

# Southwest Florida Astronomical Society

**SWFAS**



## The Eyepiece September 2013

### A MESSAGE FROM THE PRESIDENT

I hope everyone had a good Labor Day weekend!

Well, as I said last month, Comet ISON is on its way. How it will perform is still uncertain. I will be talking about it and other upcoming events as our program this month.

This summer the rain has really hurt observing. Did anyone get to see Nova Delphini at its brightest?

We have a very busy fall/winter season with a lot of events and requests. Please let me know if you can help at any of the events. I will be sending out updated calendars regularly.

Our October meeting program is to be determined. If you have a presentation or idea for a program, please let me know!

Carole Holmberg has a public event planned for Friday Sept 13th at 8pm at the CNCP.

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

Moon: Sep New 5th, 1st Quarter 12th, Full 19th, Last Quarter 26th  
Oct New 4th, 1st Quarter 11th, Full 18th, Last Quarter 26th

Star Parties: September 14, October 5, November 2, November 30, December 28.

The planets: Venus is dominating the evening sky after sunset as Saturn slips further towards the sun. Mercury will make a brief appearance midmonth after sunset. Mars is reappearing 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:

**Vacant**

Treasurer:

**Tony Heiner**

verahei@aol.com (941-457-9700)

Program Coordinator:

**Vacant**

Viewing Coords/  
Fakahatchee:

**Tony Heiner**

verahei@aol.com (941-629-8849)

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:

**Dan Fitzgerald**

bigdan2204@comcast.net (239-282-2292)

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 Sep 5th Monthly meeting at the Calusa Nature Center Planetarium 7:30 PM
- \* Fri Sep 13 Public event/Telescope Observing at CNCP (Carole Holmberg) 8 PM
- \* Sat Sep 14 Club Star Party at Caloosahatchee Regional Park (Bruce Dissette) Dusk
- \* Thurs Oct 3rd Monthly meeting at the CNCP 7:30 PM
- \* Sat Oct 5th Club Star Party at CRP (Bruce Dissette) Dusk
- \* Fri Oct 11th Public Star Party at Riverside Retreat (Martha Pierce) Afternoon/Evening
- \* Sat Oct 12th International Observe the Moon Night at CNCP 8 PM
- \* Sat Oct 12th International Observe the Moon Night at Seahawk Air Park in Cape Coral (Katie Lochlin CCPR) Dusk
- \* Fri Oct 18th Cub Scout Jamboree at Camp Miles-SR 31/74 (AJ Warnock) Dusk
- \* Sat Oct 19th Cub Scout Jamboree at Camp Miles (AJ Warnock) Solar Observing
- \* Sun Oct 20th Solar Observing at Ding Darling Days on Sanibel 10 AM-3 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 (Katie Lochlin) Dusk
- \* Thurs Nov 7th Telescope Renaissance Night/ Observing at CNCP 7 PM
- \* Tues Nov 12th? Public Star Party at Riverside Retreat (Martha Pierce) Dusk
- \* Sat Nov 30<sup>th</sup> Club Star Party at CRP (Bruce Dissette) Dusk

## Future Events

Date	Event	Location	Time	Obs Info/Contact
Fri Dec 6	Astronomy for amateurs	Hickey's Creek	Dusk	Kelly Flaherty
Sat Dec 14	Cub Scouts	Planetarium	Day & evening	Carol Stewart
Sat Dec 28	Star Party	CRP	Dusk	Bruce Dissette
Jan/Feb 2014	Public Event	Sanctuary Golf Course Sanibel	Dusk	Kyle Sweet (Need to schedule) (Wanted Feb meeting night)
Jan/Feb 2014	Public Event	Shell Point Village Star Party	Dusk	Doug Heatherly
Fri Jan 31	Astronomy for amateurs	Hickey's Creek	Dusk	Kelly Flaherty
Sat Feb 1?	Star Party	CRP	Dusk	Bruce Dissette
Sat Feb 7/10?	Star Party	Oasis Middle School Aero Club	7:30-9:00 pm	Carol Stewart
Feb 2014	Science Fair & Edison Village	FGCU/Imaginarium	Daytime on Saturdays	Parade is Feb 15 <sup>th</sup> , no dates set yet.
Sat Feb 22	Burrowing Owl Festival	Rotary Park	Daytime	
Fri Feb 22	Astronomy for amateurs	Hickey's Creek	Dusk	Kelly Flaherty
Sat Mar 1?	Star Party	CRP	Dusk	Bruce Dissette
Fri Mar 28	Astronomy for amateurs	Hickey's Creek	Dusk	Kelly Flaherty

