DISTANT LIGHT

Rockland Astronomy Club Journal ~ December 2009

THE UNIVERSE YOURS TO DISCOVER
INTERNATIONAL YEAR OF ASTRONOMY 2009

SEASONS GREETINGS

MAY YOUR WISHES BE FULL OF WONDERFUL SURPRISES

PLUS: THE ORION NEBULA IN ALL ITS GLORY

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DISTANT LIGHT
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SUBMISSION DEADLINES:
The submission deadline for new material is the 15th day of the prior month. For regular contributors and columns, all material must be received by the 20th of the month prior to the issue date.

ON THE COVER: Happy Holidays from the Rockland Astronomy Club!

Original artwork by Angela Yanette

OUR ADDRESS IS:
Rockland Astronomy Club,
225 Route 59, Suffern, NY 10901-5203

WHO WE ARE:
Rockland Astronomy Club is a non-profit organization founded in 1958. We are dedicated to expanding public awareness of the Universe and to furthering an appreciation of astronomy and space science education. In 2005 the Rockland Astronomy Club received the prestigious PRIDE OF ROCKLAND award for our on-going community involvement and pursuit of our mission.

CLUB EVENT

Holiday Viewing Extravaganza

Original artwork by Angela Yannette

AN EVENING OF HOLIDAY FUN

Saturday Dec 19 at 6PM

Holiday viewing at Anthony Wayne Recreational Area

Palisades Pkwy, Bear Mt., NY

Join the Rockland Astronomy Club at Anthony Wayne Recreational Area, on Saturday December19th for a Free Holiday Event.

Come out and spread some holiday cheer as you ponder the beauty and vastness of the universe. Peer through a telescope at a galaxy that is 200 quintillion miles away. View a cluster of one million stars that orbits around the outside of our galaxy, see a nebula where new stars and planets are just in the process of forming and perhaps even catch a glimpse of the Christmas Tree Cluster in Monoceros!

Our free star party is a wonderful opportunity for you to explore the night sky and to see all of its fascinating wonders.

Some of the finest telescopes will be at your disposal, so seize the chance to tour the universe with our experts, and enjoy some good company and holiday cheer during this festive season.
There'll be holiday music, snacks and hot refreshments, so dress warmly & bring the family for a fun filled evening.

All observing events are held weather permitting.

Call our hotline for last minute weather updates. 1-845-47STARS

VOLUME VIII NUMBER 2

IN THIS ISSUE

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COVER STORY

Pluto: In the Spotlight

By Angela Yanette
Editor Distant Light Journal

When NASA's New Horizon mission was launched in January of 2006, Pluto was still known as the ninth planet of the solar system. The goal of this new mission was to *complete* the reconnaissance of the solar system by sending a spacecraft to the ninth and last planet to be visited. Less than seven months later, Pluto was no longer the ninth planet.

A controversy which started over the 2005 discovery of Eris, an object in the Kuiper Belt which is further out and much larger Pluto, forced the International Astronomical Union to decide between naming a tenth planet or to create a new classification of solar system bodies to accommodate a potentially growing list of "other" large objects in the solar system. The new classification scenario won the battle at the IAU. Pluto fell neatly into this classification and was promptly demoted.

However, Pluto is no less important. Now the second largest Dwarf Planet and the tenth largest body directly orbiting the Sun, Pluto earned its dues in the 76 years that it was known as one of the planets. To many of us Pluto will always be the mysterious ninth planet on the fringes of the solar system, changing its designation to a dwarf planet will not erase the 76 years of history since its discovery in 1930.

Regardless of Pluto's designation, the National Academy of Sciences has noted that there are far more ice dwarf planets than rocky and gas giant worlds combined— yet, no spacecraft has previously been sent to a planet in this class. It was deemed that our knowledge of planetary types was therefore seriously incomplete. What we have since learned is that Pluto is not as unique as we once thought and its exploration will shed new light on the mysteries of the Kuiper Belt objects.

When NASA's New Horizon mission was launched in January of 2006, Pluto was still known as the ninth planet...

The ice dwarfs of the Kuiper Belt are ancient relics that formed over 4 billion years ago. They are literally the bodies out of which the larger planets accumulated, and because of this, the ice dwarfs have a great deal to teach us about planetary formation.

The solar system contains three zones: the inner, rocky planets; the gas giant planets; and the Kuiper Belt objects. In these zones the rocky worlds consist of Earth, Venus, Mercury and Mars. The gas giant zone consists of Jupiter, Saturn, Uranus and Neptune and the Kuiper Belt zone consists of the ice dwarfs Pluto, Charon, and Eris and an unknown number of additional bodies which are the planetary embryos whose growth stopped at sizes of 200 to 2,000 kilometers across and smaller.

