Catskills Astronomy Club News
August 2008

Catskills Astronomy Club News

8/1/08

Club News:

An observation session was held at Walnut Mountain Park on July 2nd due to a poor weather forecast for the session that was scheduled for July 5th. Three people attended. Early in the evening a conjunction of Mars, Saturn, and Regulus was observed. All three were low in the western sky at sunset. As the sky darkened a few double stars were observed including Albireo in Cygnus and Cor Caroli in Canes Venatici. When the sky was dark enough many deep sky objects were observed. One of the highlights of the evening was the Wild Duck Cluster (M11). It is an open star cluster in the constellation Scutum. Some of the stars in it are arranged in a "V" shape that reminds some of the flight pattern of migrating ducks. Later in the evening Jupiter rose high enough to be viewed. It was very bright in the southeastern sky.

The July 26th observation session was rescheduled for the 25th but was unattended despite favorable skies.

The August observation sessions are scheduled for the 5th and 26th. The observation session on the 5th will be held at the Big Twig recording studio near Roscoe. The session will begin at 7:30 with a showing of the Cosmos episode entitled "Traveller's Tales". This episode discusses the Voyager missions to Jupiter and Saturn. After the movie an observation session will be held. Go to http://www.bigtwig.com/ to find out more about Big Twig and for directions.

A new section has been added to our newsletter. It will be included each month. Look for it before the Space Place section of the newsletter. The following is quoted from an email introducing the service sent by Mike Simonsen of AAVSO.

The American Association of Variable Star Observers (AAVSO) has a new education and outreach initiative that we think will benefit you, your astronomical society, and the general public. We have partnered with some of the best astronomy bloggers on the Internet and made an arrangement to bring their content to you for reproduction in your newsletters.

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, dvds, and a Meade eight inch reflector as well as a three inch Edmund 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: 2008-132 July 15, 2008

Brightest Star in the Galaxy Has New Competition

A contender for the title of brightest star in our Milky Way galaxy has been unearthed in the dusty metropolis of the galaxy's center.

Nicknamed the "Peony nebula star," the bright stellar bulb was revealed by NASA's Spitzer Space Telescope and other ground-based telescopes. It blazes with the light of an estimated 3.2 million suns.

The reigning "brightest star" champion is Eta Carina, with a whopping solar wattage of 4.7 million suns. But according to astronomers, it's hard to pin down an exact brightness, or luminosity, for these scorching stars, so they could potentially shine with a similar amount of light.

"The Peony nebula star is a fascinating creature. It appears to be the second-brightest star that we now know of in the galaxy, and it's located deep into the galaxy's center," said Lidia Oskinova of Potsdam University in Germany. "There are probably other stars just as bright if not brighter in our galaxy that remain hidden from view." Oskinova is principal investigator for the research and second author of a paper appearing in a future issue of the journal Astronomy and Astrophysics.

Scientists already knew about the Peony nebula star, but because of its sheltered location in the dusty central hub of our galaxy, its extreme luminosity was not revealed until now. Spitzer's dust-piercing infrared eyes can see straight into the heart of our galaxy, into regions impenetrable by visible light. Likewise, infrared data from the European Southern Observatory's New Technology Telescope in Chile were integral in calculating the Peony nebula star's luminosity.

"Infrared astronomy opens extraordinary views into the environment of the central region of our galaxy," said Oskinova.

The brightest stars in the universe are also the biggest. Astronomers estimate the Peony nebula

star kicked off its life with a hefty mass of roughly 150 to 200 times that of our sun. Stars this massive are rare and puzzle astronomers because they push the limits required for stars to form. Theory predicts that if a star starts out too massive, it can't hold itself together and must break into a double or multiple stars instead.

Not only is the Peony nebula star hefty, it also has a wide girth. It is a type of giant blue star called a Wolf-Rayet star, with a diameter roughly 100 times that of our sun. That means this star, if placed where our sun is, would extend out to about the orbit of Mercury.

With so much mass, the star barely keeps itself together. It sheds an enormous amount of stellar matter in the form of strong winds over its relatively short lifetime of a few million years. This matter is pushed so hard by strong radiation from the star that the winds speed up to about 1.6 million kilometers per hour (one million miles per hour) in only a few hours.

Ultimately, the Peony nebula star will blow up in a fantastic explosion of cosmic proportions called a supernova. In fact, Oskinova and her colleagues say that the star is ripe for exploding soon, which in astronomical terms mean anytime from now to millions of years from now.

"When this star blows up, it will evaporate any planets orbiting stars in the vicinity," said Oskinova. "Farther out from the star, the explosion could actually trigger the birth of new stars."

