September 2011

THE SPECTROGRAM

Newsletter for the Society of Telescopy, Astronomy, and Radio

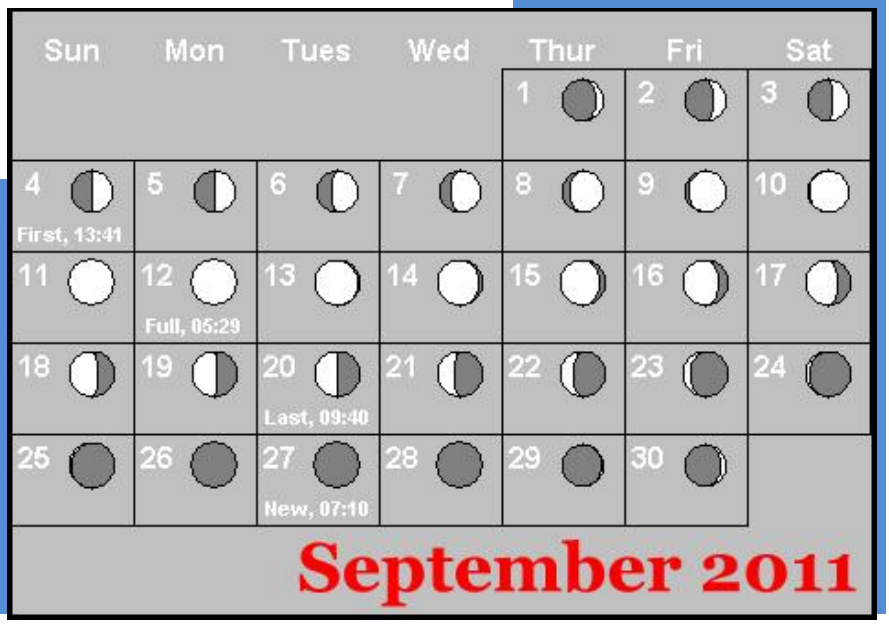
Inside this Issue:

September Meeting

The next meeting of S*T*A*R will be on Thursday, September 1st 2011. The speaker for our meeting will be club member Dennis O'Leary. His talk is titled "Highlights of NASA's Summer and JUNO a Journey to Jupiter."

Calendar

- October 6th 2011 – Monthly meeting. Speaker TBA



October Issue

Please submit articles and contributions for the next *Spectrogram* by September 27th. Please email to fowler@verizon.net.

President's Corner

Welcome everyone to a new S*T*A*R season. I've greatly enjoyed the time that I've been a member, and look forward to another year of club activities. After serving on the board of directors for four years, I hope I have learned enough from the two distinguished presidents (Gavin and Nancy) who preceded me to be an effective president. I want to thank Kevin, Steve, Arturo, and Dave for volunteering to serve on our new board.

In my time as a club member I greatly appreciated the work of club members who contributed to club activities. I had only a cursory knowledge of the sky when I joined S*T*A*R. I was somewhat intimidated by discussions I heard about strange types of objects, star catalogs, and telescope types and properties. But observing sessions with the club, and insights from helpful club members taught me a lot. I now have wonderful fun observing on my own or with other club members. I hope new members realize the benefit available from participation in club activities and discussions with our terrific club members.

I hope the club will have another eventful year. The board has discussed possible topics for talks to be presented at our meetings, which should include some on familiar topics and perhaps some that haven't been presented before. In January we will have the fun "bring your favorite food and meet other club members" meeting that former president Nancy McGuire began two years ago. Those were some of our best attended meetings, and everyone clearly enjoyed them. The board also discussed having an observing meeting. Such a meeting would require cooperation of the moon and weather. It appears that spring holds the most promise for such an event. We will also have observing sessions at Dorbrook Park, and star parties for schools and the public.

I encourage everyone to get involved in club activities. Contributing in any way can be very rewarding. We have several nice telescopes available to be borrowed. Put them to good use. Enjoy our meetings, and get outside to observe the sky.

Rob

Are you a S*T*A*R Member?