Pluto is one of the largest bodies of that icy "third zone," and like other members of the Kuiper belt, Pluto is composed primarily of rock and ice and is relatively small: approximately a fifth of the mass of the Earth's Moon and a third of its volume.

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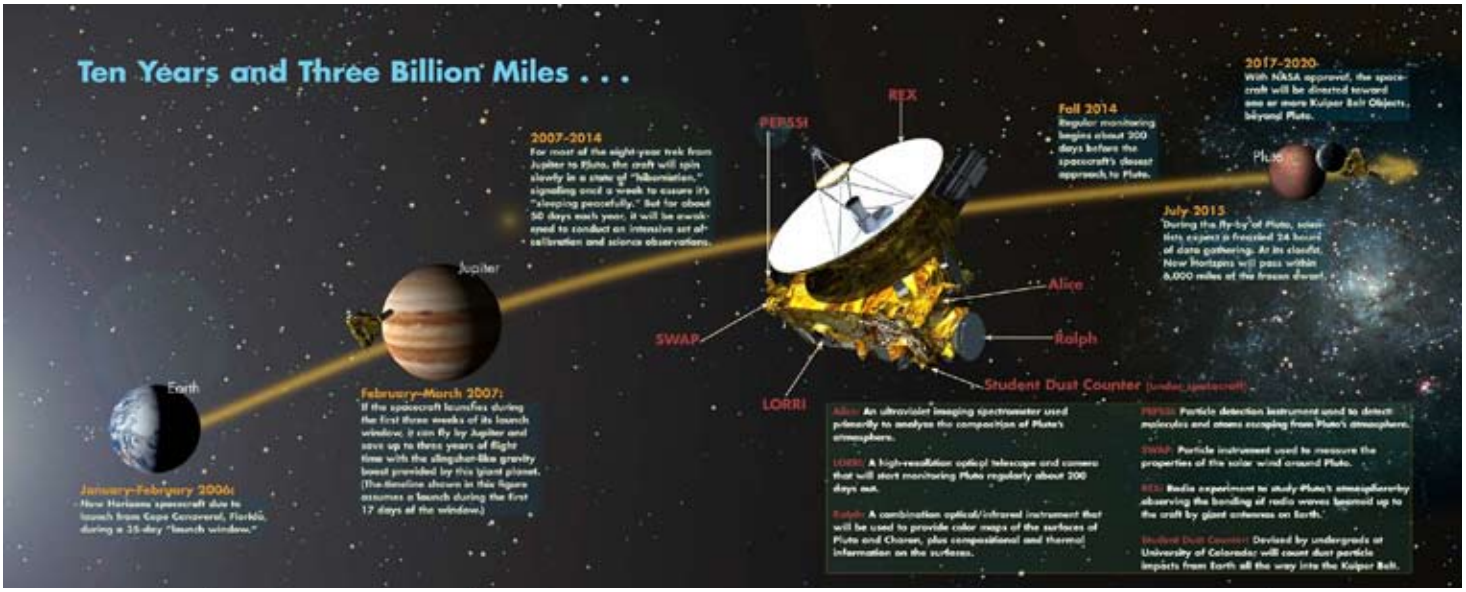
Illustrations courtesy of NASA and APL



Illustrations courtesy of NASA and APL

PLUTO

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However, Pluto has an eccentric and highly inclined orbit that takes it from 4.4 to 7.4 billion km from the Sun. This causes it periodically to come closer to the Sun than Neptune.

Pluto and the Kuiper Belt are known to be heavily endowed with organic carbon-bearing molecules and water ice — the raw materials out of which life evolves, making investigation of this region even more important.

Additionally, the Kuiper Belt is the major source of comets and cometary impactors, and like a comet, Pluto's atmosphere is also escaping into space, but on a planetary scale. Nothing like this exists anywhere else in the solar system. It is thought that the Earth's original hydrogen/helium atmosphere was lost to space this same way. By studying Pluto's atmospheric escape, we can learn a great deal about the evolution of Earth's own atmosphere.

Pluto's largest moon, Charon, is half the size of Pluto and the pair form a binary planet whose gravitational balance point is between the two bodies. Although binary planets are thought to be common in the galaxy, as are binary stars, no spacecraft has yet explored one. New Horizons will be the first mission to a binary object of any type.