In addition to the star itself, the astronomers noted a cloud of dust and gas, called a nebula, surrounding the star. The team nicknamed this cloud the Peony nebula because it resembles the ornate flower.

"The nebula was probably created from the spray of dust leaking off the massive Peony nebula star," said Andreas Barniske of Potsdam University, lead author of the study.

Wolf-Rainer Hamann, also of Potsdam University, is another co-author of the paper and the principal investigator of a Spitzer program enabling this research.

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, also in Pasadena. Caltech manages JPL for NASA. Spitzer's infrared spectrograph, which was used to determine the luminosity of the Peony nebula star, was built by Cornell University, Ithaca, N.Y. Its development was led by Jim Houck of Cornell. For more information about Spitzer, visit **http://www.spitzer.caltech.edu/spitzer** and **http://www.nasa.gov/spitzer** .

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News Release: 2008-129 July 10, 2008

Rare 'Star-Making Machine' Found in Distant Universe

Astronomers have uncovered an extreme stellar machine -- a galaxy in the very remote universe pumping out stars at a surprising rate of up to 4,000 per year. In comparison, our own Milky Way galaxy turns out an average of just 10 stars per year.

The discovery, made possible by several telescopes including NASA's Spitzer Space Telescope, goes against the most common theory of galaxy formation. According to the theory, called the Hierarchical Model, galaxies slowly bulk up their stars over time by absorbing tiny pieces of galaxies -- and not in one big burst as observed in the newfound "Baby Boom" galaxy.

"This galaxy is undergoing a major baby boom, producing most of its stars all at once," said Peter Capak of NASA's Spitzer Science Center at the California Institute of Technology, Pasadena. "If our human population was produced in a similar boom, then almost all of the people alive today would be the same age." Capak is lead author of a new report detailing the discovery in the July 10th issue of Astrophysical Journal Letters.

The Baby Boom galaxy, which belongs to a class of galaxies called starbursts, is the new record holder for the brightest starburst galaxy in the very distant universe, with brightness being a measure of its extreme star-formation rate. It was discovered and characterized using a suite of telescopes operating at different wavelengths. NASA's Hubble Space Telescope and Japan's Subaru Telescope, atop Mauna Kea in Hawaii, first spotted the galaxy in visible-light images, where it appeared as an inconspicuous smudge due to is great distance.

It wasn't until Spitzer and the James Clerk Maxwell Telescope, also on Mauna Kea in Hawaii, observed the galaxy at infrared and submillimeter wavelengths, respectively, that the galaxy stood out as the brightest of the bunch. This is because it has a huge number of youthful stars. When stars are born, they shine with a lot of ultraviolet light and produce a lot of dust. The dust absorbs the ultraviolet light but, like a car sitting in the sun, it warms up and re-emits light at infrared and submillimeter wavelengths, making the galaxy unusually bright to Spitzer and the James Clerk Maxwell Telescope.

To learn more about this galaxy's unique youthful glow, Capak and his team followed up with a number of telescopes. They used optical measurements from Keck to determine the exact distance to the galaxy -- a whopping12.3 billion light-years. That's looking back to a time when the universe was 1.3 billion years old (the universe is approximately 13.7 billion years old today).

"If the universe was a human reaching retirement age, it would have been about 6 years old at the time we are seeing this galaxy," said Capak.

The astronomers made measurements at radio wavelengths with the National Science Foundation's Very Large Array in New Mexico. Together with Spitzer and James Clerk Maxwell data, these observations allowed the astronomers to calculate a star-forming rate of about 1,000 to 4,000 stars per year. At that rate, the galaxy needs only 50 million years, not very long on cosmic timescales, to grow into a galaxy equivalent to the most massive ones we see today.

While galaxies in our nearby universe can produce stars at similarly high rates, the farthest one known before now was about 11.7 billion light-years away, or a time when the universe was 1.9 billion years old.

"Before now, we had only seen galaxies form stars like this in the teenaged universe, but this galaxy is forming when the universe was only a child," said Capak. "The question now is whether the majority of the very most massive galaxies form very early in the universe like the Baby Boom galaxy, or whether this is an exceptional case. Answering this question will help us determine to what degree the Hierarchical Model of galaxy formation still holds true."

"The incredible star-formation activity we have observed suggests that we may be witnessing, for the first time, the formation of one of the most massive elliptical galaxies in the universe," said co-author Nick Scoville of Caltech, the principal investigator of the Cosmic Evolution Survey, also known as Cosmos. The Cosmos program is an extensive survey of a large patch of distant galaxies across the full spectrum of light.

"The immediate identification of this galaxy with its extraordinary properties would not have been possible without the full range of observations in this survey," said Scoville.

