of the craft's ion and neutral mass spectrometer and the cosmic dust analyzer observations seems to indicate the vapor and fine material are originating from the "hot" polar cap region. These data also indicate the production of water vapor and ejection of fine material are connected, as they are in a comet. This suggests that vapor and dust-sized icy material are coming from the tiger stripes.

Enceladus is on a short list of bodies in our solar system where scientists have found internal activity. The others are the volcanoes on Jupiter's moon Io and geysers on Neptune's moon Triton.

Data for these measurements were taken during Cassini's closest flyby on July 14, 2005. The spacecraft came within 175 kilometers (109 miles) of the surface of Enceladus. Enceladus is 500 kilometers (314 miles) across and has the most reflective surface in the solar system.

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 mission for NASA's Science Mission Directorate, Washington.

For information about the Cassini-Huygens mission on the Web, visit http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov . For information about NASA and agency programs on the Web, visit http://www.nasa.gov/home/index.html .

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News Release: 2005-135 August 17, 2005

Mars Reconnaissance Orbiter Mission Status

NASA's Mars Reconnaissance Orbiter, launched on Aug. 12, has completed one of the first tasks of its seven-month cruise to Mars, a calibration activity for the spacecraft's Mars Color Imager instrument.

"We have transitioned from launch mode to cruise mode, and the spacecraft continues to perform extremely well," said Dan Johnston, Mars Reconnaissance Orbiter deputy mission manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

The first and largest of four trajectory correction maneuvers scheduled before the orbiter reaches Mars is planned for Aug. 27.

For the calibration task on Aug. 15, the spacecraft slewed about 15 degrees to scan the camera across the positions of the Earth and Moon, then returned to the attitude it will hold for most of the cruise. Data were properly recorded onboard, downlinked to Earth and received by the Mars Color Imager team at Malin Space Science Systems, San Diego. Dr. Michael Malin of Malin Space Science Systems, principal investigator for Mars Color Imager, said the image data are being processed and analyzed.

This multiple-waveband camera is the widest-angle instrument of four cameras on the orbiter, designed for imaging all of Mars daily from an altitude of about 300 kilometers (186 miles). Imaged at a range of more than 1 million kilometers (620,000 miles) away, the crescent Earth and Moon fill only a few pixels and are not resolved in the image. However, this is enough useful information to characterize the instrument's response in its seven color bands, including two ultraviolet channels that will be used to trace ozone in the Mars atmosphere. This is the first of two events early in the cruise phase that check instrument calibrations after launching. The second will occur in early September when higher resolution cameras are pointed at Earth and the Moon as the spacecraft continues its flight to Mars.

The Mars Reconnaissance Orbiter will reach Mars and enter orbit on about March 10, 2006. After gradually adjusting the shape of its orbit for half a year, it will begin its primary science phase in November 2006. The mission will examine Mars in unprecedented detail from low orbit, returning several times more data than all previous Mars missions combined. Scientists will use its instruments to gain a better understanding of the history and current distribution of Mars' water. By inspecting possible landing sites and by providing a high-data-rate relay, it will also support future missions that land on Mars.

More information about the mission is available online at http://www.nasa.gov/mro .

The Mars Reconnaissance Orbiter mission is managed by JPL, a division of the California Institute of Technology, Pasadena, for the NASA Science Mission Directorate. Lockheed Martin Space Systems, Denver, prime contractor for the project, built both the spacecraft and the launch vehicle.

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News Release: 2005-128 August 3, 2005

NASA's Spitzer Finds Hidden, Hungry Black Holes

Most of the biggest black holes in the universe have been eating cosmic meals behind closed doors – until now.

With its sharp infrared eyes, NASA's Spitzer Space Telescope peered through walls of galactic dust to uncover what may be the long-sought missing population of hungry black holes known as quasars.

"From past studies using X-rays, we expected there were a lot of hidden quasars, but we couldn't find them," said Alejo Martínez-Sansigre of the University of Oxford, England. He is lead author of a paper about the research in this week's Nature. "We had to wait for Spitzer to find an entire population of these dust-obscured objects."

Quasars are super-massive black holes that are circled by a giant ring of gas and dust. They live at the heart of distant galaxies and can consume up to the equivalent mass of one thousand stars in a single year. As their black

holes suck in material from their dusty rings, the material lights up brilliantly, making quasars the brightest objects in the universe. This bright light comes in many forms, including X-rays, visible and infrared light.