Meetings are the first Thursday of each month, except July and August, at 8:00 PM at the Monmouth Museum on the Brookdale Community College campus. Meetings generally consist of lectures and discussions by members or guest speakers on a variety of interesting astronomical topics. S*T*A*R is a member of United Astronomy Clubs of New Jersey (UACNJ), the Astronomical League (AL), and the International Dark Sky Association (IDA).

Memberships: ( )Individual....$25 ( ) Family...$35

Name_____

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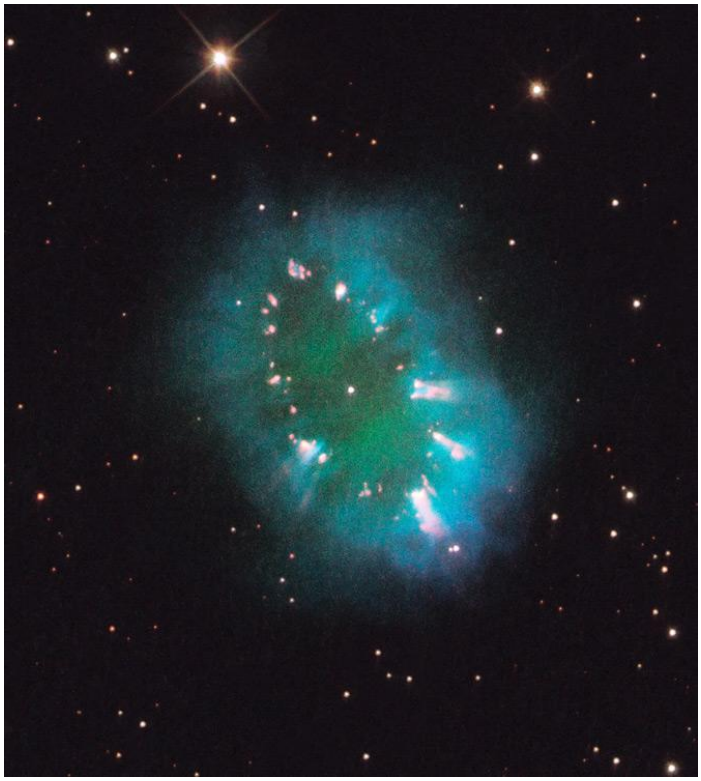
Make checks payable to: S*T*A*R Astronomy Society, Inc. and mail to P.O. Box 863, Red Bank, NJ 07701

Hubble Offers a Dazzling 'Necklace'



The Necklace Nebula is located 15,000 light-years away in the constellation Sagitta (the Arrow). In this composite image, taken on July 2, 2011, Hubble's Wide Field Camera 3 captured the glow of hydrogen (blue), oxygen (green), and nitrogen (red). Credit: NASA, ESA, and the Hubble Heritage Team (STScI/AURA)

A giant cosmic necklace glows brightly in this NASA Hubble Space Telescope image.

The object, aptly named the Necklace Nebula, is a recently discovered planetary nebula, the glowing remains of an ordinary, Sun-like star. The nebula consists of a bright ring, measuring 12 trillion miles wide, dotted with dense, bright knots of gas that resemble diamonds in a necklace.

A pair of stars orbiting close together produced the nebula, also called PN G054.2-03.4. About 10,000 years ago one of the aging stars ballooned to the point where it engulfed its companion star. The smaller star continued orbiting inside its larger companion, increasing the giant's rotation rate.

The bloated companion star spun so fast that a large part of its gaseous envelope expanded into space. Due to centrifugal force, most of the gas escaped along the star's equator, producing a ring. The embedded bright knots are dense gas clumps in the ring.

The pair is so close, only a few million miles apart, they appear as one bright dot in the center. The stars are furiously whirling around each other, completing an orbit in a little more than a day.

Hubble is a project of international cooperation between NASA and the European Space Agency. NASA's Goddard Space Flight Center in Greenbelt, Md., manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy Inc. in Washington.