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, also in Pasadena. Caltech manages JPL for NASA. For more information about Spitzer, visit http://www.spitzer.caltech.edu/spitzer and http://www.nasa.gov/spitzer .

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NEWS RELEASE: 2008-133 July 15, 2008

NASA's Phoenix Mars Lander to Begin Rasping Frozen Layer

TUCSON, Ariz. -- A powered rasp on the back of the robotic arm scoop of NASA's Phoenix Mars Lander is being tested for the first time on Mars in gathering sample shavings of ice.

The lander has used its arm in recent days to clear away loose soil from a subsurface layer of hard-frozen material and create a large enough area to use the motorized rasp in a trench informally named "Snow White."

The Phoenix team prepared commands early Tuesday for beginning a series of tests with the rasp later in the day. Engineers and scientists designed the tests to lead up to, in coming days, delivering a sample of icy soil into one of the lander's laboratory ovens.

"While Phoenix was in development, we added the rasp to the robotic arm design specifically to grind into very hard surface ice," said Barry Goldstein, Phoenix project manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "This is the exactly the situation we find we are facing on Mars, so we believe we have the right tool for the job. Honeybee Robotics in New York City did a heroic job of designing and delivering the rasp on a very short schedule."

The rasp bit extends at a shallow angle out of an opening on the back of the scoop at the end of the 2.35-meter-long (7.7-foot-long) robotic arm. To use it, the back surface of the scoop is placed on the ground, and a motor rotates the rasp. The angle of the rasp is increased from nearly horizontal to slightly steeper while it is rotating, so the tool kicks shavings sideways onto a collection surface just inside the opening. After the rasp stops, a series of moves by the scoop then shifts the collected shavings from the back of the scoop, past baffles, to the front of the scoop. The baffles serve to keep material from falling out of the rasp opening when the scoop is used as a front loader.

The commands prepared for Phoenix's activities Tuesday called for rasping into the hard material at the bottom of the Snow White trench at two points about one centimeter (0.4 inch) apart. The lander's Surface Stereo Imager and robotic arm camera will be used to check the process at several steps and to monitor any resulting sample in the scoop for several hours after it is collected.

Collecting an icy sample for an oven of Phoenix's Thermal and Evolved-Gas Analyzer (TEGA) may involve gathering shavings collected at the rasp opening and scooping up additional shavings produced by the rasp. The Phoenix team has been testing this combination on simulated Martian ice with a near-replica model of Phoenix in a test facility at the University of Arizona, Tucson.

The Phoenix mission is led by Peter Smith of the University of Arizona with project management at JPL and development partnership at Lockheed Martin, Denver. International contributions come from the Canadian Space Agency; the University of Neuchatel; the universities of Copenhagen and Aarhus, Denmark; Max Planck Institute, Germany; and the Finnish Meteorological Institute. For more about Phoenix, visit: http://www.nasa.gov/phoenix and http://phoenix.lpl.arizona.edu.

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NEWS RELEASE: 2008-137 July 17, 2008

NASA's Deep Impact Films Earth as an Alien World

PASADENA, Calif. -- NASA's Deep Impact spacecraft has created a video of the moon transiting (passing in front of) Earth as seen from the spacecraft's point of view 50 million kilometers (31 million miles) away. Scientists are using the video to develop techniques to study alien worlds.

"Making a video of Earth from so far away helps the search for other life-bearing planets in the Universe by giving insights into how a distant, Earth-like alien world would appear to us," said University of Maryland astronomer Michael A'Hearn, principal investigator for the Deep Impact extended mission, called Epoxi.

Deep Impact made history when the mission team directed an impactor from the spacecraft into comet Tempel 1 on July 4, 2005. NASA recently extended the mission, redirecting the spacecraft for a flyby of comet Hartley 2 on Nov. 4, 2010.

Epoxi is a combination of the names for the two extended mission components: a search for alien (extrasolar) planets during the cruise to Hartley 2, called Extrasolar Planet Observations and Characterization (EPOCh), and the flyby of comet Hartley 2, called the Deep Impact eXtended Investigation (DIXI).

During a full Earth rotation, images obtained by Deep Impact at a 15-minute cadence have been combined to make a color video. During the video, the moon enters the frame (because of its orbital motion) and transits Earth, then leaves the frame. Other spacecraft have imaged Earth and the moon from space, but Deep Impact is the first to show a transit of Earth with enough detail to see large craters on the moon and oceans and continents on Earth.

"To image Earth in a similar fashion, an alien civilization would need technology far beyond what Earthlings can even dream of building," said Sara Seager, a planetary theorist at the Massachusetts Institute of Technology, Cambridge, Mass., and a co-investigator on Epoxi. "Nevertheless, planet-characterizing space telescopes under study by NASA would be able to observe an Earth twin as a single point of light -- a point whose total brightness changes with time as different land masses and oceans rotate in and out of view. The video will help us connect a varying point of planetary light with underlying oceans, continents, and clouds -- and finding oceans on extrasolar planets means identifying potentially habitable worlds." said Seager.