As the first voyage to a whole new class of planets in the farthest zone of the solar system, New Horizons is a historic mission of exploration. The United States has made history by being the first nation to reach every planet from Mercury to Neptune with a space probe. The New Horizons mission to Pluto and the Kuiper Belt

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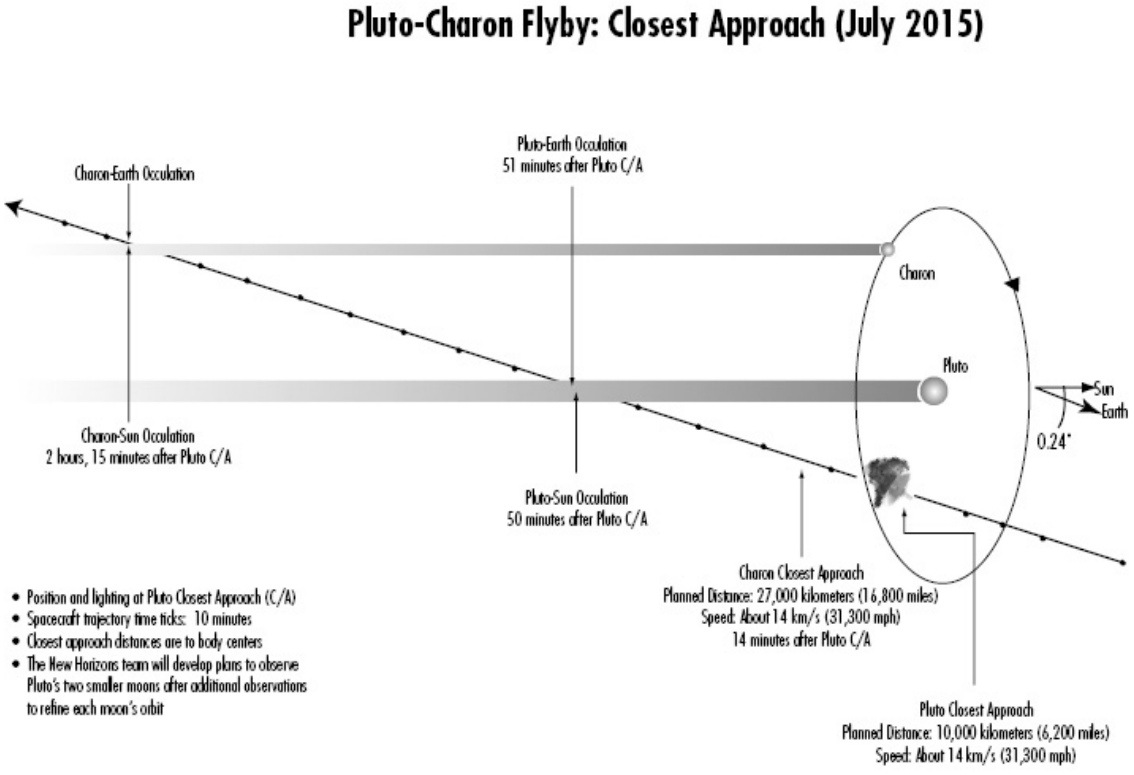
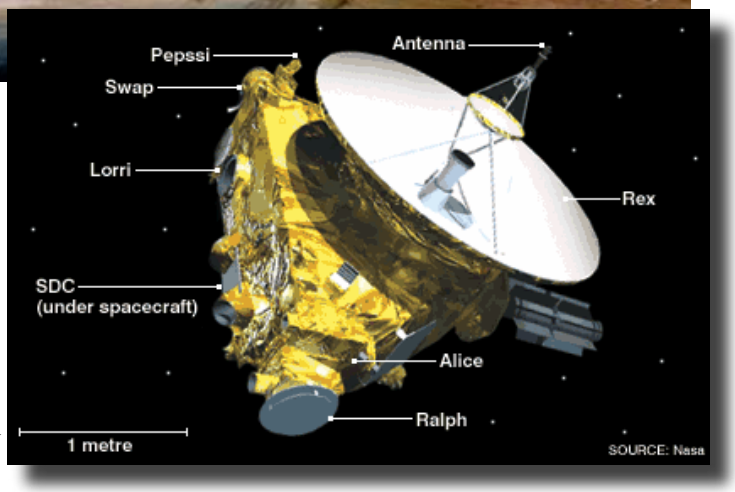




Above: artist's rendition of New Horizons at Pluto. Inset: the main instruments of the spacecraft.
All illustrations courtesy of NASA.

PLUTO

(continued from previous page)

will be the first NASA launch to a "new planet" since Voyager more than 30 years ago.

The National Academy of Sciences has placed the exploration of the Kuiper Belt– and Pluto and Charon in particular– among its highest priority mission rankings for this decade. New Horizons is NASA's mission to fulfill this objective.