For images and more information about Hubble, visit:
http://www.nasa.gov/hubble
http://hubblesite.org/news/2011/24

Donna Weaver / Ray Villard
Space Telescope Science Institute, Baltimore, Md.

NASA Moon Mission in Final Preparations For September Launch

CAPE CANAVERAL, Fla. -- NASA's Gravity Recovery And Interior Laboratory (GRAIL), mission to study the moon is in final launch preparations for a scheduled Sept. 8 launch onboard a Delta II rocket from Cape Canaveral Air Force Station in Florida.

GRAIL's twin spacecraft are tasked for a nine-month mission to explore Earth's nearest neighbor in unprecedented detail. They will determine the structure of the lunar interior from crust to core and advance our understanding of the thermal evolution of the moon.

"Yesterday's final encapsulation of the spacecraft is an important mission milestone," said David Lehman, GRAIL project manager for NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Our two spacecraft are now sitting comfortably inside the payload fairing which will protect them during ascent. Next time the GRAIL twins will see the light of day they will be about 95 miles up and accelerating."

The spacecraft twins, GRAIL A and B, will fly a circuitous route to lunar orbit taking 3.5 months and covering approximately 2.6 million miles (4.2 million kilometers) for GRAIL-A, and 2.7 million miles (4.3 million kilometers) for GRAIL-B.

In lunar orbit, the spacecraft will transmit radio signals precisely defining the distance between them. Regional gravitational differences on the moon are expected to expand and contract that distance. GRAIL scientists will use these

accurate measurements to define the moon's gravity field. The data will allow mission scientists to understand what goes on below the surface of our natural satellite.

"GRAIL will unlock lunar mysteries and help us understand how the moon, Earth and other rocky planets evolved as well," said Maria Zuber, GRAIL principal investigator from the Massachusetts Institute of Technology in Cambridge.

GRAIL's launch period opens Sept. 8 and extends through Oct. 19. On each day, there are two separate launch opportunities separated by approximately 39 minutes. On Sept. 8, the first launch opportunity is 8:37 a.m. EDT; the second is 9:16 a.m.

JPL manages the GRAIL mission. It is part of the Discovery Program managed at NASA's Marshall Space Flight Center in Huntsville, Ala. Lockheed Martin Space Systems in Denver, built the spacecraft. Launch management for the mission is the responsibility of NASA's Launch Services Program at the Kennedy Space Center in Florida.

For extensive pre-launch and launch day coverage of the GRAIL spacecraft, visit: http://www.nasa.gov

A prelaunch webcast for the mission will be streamed at noon on Wednesday, Sept. 7. Live countdown coverage through NASA's Launch Blog begins at 6:30 a.m. on Sept. 8. Coverage features live updates as countdown milestones occur and streaming video clips highlighting launch preparations and liftoff.

To view the webcast and the blog or to learn more about the GRAIL mission, visit: http://www.nasa.gov/grail and http://grail.nasa.gov

To view live interviews with lunar scientists from noon to 5 p.m. on Sept. 8 and 9, visit: http://www.livestream.com/grail

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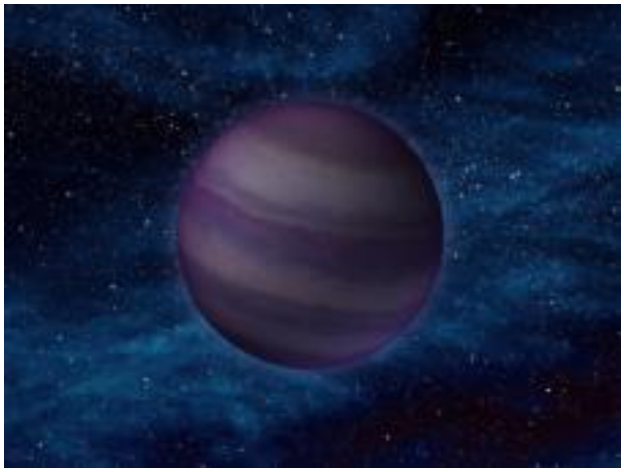
NASA'S Wise Mission Discovers Coolest Class of Stars

PASADENA, Calif. - Scientists using data from NASA's Wide-field Infrared Survey Explorer (WISE) have discovered the coldest class of star-like bodies, with temperatures as cool as the human body.