"Our video shows some specific features that are important for observations of Earth-like planets orbiting other stars," said Drake Deming of NASA's Goddard Space Flight Center in Greenbelt, Md. Deming is deputy principal investigator for Epoxi, and leads the EPOCh observations. "A 'sun glint' can be seen in the movie, caused by light reflected from Earth's oceans, and similar glints to be observed from extrasolar planets could indicate alien oceans. Also, we used infrared

light instead of the normal red light to make the color composite images, and that makes the land masses much more visible." That happens because plants reflect more strongly in the near-infrared, Deming explained. Hence the video illustrates the potential for detecting vegetated land masses on extrasolar planets by looking for variations in the intensity of their near-infrared light as the planet rotates.

The University of Maryland is the Principal Investigator institution, leading the overall Epoxi mission, including the flyby of comet Hartley 2. NASA Goddard leads the extrasolar planet observations. NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages Epoxi for NASA's Science Mission Directorate, Washington. The spacecraft was built for NASA by Ball Aerospace & Technologies Corp., Boulder, Colo.

To see the video, visit:

http://www.nasa.gov/topics/solarsystem/features/Epoxi_transit.html

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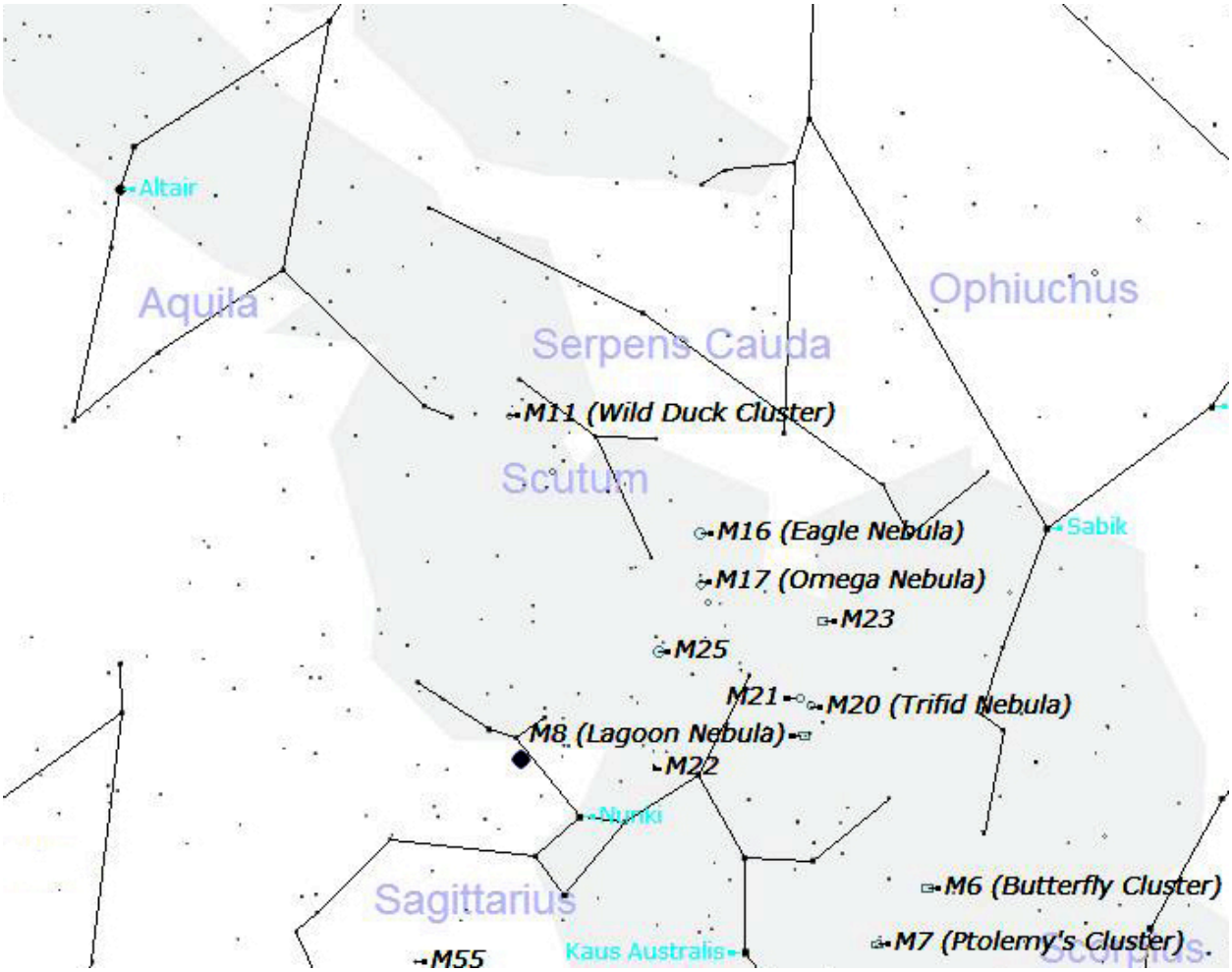
Middle Evening Observing Highlights for August

