Southwest Florida Astronomical Society
SWFAS

The Eyepiece
October 2013

A MESSAGE FROM THE PRESIDENT

Let's hope the rain has stopped.

We have a busy month ahead. One event (Ding Darling Days) on Oct. 20th may be affected if there is a government shutdown. We will keep everyone posted as to that event.

This month's events:

Sat Oct 5	Star Party	CRP	Dusk	Bruce Dissette
Fri Oct 11	Public Star Party	Riverside Retreat	Aft/Evening	Venus, 1st Quarter moon Martha Pierce (Brian Risley)
Sat Oct 12	IOMN	CNCP	Dusk	Carole Holmberg
Sat Oct 12	IOMN	Seahawk Air Park	Dusk	Keith Locklin CCPR (Brian Risley)
Fri Oct 18	Cub Scout Jamboree	Camp Miles (SR 31/74)	Dusk	AJ Warnock (No Movie this time, but there is a full moon) (Brian Risley)
Sat Oct 19	Cub Scout Jamboree	Camp Miles	Solar Observing	AJ Warnock (We can do some solar observing CPC/PST)
Sun Oct 20	Ding Darling Days	Sanibel	Day 10-3	Solar only, handouts
Sat Oct 26	Pine Island Fun Fest	Pine Island	10-2	

The November meeting is our annual Telescope Renaissance night (with observing) starting at 7pm on Nov. 7th at the CNCP. There will be no formal meeting that night.

December 5th meeting program is by Scott Flaig, SWFAS member and author of **Cosmology: Faith and Science Reveal *Universal* Truth.**

If anyone is interested in staying over at the Cub Scout Jamboree to do solar observing in the morning, please let me know. At this time, I am planning on camping there. AJ has an area we can tent camp.

Comet ISON is starting to come within the range of larger telescopes. Tony Heiner has imaged it already. As I write this it is somewhere between 12th and 14th magnitude. It passes Mars at the beginning of the month. Current predictions are that it could get as bright as Venus as it passes the Sun. We may still get a very nice comet! Astronomy Magazine for November is all about ISON and comets.

Moon: Oct New 4th, 1st Quarter 11th, Full 18th, Last Quarter 26th
Nov New 3rd, 1st Quarter 9th, Full 17th, Last Quarter 25th

CRP Star Parties: October 5, November 2, November 30, December 28.

Planets: Venus is dominating the evening sky after sunset as Saturn disappears behind the Sun. Mercury will be in the low west sky after sunset and approaches the sun by the end of the month. Mars is in the morning sky (key to finding ISON) and Jupiter rises a few hours after midnight.

Club Positions

President:
Brian Risley
swfasbrisley@embarqmail.com (239-464-0366)

Vice President:
Bruce Dissette
bdissette@centurylink.net
(239-936-2212)

Secretary:
Don Palmer
swfas.sec@gmail.com
(239-334-3471)

Treasurer:
Tony Heiner
verahei@aol.com
(941-457-9700)

Program Coordinator:
Vacant

Viewing Coords/
Fakahatchee:
Tony Heiner
verahei@aol.com
(941-629-8849)

Russ Weiland
turtledude@embarqmail.com
(239-281-0456)

Viewing Coord/
Caloosahatchee
Bruce Dissette
bdissette@centurylink.net
(239-936-2212)

Librarian:
Maria Berni
(239-940-2935)

Club Historian:
Danny Secary
asecary@gmail.com
(239-470-4764)

Equipment Coordinator:
Brian Risley
swfasbrisley@embarqmail.com (239-464-0366)

Website Coordinator:
Vacant

Astronomical League
Coordinator (ALCOR):
Carol Stewart
cjstewart@mindspring.com
(239-772-1688)

Newsletter Editor:
Carole Holmberg
CaroleHel@aol.com
(239-369-5645)

Upcoming Events

✸ Thurs Oct 3rd	Monthly meeting at CNCP	7:30 PM
✸ Sat Oct 5th	Club Star Party at CRP (Bruce Dissette)	Dusk
✸ Fri Oct 11th	Public Star Party at Riverside Retreat (Brian Risley)	Evening
✸ Sat Oct 12th	International Observe the Moon Night at CNCP (Carole Holmberg)	7 PM
✸ Sat Oct 12th (Brian Risley)	International Observe the Moon Night at Seahawk Air Park in Cape Coral	7 PM
✸ Fri Oct 18th	Cub Scout Jamboree at Camp Miles-SR 31/74 (Brian Risley)	Dusk
✸ Sat Oct 19th	Cub Scout Jamboree at Camp Miles (Brian Risley)	Solar Observing
✸ Sun Oct 20th	Solar Observing at Ding Darling Days on Sanibel	10 AM–3 PM
✸ Sat Oct 26th	Solar Observing at Pine Island Fun Fest on Pine Island	10 AM- 2 PM
✸ Fri Nov 1st	Astronomy for Amateurs at Hickey's Creek (Kelly Flaherty)	Dusk
✸ Sat Nov 2nd	Club Star Party at CRP (Bruce Dissette)	Dusk
✸ Sat Nov 2nd	Public Star Party at Jaycee Park Cape Coral (Carol Stewart)	Dusk
✸ Thurs Nov 7th	Telescope Renaissance Night/ Observing at CNCP	7 PM
✸ Sat Nov 30th	Public Star Party at CRP (Bruce Dissette)	Dusk
✸ Thurs Dec 5th	Monthly meeting at CNCP (Scott Flaig, speaker)	7:30 PM
✸ Fri Dec 6th	Astronomy for Amateurs at Hickey's Creek (Kelly Flaherty)	Dusk
✸ Sat Dec 14th	Cub Scouts at CNCP Planetarium (Carol Stewart)	Day & Evening
✸ Sat Dec 28th	Club Star Party at CRP (Bruce Dissette)	Dusk