Astronomers have puzzled for years over the question of how many of these cosmic behemoths are out there. One standard method for estimating the number is to measure the cosmic X-ray background. Quasars outshine everything else in the universe in X-rays. By counting the background buzz of X-rays, it is possible to predict the approximate total number of quasars.

But this estimate has not matched previous X-ray and visible-light observations of actual quasars, which number far fewer than expected. Astronomers thought this might be because most quasars are blocked from our view by gas and dust. They proposed that some quasars are positioned in such a way that their dusty rings hide their light, while others are buried in dust-drenched galaxies.

Spitzer appears to have found both types of missing quasars by looking in infrared light. Unlike X-rays and visible light, infrared light can travel through gas and dust.

Researchers found 21 examples of these quasars in a small patch of sky. All the objects were confirmed as quasars by the National Radio Astronomy Observatory's Very Large Array radio telescope in New Mexico and by the Particle Physics and Astronomy Research Council's William Herschel Telescope in Spain.

"If you extrapolate our 21 quasars out to the rest of the sky, you get a whole lot of quasars," said Dr. Mark Lacy of the Spitzer Science Center, California Institute of Technology, Pasadena, Calif., a co-author of the Nature paper. "This means that, as suspected, most super-massive black hole growth is hidden by dust."

The discovery will allow astronomers to put together a more complete picture of how and where quasars form in our universe. Of the 21 quasars uncovered by Spitzer, 10 are believed to be inside fairly mature, giant, elliptical galaxies. The rest are thought to be encased in thick, dusty galaxies that are still forming stars.

A team of researchers based at the University of Arizona, Tucson, found similar quasars using Spitzer. Their research is described at http://uanews.org/science **.**

Other authors of the Nature paper include Drs. Steve Rawlings and Matt Jarvis, University of Oxford; Drs. Dario Fadda and Francine Marleau, Spitzer Science Center; Dr. Chris Simpson, University of Durham, England; and Dr. Chris Willott, National Research Council Canada, Victoria.

The Jet Propulsion Laboratory, Pasadena, Calif., a division of Caltech, manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at Caltech. Spitzer's multiband imaging photometer, which observed the quasars, was built by Ball Aerospace Corporation, Boulder, Colo.; the University of Arizona; and Boeing North America, Canoga Park, Calif. Spitzer's infrared array camera, which also observed the quasars, was built by NASA Goddard Space Flight Center, Greenbelt, Md.

A Spitzer false-colored picture of one of the newfound quasars is available at http://www.spitzer.caltech.edu/Media/index.shtml .

For information about NASA and agency programs visit http://www.nasa.gov/home/ .

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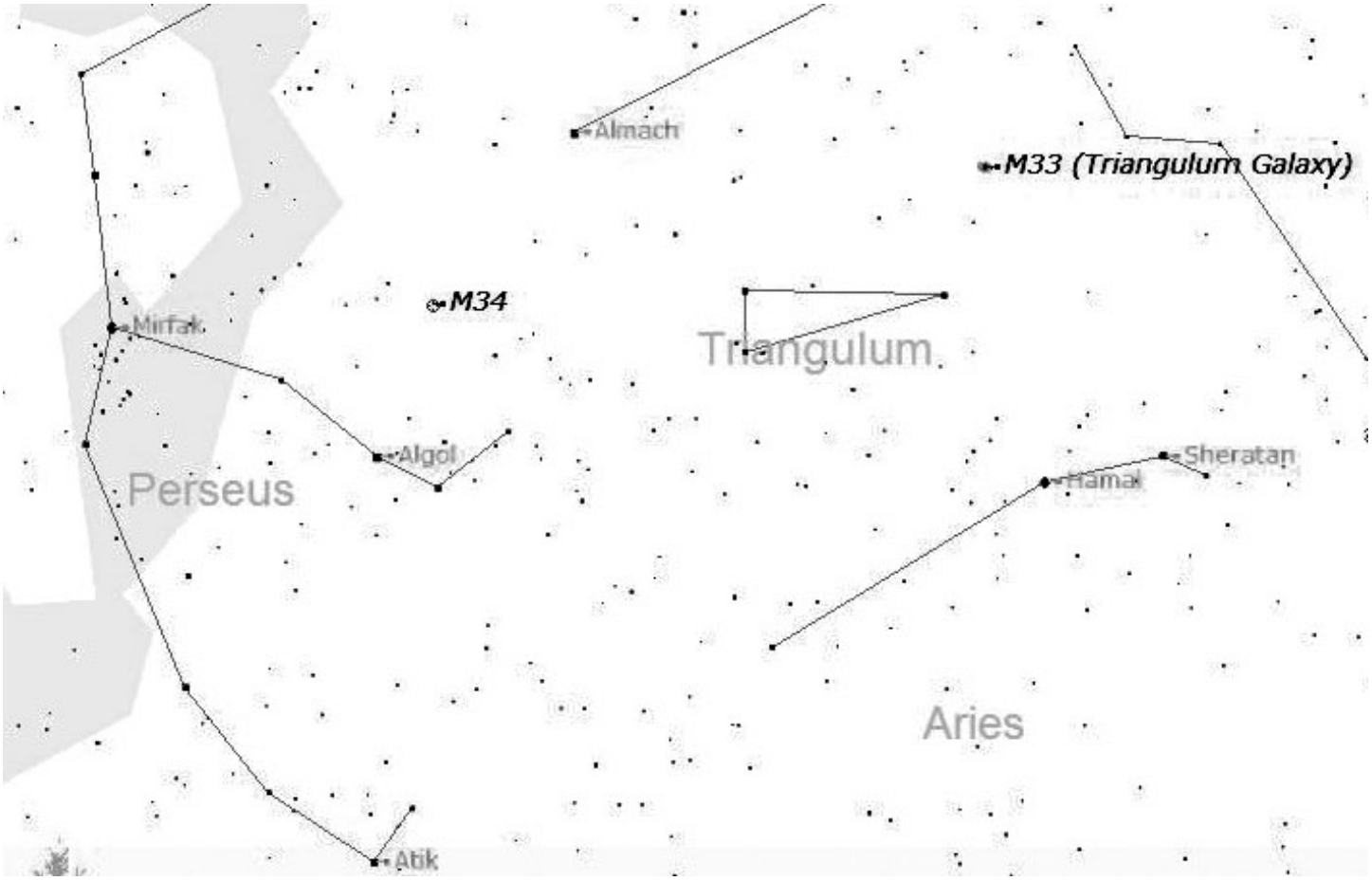
Midevening Observing Highlights for September