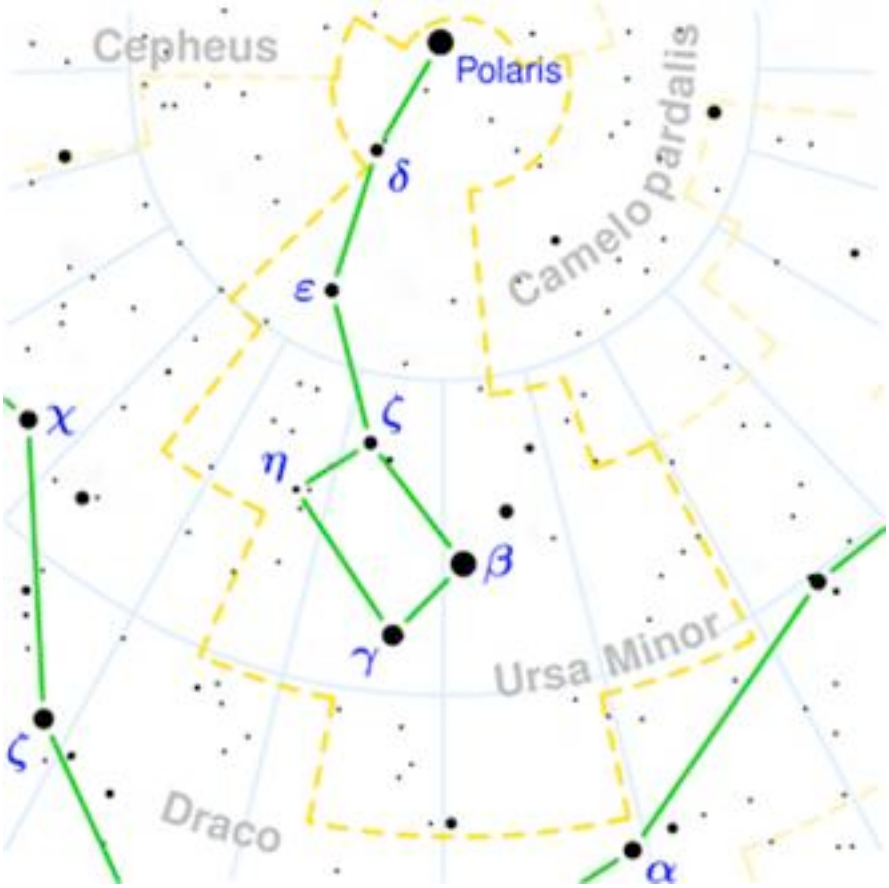
Jupiter is bright in the southern sky. The Milky Way stretches across the sky from south to north. Sagittarius is in the southern sky. It forms an easily recognizable "teapot' shape. Between Sagittarius and the bright star Altair lies the constellation Scutm. With in Scutm lies the open star cluster M11 often referred to as the Wild Duck Cluster. It can easily be seen in binoculars. The Great Square of Pegasus is rising in the east. The bright star Arcturus is in the western sky. Full moon is on August 16th and new moon is on August 1st. The Perseid meteor shower peaks on the morning of August 12th. Light from a waxing gibbous moon will block out many of the fainter meteors. Some Perseids are visible from July 23rd to August 20th. They are at about a quarter of their maximum intensity from August 9th to August 14th. From August 13th through the 16th Mercury, Venus, and Saturn are close to each other low in the western sky right after sunset. The image below shows the location of the Wild Duck Cluster as well as other deep sky objects in the southern sky.



AAVSO Writers Bureau Blog

Jul 24, 2008

Polaris
By Mike Simonsen, Simostronomy



I've won and lost a lot of money for people in silly bar bets about Polaris. People have the common misconception that Polaris, the North Star, is the brightest star in the sky. It's not; Sirius holds that honor. It's not even in the top 20 brightest stars. It comes in at number 48. That'll be five dollars, thank you.

And as my friends and family all know, if you ask me an astronomy question after a few drinks, you are not going to get a short answer. So here is the rest of the fascinating story of the North Star, Polaris.