New Horizons was launched on January 16, 2006 directly into an Earth-solar escape trajectory. It had a velocity of about 58,536 km/h after its last engine shut down, making it the fastest vehicle to ever leave Earth. It flew by Jupiter on February 28, 2007 and crossed Saturn's orbit on June 8, 2008. It will arrive at Pluto on July 15, 2015 and then continue into the Kuiper belt. As maneuvering capability is limited, this phase of the mission is contingent on finding suitable KBOs close to New Horizons's flight path, this rules out any possibility for a planned flyby of Eris. The thrusters on New Horizons are designed primarily for trajectory corrections and attitude control.

Above: the New Horizons spacecraft during assembly at John Hopkins Applied Physics Laboratory. Photo courtesy of NASA and APL.

The triangular shaped vehicle is roughly the size and shape of a grand piano with a Volkswagon size dish antenna attached to the top. It is much larger than physically necessary, containing a great deal of empty space to act as a shielding against interference from it's radioactive power supply.

There are no batteries aboard the New Horizons craft, all power is supplied via a radioisotope thermoelectric generator, which is actually a spare from the Cassini mission. New supplies of plutonium were inadequate due to security concerns at the Los Alamos Laboratory which threatened to hamper the mission schedule.

New Horizons is the last mission in NASA's New Frontiers mission category, larger and more expensive than the Discovery missions but smaller than the Flagship Program. The entire cost of the mission is approximately $650 million over it's 15 year period. An earlier proposed Pluto mission– the Pluto Kuiper Express– was cancelled by NASA in 2000 for budgetary reasons.

Overall control of the vehicle is performed at the Mission Operations Center at the Applied Physics Laboratory. ✶

FEATURED OBJECT

M42- The Orion Nebula

By Angela Yanette
Editor Distant Light Journal

Image: Rob Gendler

Above: the ever-splendid Great Nebula of Orion. It is one of the few nebula visible to the naked eye and the only one where color can be detected with a moderately sized telescope. Left inset: telescopic view. M42 provides a spectacular view in just about type of optical instrument. Larger instruments will reveal an incredible amount of detail within the nebula structure.

The jewel of the winter sky is without dispute the Orion Nebula. It is one of the brightest nebulae in the sky and is visible to the naked eye. Designated as Messier object 42 (M42), it is located at a distance of approx 1400 light years.

As the closest massive region of star formation, the Orion Nebula is one of the most scrutinized and photographed objects in the night sky, and is among the most intensely studied celestial objects. The nebula has revealed much about how the process of stars and planetary systems are formed. Astronomers have directly observed protoplanetary disks, brown dwarfs, intense and turbulent motions of the gas, and the photo-ionizing effects of massive nearby stars in the nebula.

While visible to the naked eye, oddly there is no mention of the nebulosity in the written astronomical records prior to the 17th century. In particular, neither Ptolemy in the *Almagest* nor Al Sufi in his *Book of Fixed Stars* noted this nebula, nor for that matter even by Galileo though he made telescope observations of this part of the constellation.

The Orion Nebula is generally credited as being first noted by Nicolas-Claude Fabri de Peiresc in 1610, but first sketched by Christiaan Huygens in 1656 and published in 1659.

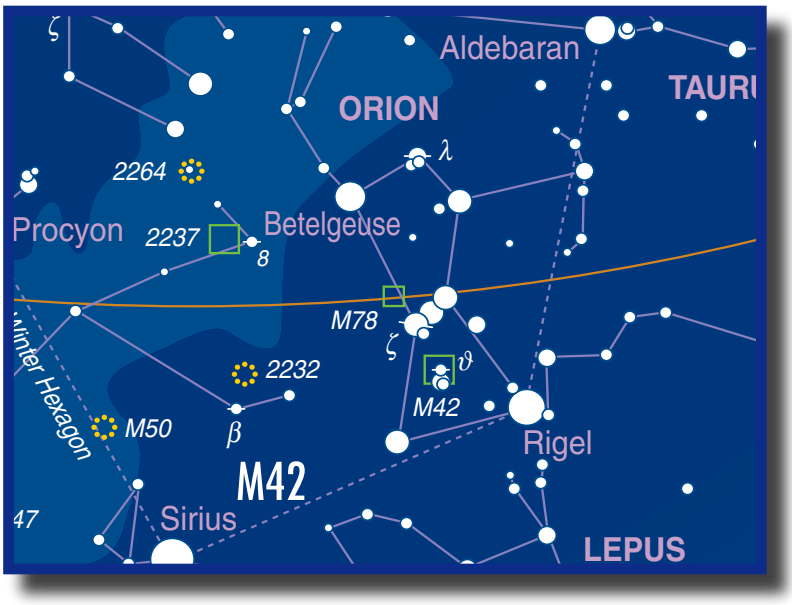
Right Ascension	*05 : 35.4 (h:m)*
Declination	*-05 : 27 (deg:m)*
Distance	*1.4 (kly)*
Visual Brightness	*4.0 (mag)*
Apparent Dimension	*85x60 (arc min)*