Astronomers hunted these dark orbs, termed Y dwarfs, for more than a decade without success. When viewed with a visible-light telescope, they are nearly impossible to see. WISE's infrared vision allowed the telescope to finally spot the faint glow of six Y dwarfs relatively close to our sun, within a distance of about 40 light-years.

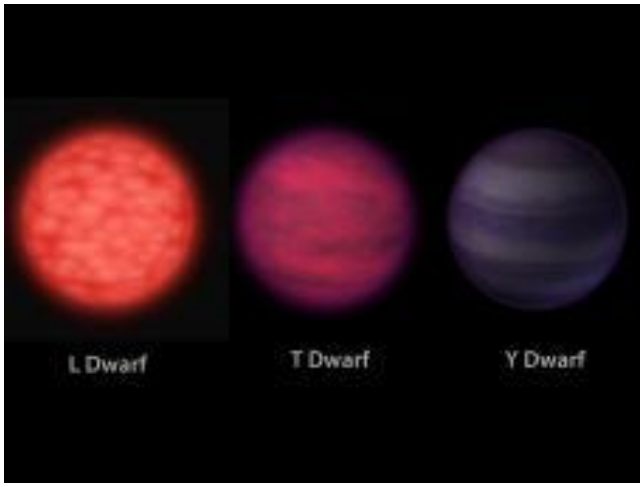
"WISE scanned the entire sky for these and other objects, and was able to spot their feeble light with its highly sensitive infrared vision," said Jon Morse, Astrophysics Division director at NASA Headquarters in Washington. "They are 5,000 times brighter at the longer infrared wavelengths WISE observed from space than those observable from the ground."



This artist's conception illustrates what a "Y dwarf" might look like. Y dwarfs are the coldest star-like bodies known, with temperatures that can be even cooler than the human body. Image credit: NASA/JPL-Caltech

NASA's Wide-field Infrared Survey Explorer, or WISE, has uncovered the coldest brown dwarf known so far (green dot in very center of this infrared image). Image credit: NASA/JPL-Caltech/UCLA

The Y's are the coldest members of the brown dwarf family. Brown dwarfs are sometimes referred to as "failed" stars. They are too low in mass to fuse atoms at their cores and thus don't burn with the fires that keep stars like our sun shining steadily for billions of years. Instead, these objects cool and fade with time, until what little light they do emit is at infrared wavelengths.



This artist's conception illustrates what brown dwarfs of different types might look like to a hypothetical interstellar traveler who has flown a spaceship to each one. Image credit: NASA/JPL-Caltech

Astronomers study brown dwarfs to better understand how stars form, and to understand the atmospheres of planets beyond our solar system. The atmospheres of brown dwarfs are similar to those of gas-giant planets like Jupiter, but they are easier to observe because they are alone in space, away from the blinding light of a parent star.

So far, WISE data have revealed 100 new brown dwarfs. More discoveries are expected as scientists continue to examine the enormous quantity of data from WISE. The telescope performed the most advanced survey of the sky at infrared wavelengths to date, from Jan. 2010 to Feb. 2011, scanning the entire sky about 1.5 times.

Of the 100 brown dwarfs, six are classified as cool Y's. One of the Y dwarfs, called WISE 1828+2650, is the record holder for the coldest brown dwarf, with an estimated atmospheric temperature cooler than room temperature, or less than about 80 degrees Fahrenheit (25 degrees Celsius).

"The brown dwarfs we were turning up before this discovery were more like the temperature of your oven," said Davy Kirkpatrick, a WISE science team member at the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena, Calif. "With the discovery of Y dwarfs, we've moved out of the kitchen and into the cooler parts of the house."