## September Meeting

Our next meeting is on Thursday September 5th at 7:30 PM at the Calusa Nature Center Planetarium. Our program is TBD.

## CRP Star Party Schedule

The remaining Star Parties for 2013 will be September 14, October 5, November 2, November 30, and December 28. CRP star party dates for 2014 have not been set.

## A Planet for Goldilocks

At the Astronomical Society for the Pacific annual conference this past summer, Natalie Batalha, San Jose State University, gave a talk entitled *A Planet for Goldilocks*. The hour-long talk can be found on the web at [www.astrosociety.org/education/asp-annual-meeting/2013-meeting-plenary-session-videos/](http://www.astrosociety.org/education/asp-annual-meeting/2013-meeting-plenary-session-videos/)

Here is the blurb about her talk: The search for life beyond Earth has inspired Solar System exploration and SETI surveys. Today, the search for life also leads to exoplanet discovery and characterization. Launched in March 2009, NASA's Kepler Mission has discovered thousands of exoplanets with diverse properties. Though each new world is interesting in its own right, Kepler aims to understand the population as a whole. Its primary objective is to determine the frequency of exoplanets of different sizes and orbital periods. Of special interest are the earth-size planets in the Goldilocks (or Habitable) Zone where the flux of incoming starlight is conducive to the existence of surface liquid water. Once Kepler establishes the prevalence of such planets in the Solar neighborhood, future missions can be designed to find not just a planet in the Goldilocks Zone but a planet for Goldilocks — a truly habitable environment for life as we know it.

## Hatching in the Hunter's Head

This colorful Spitzer Space Telescope image shows infant stars "hatching" in a dust cloud in the constellation Orion the Hunter. Astronomers suspect that shock waves from a supernova explosion in Orion's head three million years ago may have initiated this newfound birth. This area is located approximately 1,300 light-years away and sits on the right side of Orion's head. Wisps of green are organic molecules called polycyclic aromatic hydrocarbons, formed anytime carbon-based materials are burned incompletely. Tints of orange-red are dust particles warmed by the newly-forming stars. The reddish-pink dots are very young stars embedded in a cocoon of cosmic gas and dust. Blue spots in the image are background stars in the Milky Way along our line of sight.

- *The Year in Space Calendar*



## NASA Spacecraft Reactivated to Hunt for Asteroids



A NASA spacecraft that discovered and characterized tens of thousands of asteroids throughout the solar system before being placed in hibernation will return to service for three more years, assisting the agency in its effort to identify the population of potentially hazardous near-Earth objects, as well as those suitable for asteroid exploration missions.

The Wide-field Infrared Survey Explorer (WISE) will be revived this month with the

goal of discovering and characterizing near-Earth objects (NEOs), space rocks that can be found orbiting within 28 million miles from Earth's path around the sun. NASA anticipates WISE will use its 16-inch telescope and infrared cameras to discover about 150 previously unknown NEOs and characterize the size, albedo and thermal properties of about 2,000 others -- including some which could be candidates for the agency's recently announced asteroid initiative.

NASA's asteroid initiative will be the first mission to identify, capture and relocate an asteroid. It represents an unprecedented technological feat that will lead to new scientific discoveries and technological capabilities that will help protect our home planet. The asteroid initiative brings together the best of NASA's science, technology and human exploration efforts to achieve President Obama's goal of sending humans to an asteroid by 2025.