The Milky Way stretches across the sky from southwest to northeast. Cygnus can be found directly overhead. The Great Square of Pegasus is rising in the east. To the northeast of the Great Square the constellation of Andromeda can be seen and just above its center is M31, the Andromeda Galaxy. The Double Cluster (NGC 869 and NGC 884) and open cluster M34 in Perseus can be seen rising in the northeast. Sagittarius and Scorpius are in the southwest. The bright star Arcturus is setting in the west. The Big Dipper is low on the northern horizon. The Summer Triangle of the stars Vega, Deneb, and Altair can be found directly overhead. The image below shows the position of M34, the double star Almach, and the galaxy M33 in the sky.



Full moon is on September 18th and new moon is on September 3rd.

NASA Space Place

Improbable Bulls-Eye

by **Dr. Tony Phillips**

Picture this: Eighty-eight million miles from Earth, a robot spacecraft plunges into a billowing cloud almost as wide as the planet Jupiter. It looks around. Somewhere in there, among jets of gas and dust, is an icy nugget invisible to telescopes on Earth—a 23,000 mph moving target.

The ship glides deeper into the cloud and jettisons its cargo, the "impactor." Bulls-eye! A blinding flash, a perfect strike.

As incredible as it sounds, this really happened on the 4th of July, 2005. Gliding through the vast atmosphere of Comet Tempel 1, NASA's Deep Impact spacecraft pinpointed the comet's 3x7-mile wide nucleus and hit it with an 820-lb copper impactor. The resulting explosion gave scientists their first look beneath the crust of a comet.

That's navigation.

Credit the JPL navigation team. By sending commands from Earth, they guided Deep Impact within sight of the comet's core. But even greater precision would be needed to strike the comet's spinning, oddly-shaped nucleus.

On July 3rd, a day before the strike, Deep Impact released the impactor. No dumb hunk of metal, the impactor was a spaceship in its own right, with its own camera, thrusters and computer brain. Most important of all, it had "AutoNav."

AutoNav, short for *Autonomous Navigation*, is a computer program full of artificial intelligence. It uses a camera to see and thrusters to steer—no humans required. Keeping its "eye" on the target, AutoNav guided the impactor directly into the nucleus.

The system was developed and tested on another "Deep" spacecraft: Deep Space 1, which flew to asteroid Braille in 1999 and Comet Borrelly in 2001. The mission of Deep Space 1 was to try out a dozen new technologies, among them an ion propulsion drive, advanced solar panels and AutoNav. AutoNav worked so well it was eventually installed on Deep Impact.