Polaris, also named alpha Ursa Minoris, is the brightest star in the Little Dipper. It marks the end of the handle. By a twist of luck it, also happens to reside very close to the North Celestial Pole (NCP). This is the point in the sky that all the stars in the north rotate around. It's not exactly on the NCP, in fact it's more than a Moons width away, so it scribes out a very small circle in long

exposure star trail images like this one below. To the unaided eye it appears that all the stars rotate around Polaris while it remains fixed in one spot.

This fact has been known since ancient times, and Polaris has been used for navigation for centuries. The Chinese philosopher, Confucius, remarked, “He who exercises government by means of his virtue may be compared to the north polar star, which keeps its place and all the stars turn towards it.” Not only does it tell you where north is, its angle above the horizon roughly equals your latitude on Earth.

Through binoculars Polaris looks like the diamond in a small asterism called the ‘Engagement Ring’.

Through a small telescope it is easy to see that Polaris is actually a double star, a fact discovered by William Herschel in 1780. This visual companion is known as alpha UMi B.

In 1929, another fainter and much closer companion was detected spectroscopically, but it wasn’t until 2006 that we were actually able to image this close dwarf star with the Hubble Space Telescope. This third member of the system is called alpha UMi Ab.

In spite of Shakespeare's Julius Caesar declaring, "I am as constant as the Northern Star, of whose true fixed and resting quality, there is no fellow in the firmament", not only is it not at rest in the firmament, the North Star is not constant in brightness either! Polaris is a variable star, and as it turns out, a rather interesting, unique variable star.

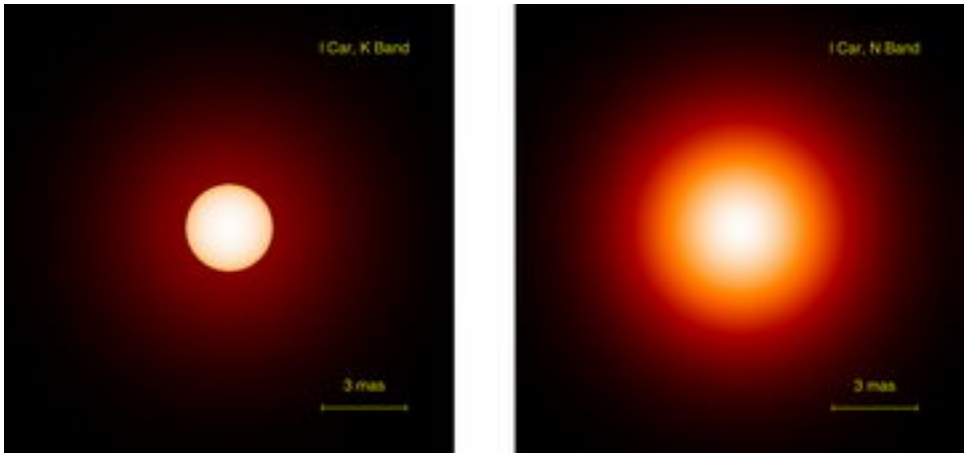
Polaris is a Cepheid variable. These are stars that pulsate with periods of a few days. The expansion and contraction of the outer atmosphere leads to changes in brightness. These stars are typically yellow giants or super-giants. They are huge stars, 40-180 times the radius of our Sun and much more massive. Polaris is six times as massive as our Sun and its radius is 45 times that of

the Sun. Polaris is the closest of these stars, at a distance of 431 light years.

Cepheids have the unique characteristic that the period of the star, the time it takes to go from maximum light to minimum and back again, is directly proportional to the absolute magnitude (brightness) of the star. If we know the period and how bright the star 'appears' from earth, we can determine with a great deal of accuracy how far away the star is. In this way Cepheids have been used as benchmarks, or 'standard candles' to measure distances. Since these stars tend to be huge and bright, we can even see them in galaxies outside the Milky Way.

Since Cepheids are used to measure the distance to galaxies and the expansion rate of the universe, it is essential to understand their physics and evolution. Being able to image and study the exact motion of Polaris and alpha UMi Ab is a boon for astronomers who want to determine the mass of Polaris accurately. Analyzing the orbits of double stars is one of the most effective ways astronomers have for determining the mass of stars. Knowing the mass is the most important ingredient in understanding the evolution and other properties of stars.