Launched in December 2009 to look for the glow of celestial heat sources from asteroids, stars and galaxies, WISE made about 7,500 images every day during its primary mission, from January 2010 to February 2011. As part of a project called NEOWISE, the spacecraft made the most accurate survey to date of NEOs. NASA turned most of WISE's electronics off when it completed its primary mission.

"The data collected by NEOWISE two years ago have proven to be a gold mine for the discovery and characterization of the NEO population," said Lindley Johnson, NASA's NEOWISE program executive. "It is important that we accumulate as much of this type of data as possible while the WISE spacecraft remains a viable asset."

Because asteroids reflect but do not emit visible light, infrared sensors are a powerful tool for discovering, cataloging and understanding the asteroid population. Depending on an object's reflectivity, or albedo, a small, light-colored space rock can look the same as a big, dark one. As a result, data collected with optical telescopes using visible light can be deceiving.

During 2010, NEOWISE observed about 158,000 rocky bodies out of approximately 600,000 known objects. Discoveries included 21 comets, more than 34,000 asteroids in the main belt between Mars and Jupiter, and 135 near-Earth objects.

The WISE prime mission was to scan the entire celestial sky in infrared light. It captured more than 2.7 million images in multiple infrared wavelengths and cataloged more than 560 million objects in space, ranging from galaxies faraway to asteroids and comets much closer to Earth.

More information about NEOWISE is available online at [www.nasa.gov/wise](http://www.nasa.gov/wise) . For more information on the asteroid initiative, visit [www.nasa.gov/asteroidinitiative](http://www.nasa.gov/asteroidinitiative) .

## Best Tressed in Space

Expedition 36 Flight Engineer Karen Nyberg shows how you wash and rinse your hair in space. Floating in air like a superhero may sound like a lot of fun, but there are many challenges associated with living on the International Space Station where the lack of gravity can make

things that are easy to do on Earth harder. Astronauts have been living for more than a decade aboard the space station and have developed a few tricks that make these everyday tasks easier.

In a recent video, Expedition 36 astronaut Karen Nyberg of NASA demonstrated how she washes her long blonde hair aboard the space station.

Her video, showing how to wash and rinse your hair in space is at [www.nasa.gov/content/how-do-you-wash-your-hair-in-space/index.html#.UiTZxPkuem4](http://www.nasa.gov/content/how-do-you-wash-your-hair-in-space/index.html#.UiTZxPkuem4)

## **Comet ISON to fly by Mars**

Around the world, astronomers are buzzing with anticipation over the approach of Comet ISON. On Thanksgiving Day 2013, the icy visitor from the outer solar system will skim the sun's outer atmosphere and, if it survives, could emerge as one of the brightest comets in years.

First, though, it has to fly by Mars.

"Comet ISON is paying a visit to the Red Planet," says astronomer Carey Lisse of the Johns Hopkins University Applied Physics Lab. "On Oct 1st, the comet will pass within 0.07 AU from Mars, about six times closer than it will ever come to Earth."

Mars rovers and satellites will get a close-up view. It's too early to say whether Curiosity will be able to see the comet from the surface of Mars—that depends on how much ISON brightens between now and then. Lisse says the best bet is NASA's Mars Reconnaissance Orbiter. The MRO satellite is equipped with a powerful half-meter telescope named HiRISE that is more than capable of detecting the comet's atmosphere and tail. Observations are planned on four dates: August 20th, Sept 29th, and Oct 1st and 2nd.

HiRISE wasn't sent to Mars to do astronomy, notes the telescope's principal investigator Alfred McEwen of the University of Arizona. "The camera is designed for rapid imaging of Mars. Our maximum exposure time is limited compared to detectors on other space telescopes. This is a major limitation for imaging comets. Nevertheless, I think we will detect Comet ISON."

The Mars flyby comes at a key time in Comet ISON's journey. It will have just crossed the "frost line," a place just outside the orbit of Mars where solar heating is enough to start vaporizing frozen water.