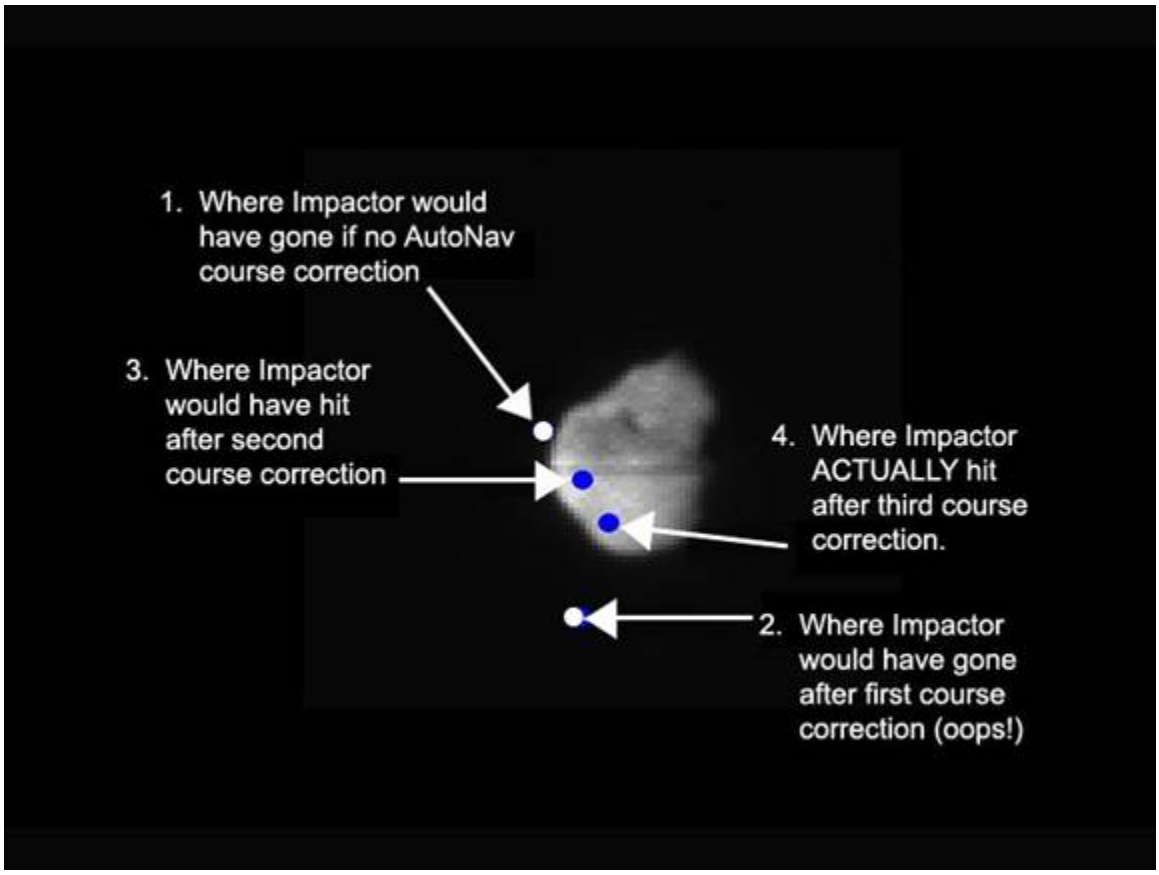
"Without AutoNav, the impactor would have completely missed the nucleus," says JPL's Ed Riedel, who led the development of AutoNav on Deep Space 1 and helped colleague Dan Kubitschek implement it on Deep Impact.

En route to the nucleus, AutoNav "executed three maneuvers to keep the impactor on course: 90, 35, and 12.5 minutes before impact," says Riedel. The nearest human navigators were 14 light-minutes away (round trip) on Earth, too far and too slow to make those critical last-minute changes.

Having proved itself with comets, AutoNav is ready for new challenges: moons, planets, asteroids … wherever NASA needs an improbable bulls-eye.

Dr. Marc Rayman, project manager for Deep Space 1, describes the validation performance of AutoNav in his mission log at http://nmp.nasa.gov/ds1/arch/mrlog13.html (also check mrlog24.html and the two following). Also, for junior astronomers, the Deep Impact mission is described at http://spaceplace.nasa.gov/en/kids/deepimpact/deepimpact.shtml

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



Caption:
Comet Tempel 1, as seen by the Deep Impact impactor's camera. Three last-minute AutoNav-controlled impact correction maneuvers enabled the Impactor to hit the bulls-eye.