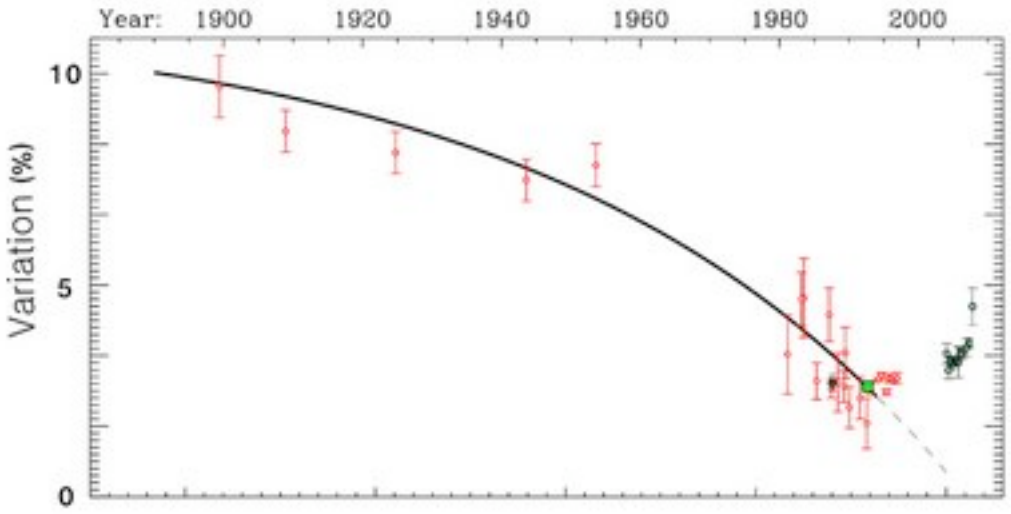
Another interesting discovery in the last few years is that Polaris and many other Cepheids are shrouded in an envelope of gas, some 2 to 3 times the size of the stars themselves. The physical processes that have created these envelopes are still uncertain, but it is probable that these envelopes were created from matter
ejected by the star itself.



As a consequence of the large amplitude oscillations of these humungous stars in a period of just a few days, material in the photospheres of these variable stars can be moving with velocities up to 100,000 km/h. It doesn't seem too unlikely that occasionally these stars might lose their gravitational grip on some of this fast moving material. Astronomers are studying the link between this pulsation, the mass loss and the formation of these envelopes.

Even stranger than all this, is the fact that Polaris has been steadily quieting down its pulsations

over the last 100 years. Around 1900 the variations in brightness were about 10% of the average luminosity. During the last half of the 20th century Polaris' variations had dropped to approximately 2%. No other Cepheid is known to have gone through this. Astronomers believed they were witnessing the evolution of the star before their very eyes, and that eventually we would see Polaris' variations snuff out entirely



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In the course of performing this death-watch, it was discovered recently that Polaris is actually coming back to life! The amplitude of pulsations is on the rise. The evolutionary explanation of the changes in Polaris may not hold water any more, and astronomers will be scrambling to collect more data to figure out what is actually happening.

So, while she may not be the brightest star in the night sky, Polaris is one of the most intriguing.

0 comments
Labels: Cepheids, Polaris, Variable Stars

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NASA Space Place

Death of a Supergiant

By all outward appearances, the red supergiant appeared normal. But below the surface, hidden from probing eyes, its core had already collapsed into an ultra-dense neutron star, sending a shock wave racing outward from the star's center at around 50 million kilometers per hour.

The shock wave superheated the plasma in its path to almost a million degrees Kelvin, causing the star to emit high-energy ultraviolet (UV) radiation. About six hours later, the shock wave reached the star's surface, causing it to explode in a Type IIP supernova named SNLS-04D2dc.

Long before the explosion's visible light was detected by telescopes on Earth, NASA's Galaxy Evolution Explorer (GALEX) space telescope captured the earlier pulse of UV light — scientists' first glimpse of a star entering its death throes.

"This UV light has traveled through the star at the moment of its death but before it was blown apart," explains Kevin Schawinski, the University of Oxford astrophysicist who led the observation. "So this light encodes some information about the state of the star the moment it died."

And that's exactly why astronomers are so excited. Observing the beautiful nebula left behind by a supernova doesn't reveal much about what the star was like before it exploded; most of the evidence has been obliterated. Information encoded in these UV "pre-flashes" could offer scientists an unprecedented window into the innards of stars on the verge of exploding.

In this case, Schawinski and his colleagues calculated that just before its death, the star was 500 to 1000 times larger in diameter than our sun, confirming that the star was in fact a red supergiant. "We've been able to tell you the size of a star that died in a galaxy several billion light-years away," Schawinski marvels.