"The volatiles in a comet are 80% to 90% water ice," notes Lisse. "Right now in August almost all the water is still frozen, and the outgassing we see in ISON is driven by carbon dioxide and other lesser constituents. Probably only isolated patches of the comet's nucleus are active." But when ISON crosses the frost line, "the whole comet could erupt in geysers of gas," says Lisse. "Mars orbiters will have a ringside seat."

The amount of outgassing at Mars will give researchers clues to the size of ISON's nucleus, which is hidden from view deep within the comet's dusty atmosphere.

"If ISON's nucleus is much bigger than 0.5 km, it will probably survive its Thanksgiving Day brush with the sun," says Lisse. "It could turn into one of the most spectacular comets in many years."

McEwen sees this as a tune-up for another comet encounter next year. "The science value of observing Comet ISON is hard to predict. We've never tried such a thing before. However, this is good practice for Comet Siding Spring, which will pass much closer to Mars in 2014."

For now all eyes are on Comet ISON. An unprecedented number of NASA spacecraft - 16 - will be observing the comet. Astronauts on board the International Space Station will be watching, too.

Meanwhile back on Earth, Lisse is working with NASA to organize a worldwide observing campaign for Comet ISON. "Our goal is to have every telescope on Earth pointed at the comet when it emerges from the sun," says Lisse. "The Mars flyby will give us a sneak preview, providing data we need to predict what we might see."

- Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA

## **Solar System Ambassadors Program Accepting Applications**

The NASA Jet Propulsion Laboratory Solar System Ambassadors Program (SSA), a nationwide network of space enthusiast volunteers, will accept applications from September 1 through **September 30, 2013**.

Highly motivated individuals will be given the opportunity to represent NASA's Jet Propulsion Laboratory as volunteer Solar System Ambassadors to the public for a one-year, renewable term beginning January 1, 2014.

While applications will be sought nationwide, interested parties from the following states are especially encouraged to apply: Alaska, Delaware, Mississippi, Montana, Nebraska, Oklahoma, South Dakota, West Virginia, Wyoming and the District of Columbia. SSA hopes to add 100 new volunteers to the program in 2014.

To learn more about the Solar System Ambassador Program, visit

<http://www2.jpl.nasa.gov/ambassador/>. The Announcement of Opportunity and application form will be available on that website beginning September 1.

If you have questions about this opportunity, contact Kay Ferrari, SSA Coordinator, by email at [ambassad@jpl.nasa.gov](mailto:ambassad@jpl.nasa.gov).

## **Earliest Known Iron Artifacts Come From Outer Space**

Researchers have shown that ancient Egyptian iron beads held at the UCL Petrie Museum were hammered from pieces of meteorites, rather than iron ore. The objects, which trace their origins to outer space, also predate the emergence of iron smelting by two millennia. Carefully hammered into thin sheets before being rolled into tubes, the nine beads -- which are over 5000 years-old -- were originally strung into a necklace together with other exotic minerals such as gold and gemstones, revealing the high value of this exotic material in ancient times. The study is published in the *Journal of Archaeological Science*.

Professor Thilo Rehren (UCL Archaeology, Qatar), lead author of the paper, said: "The shape of the beads was obtained by smithing and rolling, most likely involving multiple cycles of hammering, and not by the traditional stone-working techniques such as carving or drilling which were used for the other beads found in the same tomb."

The team's results show that in the fourth millennium BC metalworkers had already mastered the smithing of meteoritic iron, an iron-nickel alloy much harder and more brittle than the more commonly worked copper, developing techniques that went on to define the iron age.

As a result metalworkers had already nearly two millennia of experience of working with meteoritic iron when iron smelting was introduced in the mid-second millennium BC. This knowledge was essential for the development of iron smelting and the production of iron from iron ore, enabling iron to replace copper and bronze as the main metals used.

Excavated in 1911, in a pre-dynastic cemetery near the village of el-Gerzeh in Lower Egypt, the beads were already completely corroded when they were discovered. As a result, the team used x-ray methods to determine whether the beads were actually meteoric iron, and not magnetite, which can often be mistaken to be corroded iron due to similar properties.