October Meeting

Our next meeting is on Thursday October 3rd at 7:30 PM at the Calusa Nature Center Planetarium. SWFAS member Bruce Dissette will give our monthly program, which will be about observing Southern Skies.

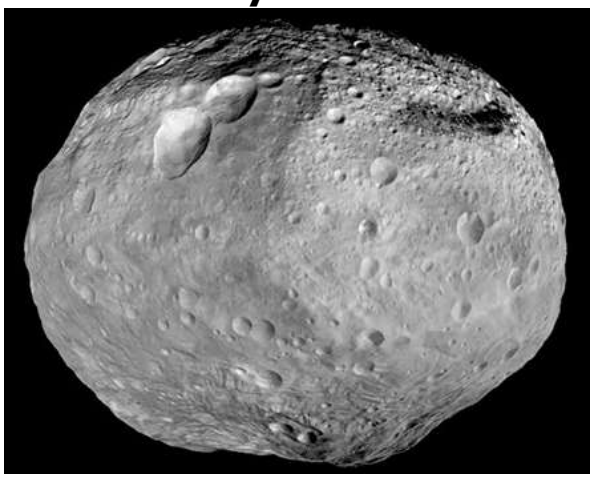
CRP Star Party Schedule

The remaining Star Parties for 2013 will be October 5, November 2, November 30, and December 28. CRP star party dates for 2014 have not been set.

Webmaster Needed

SWFAS needs a new webmaster. After many years of service Dan Fitzgerald is stepping down. He will keep at it for a little longer so that we may get someone new familiar with the processes. Our website is hosted on Naples FreeNet. If you are interested please get with me and I will have you get with Dan to go over the details of what is needed to maintain the site.
Thanks for your help,
- Brian Risley, President, Southwest Florida Astronomical Society, Inc.

Dawn Reality-Checks Telescope Studies of Asteroids



Tantalized by images from NASA's Hubble Space Telescope and ground-based data, scientists thought the giant asteroid Vesta deserved a closer look. They got a chance to do that in 2011 and 2012, when NASA's Dawn spacecraft orbited the giant asteroid, and they were able to check earlier conclusions. A new study involving Dawn's observations during that time period demonstrates how this relationship works with Hubble and ground-based telescopes to clarify our understanding of a solar system object.

Vesta, the second most massive asteroid in the main asteroid belt, differs from most garden-variety asteroids in having a crust, mantle and core like our Earth. Early ground-based observations of Vesta, which was discovered in 1807, showed that Vesta's color and surface composition changed as it rotated around its axis. Astronomers using the Infrared Telescope Facility at Mauna Kea saw distinct compositional units. It wasn't until Dawn arrived at Vesta that scientists determined the fine details and the exact distribution of these color variations, and the difference in composition between these regions.

One particularly useful comparison for future work on asteroids or other solar system objects involves comparing Dawn's framing camera data to data from Hubble. With Hubble, astronomers first saw the giant impact basin near the south pole of Vesta and also identified numerous bright and dark features on Vesta that correspond to different compositional units. It wasn't until Dawn's framing camera provided high-resolution views of Vesta that scientists were able to see the detailed contours of the giant impact basin that came to be called Rheasilvia and saw how bright the brightest materials were and how dark the dark materials were. Dawn's observations also showed that there was an older, overlapping giant impact basin under Rheasilvia. The bright materials appear to be pristine rocks native to Vesta, while the carbon-rich dark material appears to have been brought to Vesta from afar.