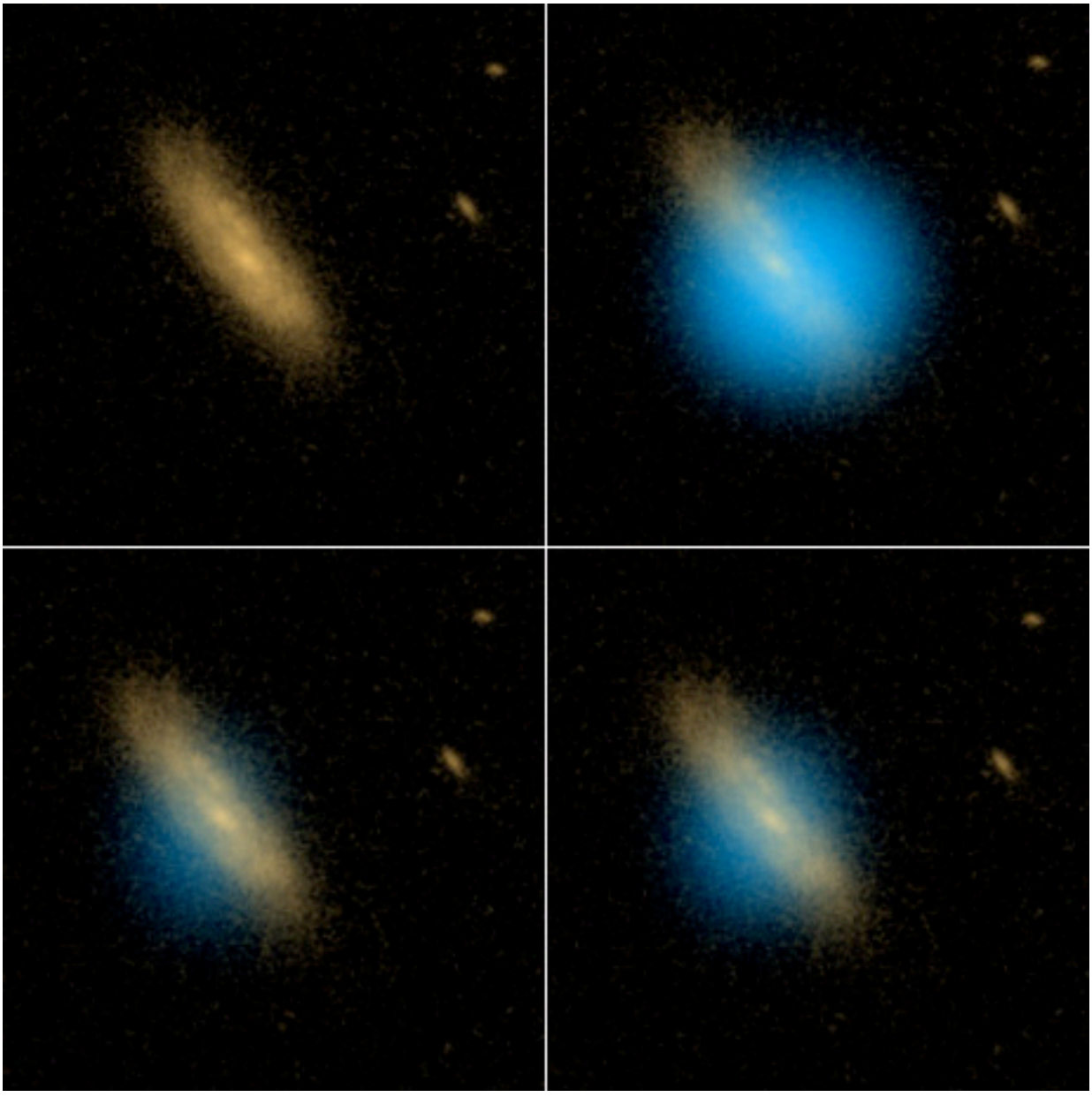
"GALEX has played a very important role in actually seeing this for a few reasons," Schawinski says. First, GALEX is a space telescope, so it can see far-UV light that's blocked by Earth's atmosphere.

Also, GALEX is designed to take a broad view of the sky. Its relatively small 20-inch primary mirror gives it a wide, 1.2-degree field of view, making it more likely to catch the UV flash preceding a supernova.

With these advantages, GALEX is uniquely equipped to catch a supernova before it explodes. "Just when we like to see it," Schawinski says.

For more information, visit www.galex.caltech.edu, "Ultraviolet Gives View Inside Real 'Death Star'." Kids can check out how to make a mobile of glittering galaxies at spaceplace.nasa.gov/en/kids/galex_make1.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:

Sequence of images shows supernova start to finish. The top left image shows the galaxy before the supernova. At top right, the bright UV flash called the shock breakout indicates a red supergiant has collapsed. At bottom left, moments later, the flash is mostly gone. As the debris expands, it heats up again and becomes brighter (bottom right). The supernova became 10 times the size of the original over