By scanning the beads with beam of neutrons and gamma-rays, the team was able to reveal the unique texture and also high concentration of nickel, cobalt, phosphorus and germanium -- which is only found in trace amounts in iron derived from ore -- that is characteristics of meteoric iron, without having to attempt invasive analysis which could potentially damage these rare objects.

Professor Rehren said: "The really exciting outcome of this research is that we were for the first time able to demonstrate conclusively that there are typical trace elements such as cobalt and germanium present in these beads, at levels that only occur in meteoritic iron."

"We are also excited to be able to see the internal structure of the beads, revealing how they were rolled and hammered into form. This is very different technology from the usual stone bead drilling, and shows quite an advanced understanding of how the metal smiths worked this rather difficult material."

- <http://esciencenews.com/articles/2013/08/19/earliest.known.iron.artifacts.come.outer.space>

## The Strange Attraction of Hot Jupiters

When the Space Age began, astronomers knew of exactly *zero* planets outside the solar system. What a difference 50 years makes.



**Left:** An artist's concept of NASA's Kepler spacecraft.

Modern, ground-based telescopes and NASA's Kepler spacecraft have now confirmed more than 850 exoplanets, while thousands more await confirmation. The pace of discovery suggests "there are at least 100 *billion* planets in our galaxy," says John Johnson of Caltech, who works with data from the Kepler mission. "That's mind-boggling."

When the hunt for exoplanets began, the focus was on Earth-like worlds, planets like our own that might support alien life in distant solar systems. Yet planets as small as Earth are difficult to detect when they circle stars hundreds of light years away. Indeed, only a handful have been found so far.

The real haul has been in gas giants, especially "hot Jupiters." These are behemoth worlds that orbit close to their parent stars, blocking a fraction of the star's light when it transits in front. Observations of hot Jupiter "mini-eclipses" have yielded hundreds of discoveries.

At first considered to be the "chaff" researchers would have to wade through to get to the fainter Earth-like worlds, hot Jupiters are now attracting their own attention.

Consider the case of "HD189733b," discovered in 2005 by a team working at the Haute-Provence Observatory in France. Because it is nearby, only 63 light years away, and because it blocks a whopping 3% of the light from its orange-dwarf parent star, astronomers are rapidly learning a great deal.

For one thing, it's blue. Data obtained by the Hubble Space Telescope suggest that, seen from a distance, the azure disk of HD 189733b would look to the human eye much like Earth. Indeed, some members of the media have taken to calling it "the *other* blue planet."

It is, however, anything but Earthlike.

In 2007, Heather Knutson of Caltech made a global temperature map of HD189733b using NASA's infrared Spitzer Space Telescope. She knew it would be hot because HD189733b orbits its star 13 times closer than Mercury. "Even so, we were impressed by the readings," she recalls. Temperatures ranged from 1200 F on the nightside to 1700 F on the dayside. Thermal gradients drive winds as fast as 6000 mph, carrying suffocating heat around the globe.

The blue color may be caused by silicate particles in the planet's atmosphere, which scatter blue wavelengths of light from the parent star. The same physics plays out in Earth's atmosphere, although the chemicals are different. Silicates are a component of glass, so some researchers have speculated that it is actually raining molten glass on HD189733b.

The newest observations come from a pair of X-ray observatories. NASA's Chandra and the ESA's XMM Newton watched HD189733b transit its star and detected a drop in X-rays three times deeper than the corresponding decrease in optical light. This means the outer atmosphere is larger than anyone expected.

In fact, it is probably boiling away. Authors of the study estimate HD189733b is losing 100 million to 600 million kilograms of mass per second.

"The extended atmosphere of this planet makes it a bigger target for high-energy radiation from its star, so more evaporation occurs," notes Scott Wolk of the Center for Astrophysics.