Launched in 2007, Dawn orbited Vesta for more than a year, departing in September 2012. Dawn is now on its way to the dwarf planet Ceres and will arrive there in early 2015.
- The full version of this story with accompanying images is at
www.jpl.nasa.gov/news/news.php?release=2013-293&cid=release_2013-293

Is There Life Out There? The Search For Habitable Exoplanets

This is a presentation on exoplanets by the recent "Genius Award" winner, Sara Seager using the creative presentation platform Prezi. Enjoy!

http://prezi.com/zizte0g6m5ep/is-there-life-out-there-the-search-for-habitable-exoplanets/?utm_source=em0nl0explore&utm_medium=email&utm_campaign=gro&utm_term=a370923674

Saturn's "Sponge"

Rotating chaotically while it orbits Saturn every twenty-one days, Hyperion is one of the most bizarre moons in the solar system. Its irregular surface, pockmarked by surprisingly deep craters, gives Hyperion a sponge-like appearance. Data from the Cassini spacecraft, which made a close approach to Hyperion in 2005 and 2006, shed some light on what might cause this strange terrain. When meteorites fall on dense bodies, like the Moon, plumes of debris are ejected and eventually settle around the impact site, in effect repaving the surrounding surface by filling in older nearby craters. Hyperion, however, is so brittle and porous (Cassini found that over 40% of it is empty space) that impacts create little or no debris, and can result in comparatively deep, well-preserved craters.

- The Year in Space calendar, Image credit: NASA / JPL / Space Science Institute

Voyager 1 Has Left the Solar System

NASA's Voyager 1 spacecraft officially is the first human-made object to venture into interstellar space. The 36-year-old probe is about 12 billion miles from our sun.

New and unexpected data indicate Voyager 1 has been traveling for about one year through plasma, or ionized gas, present in the space between stars. Voyager is in a transitional region immediately outside the solar bubble, where some effects from our sun are still evident.

Voyager 1 first detected the increased pressure of interstellar space on the heliosphere, the bubble of charged particles surrounding the sun that reaches far beyond the outer planets, in 2004. Scientists then ramped up their search for evidence of the spacecraft's interstellar arrival, knowing the data analysis and interpretation could take months or years.

Voyager 1 does not have a working plasma sensor, so scientists needed a different way to measure the spacecraft's plasma environment to make a definitive determination of its location. A coronal mass ejection, or a massive burst of solar wind and magnetic fields, that erupted from the sun in March 2012 provided scientists the data they needed. When this unexpected gift from the sun eventually arrived at Voyager 1's location 13 months later, in April 2013, the plasma around the spacecraft began to vibrate like a violin string. On April 9, Voyager 1's plasma wave instrument detected the movement. The pitch of the oscillations helped scientists determine the density of the plasma. The particular oscillations meant the spacecraft was bathed in plasma more than 40 times denser than what they had encountered in the outer layer of the heliosphere. Density of this sort is to be expected in interstellar space.

The plasma wave science team reviewed its data and found an earlier, fainter set of oscillations in October and November 2012. Through extrapolation of measured plasma densities from both events, the team determined Voyager 1 first entered interstellar space in August 2012.

"The team's hard work to build durable spacecraft and carefully manage the Voyager spacecraft's limited resources paid off in another first for NASA and humanity," said Suzanne Dodd, Voyager project manager. "We expect the fields and particles science instruments on Voyager will continue to send back data through at least 2020. We can't wait to see what the Voyager instruments show us next about deep space."

Voyager 1 and its twin, Voyager 2, were launched 16 days apart in 1977. Both spacecraft flew by Jupiter and Saturn. Voyager 2 also flew by Uranus and Neptune. Voyager 2, launched before Voyager 1, is the longest continuously operated spacecraft. It is about 9.5 billion miles away from our sun.

Voyager mission controllers still receive data from Voyager 1 and Voyager 2 every day, though the emitted signals are currently very dim, at about 23 watts - the power of a refrigerator light bulb. By the time the signals get to Earth, they are a fraction of a billion-billionth of a watt. Data from Voyager 1's instruments are transmitted to Earth typically at 160 bits per second, and captured by 34- and 70-meter NASA Deep Space Network stations. Traveling at the speed of light, a signal from Voyager 1 takes about 17 hours to travel to Earth. After the data are processed by the science teams, Voyager data are made publicly available.

"Voyager has boldly gone where no probe has gone before, marking one of the most significant technological achievements in the annals of the history of science, and adding a new chapter in human scientific dreams and endeavors," said John Grunsfeld, NASA's associate administrator for science. "Perhaps some future deep space explorers will catch up with Voyager, our first interstellar envoy, and reflect on how this intrepid spacecraft helped enable their journey." Scientists do not know when Voyager 1 will reach the undisturbed part of interstellar space where there is no influence from our sun. They also are not certain when Voyager 2 is expected to cross into interstellar space, but they believe it is not very far behind.
- Production editor: Dr. Tony Phillips | Credit: Science@NASA

2013 Cassini Scientist for a Day Essay Contest

The Cassini Scientist for a Day contest challenges students to become NASA scientists studying Saturn. Participants examine three possible observations taken by Cassini and choose the one they think will yield the best scientific results. This year's targets are Saturn and its moons Iapetus and Dione. After researching the three options, students write an essay under 500 words explaining their choice.
The contest is open to all students in the United States in grades 5-12. The essays will be divided into three groups for scoring: grades 5-6, 7-8 and 9-12. All submissions must be students' original work. Participants may enter as individuals or as part of a team of up to four students.
The deadline for entries is **Oct. 25, 2013**.
For more information, visit http://saturn.jpl.nasa.gov/scientistforaday/.