Kirkpatrick is lead author of a paper appearing in the Astrophysical Journal Supplement Series, describing the 100 confirmed brown dwarfs. Michael Cushing, a WISE team member at NASA's Jet Propulsion Laboratory in Pasadena, Calif., is lead author of a paper describing the Y dwarfs in the Astrophysical Journal.

The Y dwarfs are in our sun's neighborhood, from approximately nine to 40 light-years away. The Y dwarf approximately nine light-years away, WISE 1541-2250, may become the seventh closest star system, bumping Ross 154 back to eighth. By comparison, the star closest to our solar system, Proxima Centauri, is about four light-years away.

"Finding brown dwarfs near our sun is like discovering there's a hidden house on your block that you didn't know about," Cushing said. "It's thrilling to me to know we've got neighbors out there yet to be discovered. With WISE, we may even find a brown dwarf closer to us than our closest known star."

Once the WISE team identified brown dwarf candidates, they turned to NASA's Spitzer Space Telescope to narrow their list. To definitively confirm them, the WISE team used some of the most powerful telescopes on Earth to split apart the objects' light and look for telltale molecular signatures of water, methane and possibly ammonia. For the very coldest of the new Y dwarfs, the team used NASA's Hubble Space Telescope. The Y dwarfs were identified based on a change in these spectral features compared to other brown dwarfs, indicating they have a lower atmospheric temperature.

The ground-based telescopes used in these studies include the NASA Infrared Telescope Facility atop Mauna Kea, Hawaii; Caltech's Palomar Observatory near San Diego; the W.M. Keck Observatory atop Mauna Kea, Hawaii; and the Magellan Telescopes at Las Campanas Observatory, Chile, among others.

JPL manages WISE for NASA's Science Mission Directorate. The principal investigator is Edward Wright at UCLA. The WISE satellite was decommissioned in 2011 after completing its sky survey observations. The mission was selected under NASA's Explorers Program managed by the Goddard Space Flight Center in Greenbelt, Md. The science instrument was built by the Space Dynamics Laboratory in Logan, Utah, and the spacecraft by Ball Aerospace & Technologies Corp., in Boulder, Colo. Science operations and data processing are at the Infrared Processing and Analysis Center at the California Institute of Technology. JPL is a division of the California Institute of Technology in Pasadena.

More information is online at http://www.nasa.gov/wise , http://wise.astro.ucla.edu and http://jpl.nasa.gov/wise .

Whitney Clavin, Jet Propulsion Laboratory, Pasadena, Calif.

Next NASA Earth-Observing Satellite Arrives in California for Launch

On Tuesday, Aug. 30, NASA's next earth-observing research satellite arrived at Vandenberg Air Force Base in California to begin preparations for an October launch.

The National Polar-orbiting Operational Environmental Satellite System Preparatory Project (NPP) is the first of a new generation of satellites that will observe many facets of our changing Earth.

The satellite will collect critical data to improve our understanding of long-term climate change and short-term weather conditions. With NPP, NASA continues many key data records initiated by the agency's Earth Observing System satellites by monitoring changes occurring in the atmosphere, oceans, vegetation, ice and solid Earth.

The NPOESS Preparatory Project (NPP) climate satellite arrives at Vandenberg Air Force Base in preparation for its October launch. Credit: NASA/Jerry Nagy

On Aug. 28, NPP was placed in a shipping container and loaded on a transport truck at Ball Aerospace & Technologies Corp. in Boulder, Colo. After Tuesday's arrival, the satellite was unloaded and moved into the clean room at the AstroTech facility for launch preparation.

"The NPP team has produced an outstanding satellite and kept to schedule over the past year and a half," said Ken Schwer, NPP project manager at NASA's Goddard Space Flight Center in Greenbelt, Md. "The world is looking forward to NPP's scientific measurements."

The NPP spacecraft will undergo prelaunch processing at Vandenberg, including a solar array functional test; a spacecraft limited performance test; and testing of the science instruments. Following these tests and a spacecraft launch simulation, the satellite will be fueled with its attitude control propellant.