Blasts of stellar radiation hitting the planet at point-blank range could have another effect: auroras that wrap around the planet from pole to pole, orders of magnitude brighter than any Northern Lights in our own solar system. This is speculative, though. While the search for Earth-like planets proceeds, hot Jupiters are a welcome albeit unexpected diversion. It makes you wonder, what will we be looking for 50 years from now...? - Credits: Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA

## NASA's Massive Free E-Book Collection



**Left:** Cosmonaut Pavel Belyayev in 1965 from *Rockets and People* (Asif Siddiqi)

Behold, the hundreds of free e-books about space history contained on <http://history.nasa.gov/series95.html> .

From old favorites like *The Difficult Road to Mars: A Brief History of Mars Exploration in the Soviet Union* and *Wind Tunnels of NASA* to experimental work like *Aerospace Food Technology* and *Life in the Universe: Proceedings of a conference held at NASA Ames Research Center Moffet Field, California, June 19-20, 1979*, this is one of the best collections of space arcana you're likely to find.

Who could resist *Exploring Space With a Camera?* Or *Rockets and People*, the autobiography of rocket designer Boris Chertok and a key history of the Soviet space program?

These books were placed online over the last decade, so some of the formatting leaves something to be desired. Many of the works have been broken up into tiny pieces, forcing one to click through page after page. But this is a singular information repository, a storehouse for our fascination with flight.

What these works also show is how central the space program made and found itself during the 20th century. NASA could convene Pillsbury and the chefs on nuclear submarines to talk about food. Computing and solar energy were both pushed along by NASA's interest. The Space Race was a proxy skirmish in the Cold War. And, of course, all sorts of ideas from the era leaked into the way NASA thought about things: freedom and America and gender and aesthetics and the future.

Oh, and don't miss a personal favorite, *We Freeze to Please: A History of NASA's Icing Research Tunnel and the Quest for Safety*. A page turner.

Right: Inspecting blades, from *We Freeze to Please* - [Alexis C. Madrigal, www.theatlantic.com/technology/archive/2013/08/nasas-massive-free-e-book-collection/278496/](http://www.theatlantic.com/technology/archive/2013/08/nasas-massive-free-e-book-collection/278496/)



## More Free NASA Books

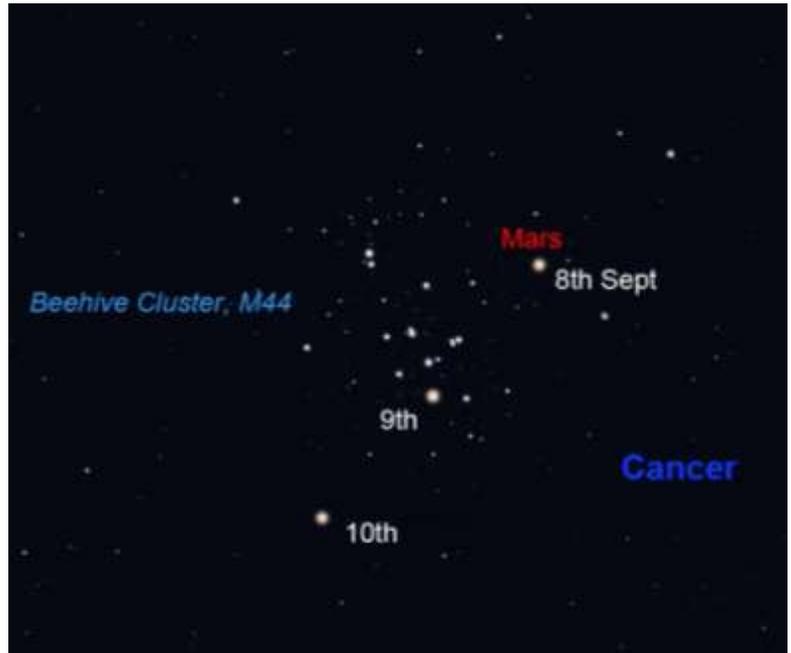
The Aeronautics Research Mission Directorate is also building a collection of free ebooks at [www.aeronautics.nasa.gov/ebooks](http://www.aeronautics.nasa.gov/ebooks).