Paper Model of Comet ISON's Orbit

Now available from NASA:
http://svs.gsfc.nasa.gov/vis/a010000/a011200/a011222/Paper_Model_of_Comet_ISONs_Orbit.pdf

You can also make a simple comet model using a Styrofoam ball and some pipe cleaners for the tails, as shown at right:

Man Finds Rock by River (and it's a Piece of Space Station Mir)

Walks by the river can clear your head, open your eyes, and soothe your inner flow. It's possible that you even espy unusual things along the banks -- peculiar voles, moles, or holes that conjure stories in your head.

Phil Green was wandering along the Merrimack River in Massachusetts when he discovered a piece of rock that didn't seem like it was from around his parts. He told CBS Boston: "There she was just sitting there, sticking up like that, and I said heck what is this. It just didn't belong."

Yes, greenish rocks tend not to belong. Unless they're on the finger of someone you adore so much you might even marry them. Green is a curious man, but not too curious. So he put his green rock in the Green garden and left it there for six years.

Left: Green and his green rock. Credit: CBS Boston

When a friend finally asked about it, Green thought he'd finally investigate. It was his good fortune that his sister-in-law had a friend who worked at NASA. Many of us wish we had a friend there too. There are several objects and beings I would happily have examined for their provenance.

In this case, the green rock did actually fall from the sky. NASA has determined it is a piece of the Russian space station Mir. Mir first went up to the beyond in 1986. It was decommissioned and thrust back down to Earth in 2001. Most of it landed in the South Pacific. This rogue piece - and who knows how many more there might be - decided that Massachusetts was a better resting place.

Not everyone can claim they have a piece of a space station, or indeed anything from up there. A couple of years ago, a grandmother complained bitterly that NASA had forced her to return a piece of moon rock. She claimed Neil Armstrong had given it to her husband.

One can only hope that two large men with Russian accents don't appear at Green's door, asking very politely for their piece of space station back.

- Chris Matyszczyk, http://news.cnet.com/8301-17852_3-57589481-71/man-finds-rock-by-river-its-a-piece-of-space-station-mir/

This Video is a Trip -- Through the Known Universe

Astronomers have put the known universe in a box on your computer screen – the 120 million light-years of it within our grasp, at least.

With a mellifluous French-accented narration, some light piano music and sweeping computer animation, the video could become a stoner classic. It also happens to be the most detailed modern cosmography of all that is visible in the sky – and a great deal of what is not.

At nearly 18 minutes long (that's less than one side of Pink Floyd's "The Dark Side of the Moon"), the video is not the stuff of the MTV generation and certainly not ready for prime time. But odds are it will reach cult status among astronomers, planetarium addicts and the cosmically inclined.

"I'd like to think this is the first of more ventures along the same line," said University of Hawaii astrophysicist R. Brent Tully, who was treated to a public presentation of the work for his 70th birthday in Paris. "I think we're learning how to do it. I think the next time around we'll do it better."

Tully worked with a team including Helene Courtois of the University of Lyon, who narrates, and whose son, Jules, accompanies her with an original piano composition.

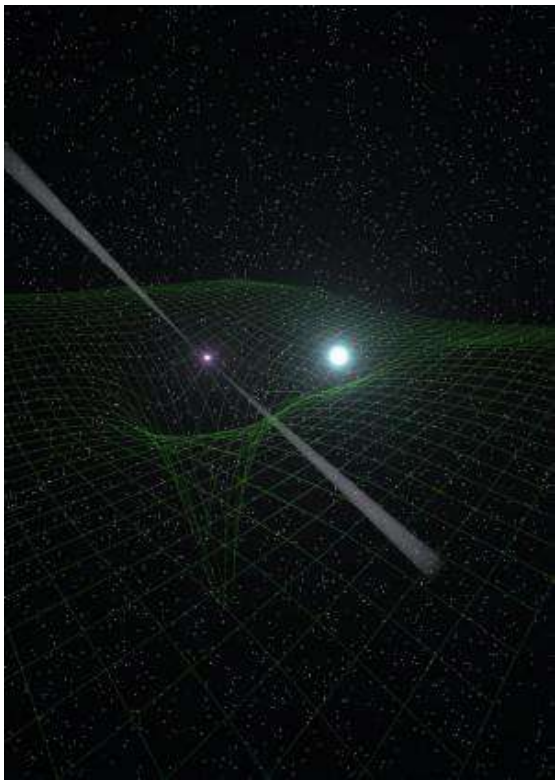
Putting the video together -- largely the work of Daniel Pomarede of the Institute of Research on Fundamental Laws of the Universe, on the outskirts of Paris -- took months, but the research had gone on for several years. The work has been submitted to the Astronomical Journal.

Few people know the known universe quite like Tully, who mapped it in 1987, on paper. "I don't know anybody else who's tried to put something on paper," Tully said.