NPP will be launched on a United Launch Alliance Delta II 7920 expendable launch vehicle. The Delta II first stage was hoisted into position on the pad at NASA's Space Launch Complex 2 on July 20. By Aug. 2, the nine solid rocket boosters were attached, and the second stage was hoisted atop the first stage. Launch vehicle testing is under way.

The second stage is being hoisted up onto the United Launch Alliance Delta II rocket that will launch NPP into orbit in October.Credit: NASA/Vandenberg Air Force Base

The NPP spacecraft is scheduled to move to the pad and be mated with the rocket on Oct. 7. Launch is scheduled for Oct. 25 during a 9-minute and 10-second launch window from 5:48:01 to 5:57:11 a.m. EDT. The Delta II will place the satellite into a 512-mile high circular polar orbit.

NPP is the first satellite mission to address the challenge of acquiring a wide range of land, ocean, and atmospheric measurements for Earth system science while simultaneously preparing to address operational requirements for weather forecasting.

NPP serves as a bridge between NASA's Earth Observing System of satellites and the forthcoming Joint Polar Satellite System (JPSS). Previously called the National Polar-orbiting Operational Environmental Satellite System, JPSS satellites will be developed by NASA for the National Oceanic and Atmospheric Administration (NOAA).

NPP will carry five science instruments and test key technologies for the JPSS missions. Data from NPP will help scientists ensure a continuous record of environmental satellite data and also contribute to weather forecasting efforts. NOAA meteorologists will incorporate NPP data into their weather prediction models to produce accurate forecasts and warnings that will help emergency responders monitor and react to natural disasters.

Goddard manages the NPP mission on behalf of the Earth Science Division of the Science Mission Directorate at NASA Headquarters in Washington. The JPSS program is providing the ground system for NPP. NOAA will provide operational support for the mission. Launch management is the responsibility of the NASA Launch Services Program at the Kennedy Space Center in Florida.

Cynthia O'Carroll, NASA's Goddard Space Flight Center, Greenbelt, Md.

Space Station Crew Enjoys Eye-Level View of Perseid Meteor Shower

With the bright moon that was out on the evening of August 13, many astronomy buffs were not able to fully appreciate the spectacular Perseid meteor shower going on in the night sky. From the International Space Station, however, astronaut Ron Garan had a front seat view as part of the Crew Earth Observations, or CEO, investigation.

Using a Nikon D3S digital camera with a 22 mm lens, Garan captured a stunning photo of one of the Perseid meteors streaking through Earth's atmosphere. You can see part of the space station's solar array in the image, allowing the viewer to share in the unique perspective of the crew from low Earth orbit. This photograph will add to the CEO investigation's collection of hundreds of thousands of Earth images.

The astronaut photography for CEO supports global research, according to William Stefanov, chief scientist for the Engineering and Science Contract Group supporting the Astromaterials Research and Exploration Science Directorate at NASA's Johnson Space Center. "The inclined equatorial orbit of the station, and having 'humans in the loop,' makes it a useful and unique platform in comparison to unmanned polar-orbiting sensor systems. From the space station, data can be collected on Earth processes at different times of day, with different image resolutions, illumination conditions and viewing angles, than is possible from the majority of robotic sensor systems," said Stefanov.

A

Perseid meteor lights up as it streaks through the Earth's atmosphere, as seen and photographed by Ron Garan while aboard the International Space Station on August 13, 2011. (NASA Image ISS028-E-24847)

One of the upcoming developments for CEO includes camera updates to enable images in near-infrared wavelengths. This will make it possible to better map vegetation conditions using crew photography. According to Stefanov, this is just one of the advantages to a station-based perception of our planet. "The orbital perspective allows us to view and record Earth processes that would be difficult, if not impossible, to measure from the ground at scales that provide local, regional, and global perspectives. Atmospheric and oceanic processes, patterns of vegetation change and urbanization, changes to Earth's snow and ice cover and glaciers, and detection of erupting volcanoes, are all examples of Earth processes of interest to our societies that we can only efficiently monitor, in a global sense and on repeatable time intervals, from space," said Stefanov.