I oversee the Headquarters Information Center which distributes and sells printed books to the public. Currently, the History Program Office is celebrating 50 years of publishing books with a massive giveaway of many titles. The price page (including which titles are available for free) is at [www.hq.nasa.gov/office/hqlibrary/ic/ic2.htm](http://www.hq.nasa.gov/office/hqlibrary/ic/ic2.htm) . We're distributing them for a \$3.00 per book shipping/handling fee.

- Richard Spencer, Information Services Manager, BFJV, Inc., Library, Information Center, Historical Reference Center, NASA Headquarters

## Cool Things for September 8

Venus continues to be visible in the western sky at sunset, while Saturn shines higher (but not as bright) in the southwestern sky. Mars and Jupiter are in the eastern pre-dawn sky. On the 8th, the waxing crescent Moon will be near Venus, as depicted in this S&T chart (on left). Also on the 8th, Mars will begin passing in front of the Beehive Cluster, an open cluster of stars in the constellation Cancer. A binocular view of its passage over the next few nights is depicted in this image from Jodrell Bank (on right).



## Size Does Matter, But So Does Dark Energy

By Dr. Ethan Siegel

Here in our own galactic backyard, the Milky Way contains some 200-400 billion stars, and that's not even the biggest galaxy in our own local group. Andromeda (M31) is even bigger and more massive than we are, made up of around a trillion stars! When you throw in the Triangulum Galaxy (M33), the Large and Small Magellanic Clouds, and the dozens of dwarf galaxies and hundreds of globular clusters gravitationally bound to us and our nearest neighbors, our local group sure does seem impressive.

Yet that's just chicken feed compared to the largest structures in the universe. Giant clusters and superclusters of galaxies, containing thousands of times the mass of our entire local group, can be found omnidirectionally with telescope surveys. Perhaps the two most famous examples are the nearby Virgo Cluster and the somewhat more distant Coma Supercluster, the latter containing more than 3,000 galaxies. There are millions of giant clusters like this in our observable universe, and the gravitational forces at play are absolutely tremendous: there are literally quadrillions of times the mass of our Sun in these systems.

The largest superclusters line up along filaments, forming a great cosmic web of structure with huge intergalactic voids in between the galaxy-rich regions. These galaxy filaments span anywhere from hundreds of millions of light-years all the way up to more than a *billion* light years in length. The CfA2 Great Wall, the Sloan Great Wall, and most recently, the Huge-LQG

(Large Quasar Group) are the largest known ones, with the Huge-LQG -- a group of at least 73 quasars -- apparently stretching nearly 4 billion light years in its longest direction: more than 5% of the observable universe! With more mass than a million Milky Way galaxies in there, this structure is a puzzle for cosmology.

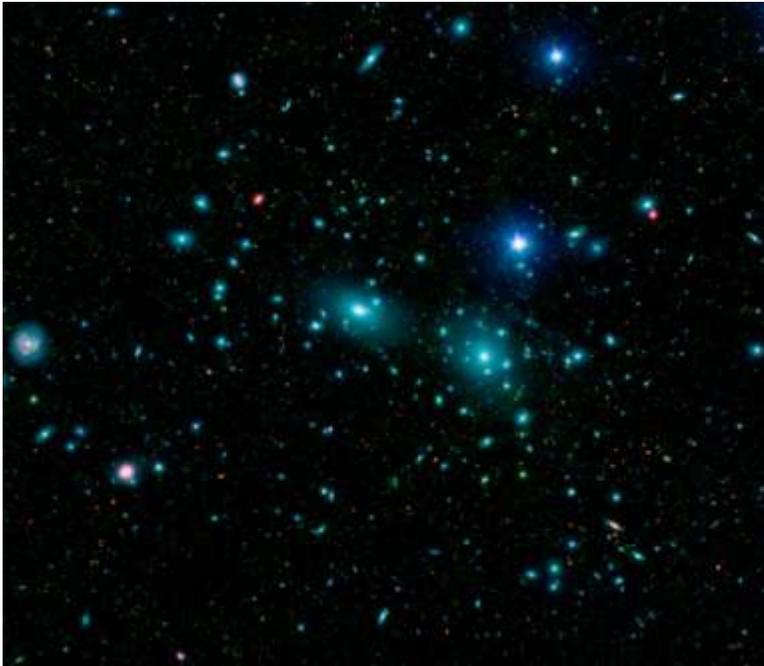
You see, with the normal matter, dark matter, and dark energy in our universe, there's an upper limit to the size of gravitationally bound filaments that should form. The Huge-LQG, if real, is more than double the size of that largest predicted structure, and this could cast doubts on the core principle of cosmology: that on the largest scales, the universe is roughly uniform everywhere. But this might not pose a problem at all, thanks to an unlikely culprit: dark energy. Just as the local group is part of the Virgo Supercluster but recedes from it, and the Leo Cluster -- a large member of the Coma Supercluster -- is accelerating away from Coma, it's conceivable that the Huge-LQG isn't a single, bound structure at all, but will eventually be driven apart by dark energy. Either way, we're just a tiny drop in the vast cosmic ocean, on the outskirts of its rich, yet barely fathomable depths.