(Tully is best known for the Tully-Fisher relation, which correlates a spiral galaxy's luminosity and rotational speed, and was published with J. Richard Fisher in 1977. It's a key tool for

measuring distances by comparing the intrinsic brightness of a galaxy with its apparent magnitude – how bright it appears.)
What's not seen is what is most astonishing about the map, which manages to represent aspects of the universe that can only be inferred from data. In this animated view of the universe, whole galaxies are mere "lighthouses" that formed in the gravitational wells of dark matter in a universe of clusters, filaments and voids.
"We actually don't know how big the whole universe is," said Tully. "What we talk about is the universe within our horizon, the travel time of light, and that's been traveling to us since 14 billion years – actually, in that time the universe has expanded, so we have access to something like 40 billion light-years."
But that's just what we could potentially see with all our sophisticated space-based telescopes and massive terrestrial arrays. "We're still picking at the depths of space," said Tully.
So what Tully and his team have boxed is the local universe, represented in terms better suited for an expanding universe – velocities. "In the maps that you're seeing there, that's really only going out a little beyond 3,000 kilometers per second," he said.
Though that translates to about 120 million light-years, consider that the speed of light is 100 times that outermost velocity. "So we're only going 1% of the way out," said Tully. "We're looking at a little local pocket of the universe."
Maybe you should just watch the video. It can be found at:
www.latimes.com/news/science/sciencenow/la-sci-sn-video-maps-universe-20130613,0,5793604.story
- By Geoffrey Mohan, Los Angeles Times

Einstein's Gravity Theory Passes Toughest Test Yet



Right: *Superdense neutron star, emitting beams of radio waves as a pulsar, center, is closely paired with a compact white-dwarf star. Together, the two provide physicists with an unprecedented natural, cosmic "laboratory" for studying the nature of gravity. The grid background illustrates the distortions of spacetime caused by the gravitational effect of the two objects. (Credit: Antoniadis, et al.)*

Once again, Albert Einstein's General Theory of Relativity, published in 1915, comes out on top.
At some point, however, scientists expect Einstein's model to be invalid under extreme conditions. General Relativity, for example, is incompatible with quantum theory. Physicists hope to find an alternate description of gravity that would eliminate that incompatibility.
A newly-discovered pulsar -- a spinning neutron star with twice the mass of the Sun -- and its white-dwarf companion, orbiting each other once every two and a half hours, has put gravitational theories to the most extreme test yet. Observations of the system, dubbed PSR J0348+0432, produced results consistent with the predictions of General Relativity.
The tightly-orbiting pair was discovered with the Green Bank Telescope (GBT), and subsequently studied in visible light with the Apache Point telescope in New Mexico, the Very Large Telescope in Chile, and the William Herschel Telescope in the Canary Islands.
In such a system, the orbits decay and gravitational waves are emitted, carrying energy from the system. By very precisely measuring the time of arrival of the pulsar's radio pulses over a long period of time, astronomers can determine the rate of decay and the amount of gravitational radiation emitted. The large mass of the neutron star in PSR J0348+0432, the

closeness of its orbit with its companion, and the fact that the companion white dwarf is compact but not another neutron star, all make the system an unprecedented opportunity for testing alternative theories of gravity.
Under the extreme conditions of this system, some scientists thought that the equations of General Relativity might not accurately predict the amount of gravitational radiation emitted, and thus change the rate of orbital decay. Competing gravitational theories, they thought, might prove more accurate in this system.
"We thought this system might be extreme enough to show a breakdown in General Relativity, but instead, Einstein's predictions held up quite well," said Paulo Freire, of the Max Planck Institute for Radioastronomy in Germany.
That's good news, the scientists say, for researchers hoping to make the first direct detection of gravitational waves with advanced instruments. Researchers using such instruments hope to detect the gravitational waves emitted as such dense pairs as neutron stars and black holes spiral inward toward violent collisions.
Gravitational waves are extremely difficult to detect and even with the best instruments, physicists expect they will need to know the characteristics of the waves they seek, which will be buried in "noise" from their detectors. Knowing the characteristics of the waves they seek will allow them to extract the signal they seek from that noise.
"Our results indicate that the filtering techniques planned for these advanced instruments remain valid," said Ryan Lynch, of McGill University.

Full moon gets partial blame for Civil War general's death

Left: Stonewall Jackson's left arm is interred separate from the rest of his body.