These meteors are fragments of the Swift-Tuttle comet, which get caught up in our planet's gravitational pull. When the fragments enter Earth's atmosphere, they begin to burn up, which appears as a visible vapor trail against the night sky. The Perseid Meteor Shower continues during the daytime, however it is not bright enough to be visible. This annual meteor shower is best viewed from the northern hemisphere and continues through August 24 this year, though peak days were August 12 to 13, 2011.

While Garan enjoyed the Perseids from his singular vantage point, those on Earth had the ability to not only watch the meteor shower, but also participate in an online NASA chat with experts on this natural phenomenon.

by Jessica Nimon
International Space Station Program Science Office

September 2011 Celestial Events: supplied by J. Randolph Walton (Randy)

Day	Date	Time (EDT)	Event
Sat	3	02:15	Mars Rises
		05:00	Mercury Rises
		06:29	Sunrise
		19:29	Sunset
		19:45	Venus Sets
		21:00	Saturn Sets
		21:50	Jupiter Rises
		22:52	Moon Set
Sun	4	13:39	**First Quarter Moon**
		23:46	Moon Set
Mon	5	21:00	**Lunar Straight Wall visible**
Sat	10	02:07	Mars Rises
		05:20	Mercury Rises
		06:36	Sunrise
		18:11	Moon rise
		19:17	Sunset
		19:37	Venus Sets
		20:33	Saturn Sets
		21:22	Jupiter Rises
Mon	12	05:27	**Full Moon**
		06:53	Moon Set
Sat	17	02:03	Mars Rises
		05:55	Mercury Rises
		06:43	Sunrise
		19:06	Sunset
		19:30	Venus Sets
		20:05	Saturn Sets
		20:55	Jupiter Rises
		21:34	Moon rise
Tue	20	09:39	**Last Quarter Moon**
		14:22	Moon Set
Fri	23	05:05	**Fall Equinox**
Sat	24	01:57	Mars Rises
		06:30	Mercury Rises
		06:49	Sunrise
		16:59	Moon Set
		18:54	Sunset
		19:23	Venus Sets
		19:40	Saturn Sets
		20:27	Jupiter Rises
Mon	26	Before 06:00	**Zodiacal Light** visible in E before morning twilight for next two weeks
Tue	27	07:04	Moon rise
		07:09	**New Moon**
Sat	**Oct 1**	01:50	Mars Rises
		18:43	Sunset
		19:15	Saturn Sets
		19:15	Venus Sets
		20:00	Jupiter Rises
		21:39	Moon Set

In the Eyepiece

Here is a list of objects for this month. This is reproduced from www.skyhound.com with the kind permission of its creator and author of SkyTools Greg Crinklaw.

Object(s)	Class	Con	RA	Dec	Mag
Garnet Star	Multiple Star	Cepheus	21h43m30.5s	+58°46'48"	4.2
Zeta Aqr	Multiple Star	Aquarius	22h28m49.9s	-00°01'12"	3.7
LW Cyg	Multiple Star	Cygnus	21h55m13.8s	+50°29'50"	9.2
M2	Globular Cluster	Aquarius	21h33m28.4s	-00°49'39"	7.3
M15	Globular Cluster	Pegasus	21h30m01.0s	+12°10'12"	7.3
Helix	Planetary Nebula	Aquarius	22h29m38.4s	-20°50'13"	7.6
Humason 1-2	Planetary Nebula	Cygnus	21h33m06.6s	+39°38'17"	12.7
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
Cocoon	Diffuse Nebula	Cygnus	21h53m24.0s	+47°16'00"	10.0
IC 5217	Planetary Nebula	Lacerta	22h23m55.7s	+50°58'00"	12.6
NGC 7094	Planetary Nebula	Pegasus	21h36m53.0s	+12°47'19"	13.7
Stephan's Quintet	Galaxy Group	Pegasus	22h36m00.5s	+33°57'57"	12.0
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
Einstein's Cross	Gravitational Lens	Pegasus	22h40m32.5s	+03°21'48"	17.4