Learn about the many ways in which NASA strives to uncover the mysteries of the universe:

<http://science.nasa.gov/astrophysics/>. Kids can make their own clusters of galaxies by checking out The Space Place's fun galactic mobile activity:

<http://spaceplace.nasa.gov/galactic-mobile/>

**Left:** Digital mosaic of infrared light (courtesy of Spitzer) and visible light (SDSS) of the Coma Cluster, the largest member of the Coma Supercluster. Image credit: NASA / JPL-Caltech / Goddard Space Flight Center / Sloan Digital Sky Survey.



## Night Sky Network

Astronomy Clubs bringing the wonders of the universe to the public

Amateur Astronomers: You are the reason the Night Sky Network is such a powerful tool. Thank you for all of your efforts to educate and amaze the public and yourselves with the wonders of the night sky. Keep up your wonderful work!

*Perseid meteor image courtesy Brocken Inaglory*

### **Congratulations to our Quarterly Prizewinners**

The following five clubs have won our latest quarterly prize: a Kepler Orrery! In order to qualify, a club must log at least two public events per quarter. Congratulations to fine folks in these clubs! May this latest prize help further your efforts to bring an understanding of the stars to the public:

Charlie Bates Solar Astronomy Project, Denver Astronomical Society, Riverside Astronomical Society, Tucson Amateur Astronomical Association, and Tri-State Astronomers.

### **Members: Live Feeds needed for Dakota Nights Astronomy Festival Sept. 27-29**

The folks at Theodore Roosevelt National Park are organizing an effort to bring dark skies to the public this fall. From September 27-29 they will be hosting an Astronomy festival and invite



clubs from across the country to participate with live feeds from their telescopes. To join their efforts to educate the public about light pollution and dark skies, go to their official event website or contact Jennifer Frost at [Jennifer\\_Frost@nps.gov](mailto:Jennifer_Frost@nps.gov).

**Save the Date: International Observe the Moon Night is coming: October 12**

Mark your calendars! International Observe the Moon Night is coming this fall. Share the wonder of our Moon and prepare to amaze folks young and old with a new peek at an object they may not even consider to be amazing-but truly is. Head over to their official website at [observethemoonnight.org](http://observethemoonnight.org) for more details and to register your event.

**Kepler Telecon Transcript now available**

Many thanks again to Dr. Nick Gautier and all of our members who participated in our recent telecon, JPL Science 101: Exoplanets and Kepler. We now have the full transcript, in both audio (.mp3) and text (.pdf) format, as well as the slides in PowerPoint (.ppt) format, available for download. Download them on our Kepler Telecon resource page ([http://nightsky.jpl.nasa.gov/download-view.cfm?Doc\\_ID=524](http://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=524)).

You can reach both of us any time at [nightskyinfo@astrosociety.org](mailto:nightskyinfo@astrosociety.org)



Wishing you clear skies!

Vivian White and David Prosper, Night Sky Network Team  
[nightskyinfo@astrosociety.org](mailto: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](http://www.theeyepiece.org)