A full moon hung just right in the night sky as the fierce Southern Army faced the encroaching Union troops in the spring of 1863. Though they were outmanned and outgunned, the momentum of the war seemed to be on the side of Generals Robert E. Lee and "Stonewall" Jackson in Northern Virginia. But the tide turned in the American Civil War not long after Jackson's own men inadvertently shot him that May night at the battle of Chancellorsville in Virginia. And for that, say two researchers, Americans can thank that full moon.
It's an intriguing concept put forth by astronomer Don Olson and researcher Laurie E. Jasinski from Texas State University. They say that when the men of the 18th North Carolina Infantry Regiment fired upon Jackson, the whitish lunar light likely obscured the target. They didn't know it was him.
In other words, they say, a moon phase is partly responsible for the molding of a nation "dedicated to the proposition that all men are created equal," as President Abraham Lincoln put it in the Gettysburg Address.
The two reconstructed the scene of the shooting using moon phases and maps, and published the results 150 years after the incident.
"The Moon was shining very brightly, rendering all objects in our immediate vicinity distinct...," one confederate captain wrote years later. "The Moon poured a flood of light upon the wide, open turnpike."
Jackson rode out with a party of officers on a scouting mission to see if the Confederate Army could find a way to cut off Union Army troops, according to the National Park Service, which cares for the nation's Civil War battlegrounds.
They were shot as they returned.
Olson and Jasinski say that a Confederate officer spotted them in the moonlight and ordered his men to open fire.

Jackson was wounded in his left arm, which had to be amputated, according to the Virginia Military Institute, where Jackson taught. He died from complications on May 10, 1863. His arm was buried separate from the rest of his body.
The South went on to win the Battle of Chancellorsville, but without Jackson, took a decisive blow in July 1863 at the Battle of Gettysburg, often thought of as the turning point of the war.
If Jackson's reconnaissance party was riding in bright moonlight, then his own men should have recognized them as they returned from the Union's side, but Olson and Jasinski say they did not -- for good reason.
The 18th North Carolina was looking to the southeast, directly toward the rising moon. It stood at 25° above the horizon at the time, just at the wrong angle. The bright moon would have silhouetted Jackson and his officers, completely obscuring their identities.
The Confederate infantrymen likely thought their own men returning were Union cavalrymen on the approach.
"Our astronomical analysis partially absolves the 18th North Carolina from blame for the wounding of Jackson," Olson says.
Stonewall Jackson may have appreciated the Texas State researchers' hypothesis, not only because it would have alleviated the conscience of the men who took his life.
Before joining the Confederate Army, he was a science professor.
- By Ben Brumfield, CNN, www.cnn.com/2013/05/01/us/stonewall-jackson/index.html?iref=allsearch

NASA's Hubble Will Use Rare Stellar Alignment to Hunt for Planets

NASA's Hubble Space Telescope will have two opportunities in the next few years to hunt for Earth-sized planets around the red dwarf Proxima Centauri.

The opportunities will occur in October 2014 and February 2016 when Proxima Centauri, the star nearest to our sun, passes in front of two other stars. Astronomers plotted Proxima Centauri's precise path in the heavens and predicted the two close encounters using data from Hubble.

"Proxima Centauri's trajectory offers a most interesting opportunity because of its extremely close passage to the two stars," said Kailash Sahu, an astronomer with the Space Science Telescope Institute.

Previous attempts to detect planets around Proxima Centauri have not been successful. But astronomers believe they may be able to detect smaller terrestrial planets, if they exist, by looking for microlensing effects during the two rare stellar alignments.

Microlensing occurs when a foreground star passes close to our line of sight to a more distant background star. These images of the background star may be distorted, brightened and multiplied depending on the alignment between the foreground lens and the background source.

These microlensing events, ranging from a few hours to a few days in duration, will enable astronomers to measure precisely the mass of this isolated red dwarf. Getting a precise determination of mass is critical to understanding a star's temperature, diameter, intrinsic brightness, and longevity.

Astronomers will measure the mass by examining images of each of the background stars to see how far the stars are offset from their real positions in the sky. The offsets are the result of Proxima Centauri's gravitational field warping space. The degree of offset can be used to measure Proxima Centauri's mass. The greater the offset, the greater the mass of Proxima Centauri. If the red dwarf has any planets, their gravitational fields will produce a second small position shift.

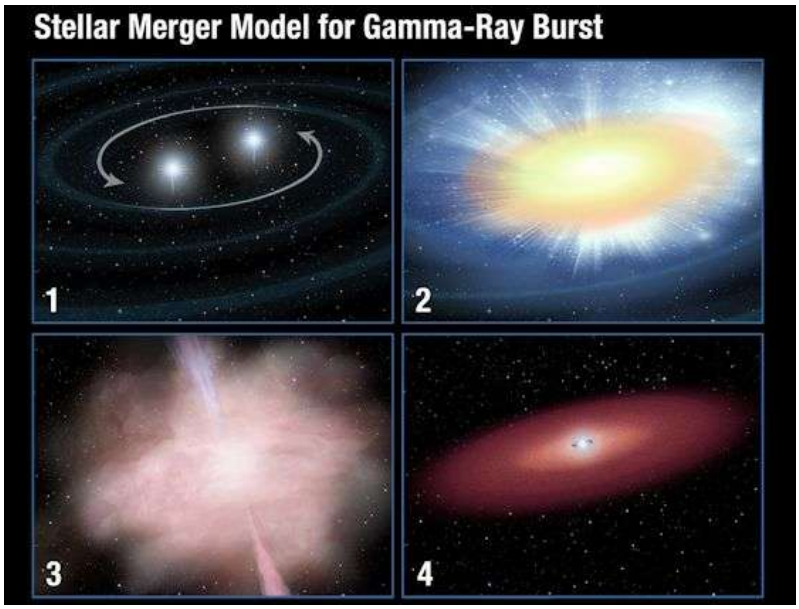
Because Proxima Centauri is so close to Earth, the area of sky warped by its gravitation field is larger than for more distant stars. This makes it easier to look for shifts in apparent stellar position caused by this effect. However, the position shifts will be too small to be perceived by any but the most sensitive telescopes in space and on the ground. The European Space Agency's

Gaia space telescope and the European Southern Observatory's Very Large Telescope in Chile may be able to make measurements comparable to Hubble's.

To identify possible alignment events, Sahu's team searched a catalog of 5,000 stars with a high rate of angular motion across the sky and singled out Proxima Centauri. It crosses a section of sky with the apparent width of the full moon as observed from Earth every 600 years.
- *www.nasa.gov/home/hqnews/2013/jun/HQ_13-163_Hubble_Microlensing.html*

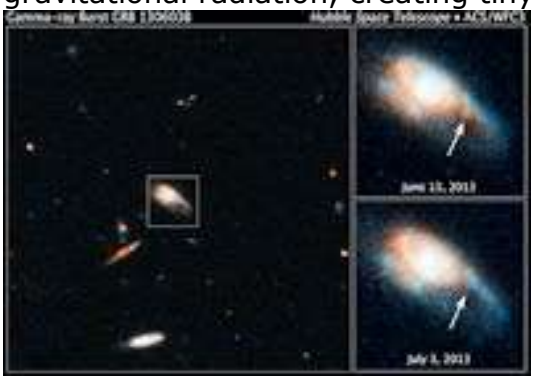
Hubble Sees the Fireball from a "Kilonova"

The Hubble Space Telescope has detected a new kind of stellar blast called a kilonova, which happens when a pair of compact objects such as neutron stars crash together. Hubble observed the fading fireball from a kilonova, following a short gamma ray burst (GRB) in a galaxy almost 4 billion light-years from Earth.
"This observation finally solves the mystery of short gamma ray bursts," says Nial Tanvir of the University of Leicester, who led a team of researchers conducting this research.



Left: This sequence illustrates the kilonova model for the formation of a short-duration gamma-ray burst. 1. A pair of neutron stars in a binary system spiral together. 2. In the final milliseconds, as the two objects merge, they kick out highly radioactive material. This material heats up and expands, emitting a burst of light called a kilonova. 3. The fading fireball blocks visible light but radiates in infrared light. 4. A remnant disk of debris surrounds the merged object, which may have collapsed to form a black hole.

Gamma ray bursts are flashes of intense high-energy radiation that appear from random directions in space. They come in two flavors--long and short. "Many astronomers have already provided a great deal of evidence that long-duration gamma ray bursts (those lasting more than two seconds) are produced by the collapse of extremely massive stars," explains Tanvir.
The short bursts, however, were more mysterious.
"We only had weak circumstantial evidence that short bursts might be produced by the merger of compact objects," he adds. "This result now appears to provide definitive proof."
Astrophysicists have predicted short-duration GRBs are created when a pair of super-dense neutron stars in a binary system spiral together. This event happens as the system emits gravitational radiation, creating tiny waves in the fabric of space-time. The energy dissipated by the waves causes the two stars to sweep closer together. In the final milliseconds before the explosion, the two stars merge into a death spiral that kicks out highly radioactive material. This material heats up and expands, emitting a burst of light.



The resulting "kilonova" is about 1,000 times brighter than a regular nova, which is caused by the eruption of a white dwarf.

Left: These Hubble images show the fireball afterglow of Gamma-ray Burst 130603B.

In a recent paper Jennifer Barnes and Daniel Kasen of the University of California at Berkeley presented new calculations predicting how kilonovas should look. They predicted the same hot plasma producing the radiation also will block the visible light, causing the gusher of energy from the kilonova to flood out in near-infrared light over several days.
An unexpected opportunity to test this model came June 3 when NASA' s Swift space telescope picked up the extremely bright gamma ray burst, cataloged as GRB 130603B. Although the initial blast of gamma rays lasted just one-tenth of a second, it was roughly 100 billion times brighter than the subsequent kilonova flash.
From June 12-13, Hubble searched the location of the initial burst, spotting a faint red object. Subsequent Hubble observations on July 3 revealed the source had faded away, providing the key evidence the infrared glow was from an explosion accompanying the merger of two objects.
- Production editor: Dr. Tony Phillips | Credit: Science@NASA

How to hunt for your very own supernova!

By Dr. Ethan Siegel

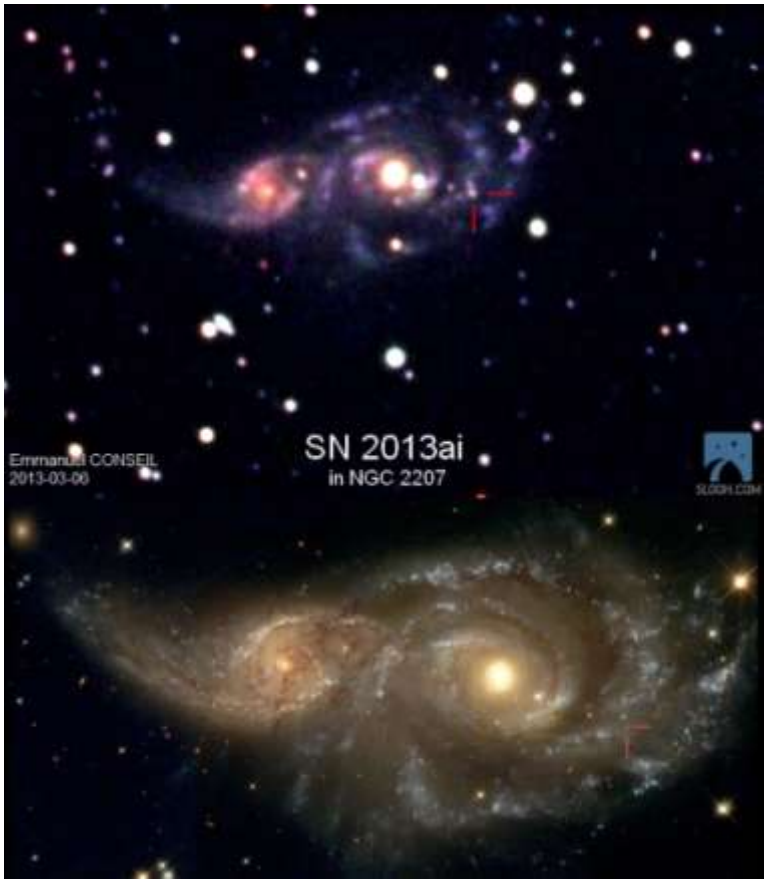
In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.

Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the most massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulfur and all the way up to iron, cobalt, and, nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The inrushing matter approaches the center of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it immediately; you just might have discovered a new supernova!

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light traveled millions of light-years across the Universe right to you, and you'll be the first person who's ever seen it!



Right: SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

Read more about the evolution and ultimate fate of the stars in our universe: http://science.nasa.gov/astrophysics/focus-areas/how-do-stars-form-and-evolve/.

While you are out looking for supernovas, kids can have a blast finding constellations using the Space Place star finder: http://spaceplace.nasa.gov/starfinder/.

How Much Do You Know About Our Sun?

Ready to play?
Test your knowledge in the latest game from NASA's Space Place - Solar Tricktionary! Pick the correct definition to a term or concept about our Sun from a list of four. Hilariously incorrect answers allow players to learn heliophysics terms while still being entertained. Visit http://spaceplace.nasa.gov/solar-tricktionary/ to play.

Greetings, fellow members of the Night Sky Network,

We just finished shipping the newly updated PlanetQuest and Shadows and Silhouettes ToolKits. They will arrive at your shipping address in the next few weeks and are full of good stuff, including star wheels, PlanetQuest viewing cards, lithographs from NASA, and more!

We also want to remind you to log your events! We will remind you again in our next newsletter. The last quarter prize is a very fun one for outreach: an eyepiece adapter for your smartphone, courtesy of Orion Telescopes! It is a universal mount for 1.25 inch eyepieces, allowing "Live viewing" of objects such as the Moon, the Sun (proper filter, of course!), and the planets-and if you are lucky, a few of the brighterouble stars and nebulae. Of course it allows you to easily take pictures and video as well. It is for both iPhone and Android devices. We were so excited we got one for ourselves to test to make sure it is up to snuff-and we had a nice crowd of neighbors gathered around as we observed the Harvest Moon via the viewscreen!

Finally, one last fun note: the JUNO spacecraft is zipping by Earth for one last assist on its way to Jupiter, and you may be able to see it!

NASA's Jupiter-bound Juno spacecraft will perform a close flyby of Earth on Oct. 9, 2013, coming to within 347 miles of Earth at closest approach. The Juno mission team welcomes images from amateur astronomers who attempt to photograph the spacecraft during and after the flyby. Information about Juno's flyby, including links to observing info will be published on the NASA website at http://www.nasa.gov/mission_pages/juno/earthflyby.html.

You can reach both of us any time at nightskyinfo@astrosociety.org

Wishing you clear skies!

Vivian White and David Prosper, Night Sky Network Team
nightskyinfo@astrosociety.org
The NASA Night Sky Network is a nationwide coalition of over 425 amateur astronomy clubs. The NASA Night Sky Network is managed by The Astronomical Society of the Pacific.

SWFAS Minutes

Minutes will be published in a future newsletter.

Southwest Florida Astronomical Society, Inc.
P.O. Box 100127
Cape Coral, FL 33910

www.theeyepiece.org