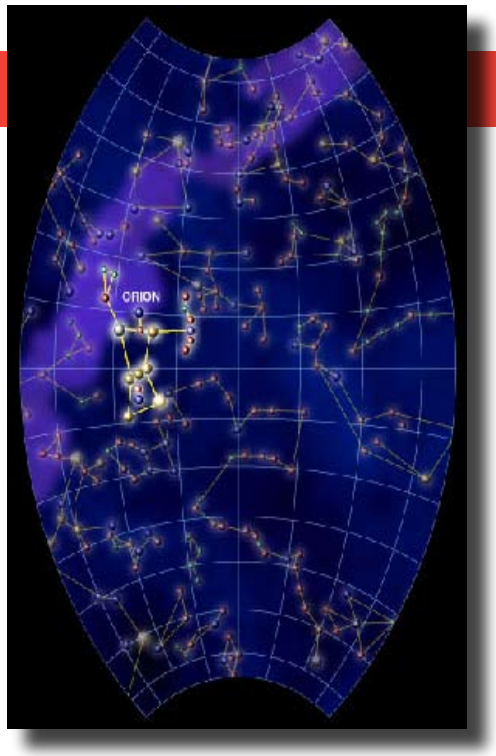
One of the few deep space objects that exhibits visible color, observers with larger aperture instruments can detect red, blue-violet as well as a distinctive greenish hue within the nebula. The red hue is caused by H-alpha radiation whereas the blue-violet coloration is the reflected radiation from the massive O-class stars at the core of the nebula and the green tint is from ionized oxygen.

The core of the nebula contains a very young open cluster of four primary stars known as the Trapezium. Two of these can be resolved into their component binary systems on nights with good seeing, giving a total of six stars. The stars of the Trapezium, along with many other stars, are still in their early years. The Trapezium may be a component of the much larger Orion Nebula Cluster, an association of about 2,000 stars within a diameter of 20 light years. Two million years ago this cluster may have been the home of the runaway stars ***AE Aurigae, 53 Arietis,*** and ***Mu Columbae***, which are currently moving away from the nebula at velocities greater than 100 km/s.

The Orion Nebula is in fact part of a much larger nebula that is known as the Orion Molecular Cloud Complex. The Orion Molecular Cloud Complex extends throughout the constellation of Orion and includes Barnard's Loop, the Horsehead Nebula, M43, M78 and the Flame Nebula. ✶

The Orion Nebula is easy to locate by first finding the three prominent stars that form the "Belt" of Orion. Below the belt hangs Orion's sword, three slightly dimmer "stars", the middle of which is actually Orion's Nebula.





THE CONSTELLATIONS

The Great Constellation of Orion

Compiled and edited
by Ed Siemenn
Club Chairman/RAC Advisory Committee

Known as Orion the Hunter, this magnificent constellation dominates the winter skies with its jewel like appearance. Orion contains more bright stars than any other constellation and is one of the most recognizable patterns of stars in the sky, perhaps second only to the Big Dipper.

The most distinctive feature of Orion is its belt - a short diagonal row of three bright stars which from east to west are called ***Alnitak (zeta Orionis), Alnilam (epsilon Orionis)*** and ***Mintaka (delta Orionis).*** These three stars all lie approximately 1800 light-years from us and are far more massive than our own Sun. Furiously consuming their fuel supplies, changing hydrogen into helium, the three will live much shorter lives than our own Sun.

The Hunter's right shoulder is marked by the main star of constellation, ***alpha Orionis,*** this brilliant orange star is commonly known as ***Betelgeuse*** and lies 650 light-years from Earth. This huge red supergiant is one of the largest stars known; if it were to take the place of the Sun in our solar system its gigantic diameter would extend beyond the orbit of Mars. Betelgeuse is entering the twilight years of its life and has cooled considerably since is youth hence its orange huge. The color of stars are related to their age. Young stars generate more energy and are hotter shining brightly with a blue or white light. As they grow old the energy they produce dwindles and their temperature drops; the dominant light emitted then turns from white to yellow though to orange and finally red, much like the dying embers of a coal fire. The surface temperature of Betelgeuse is cooler than the Sun measuring approximately 3000°C compared with 6000°C.

The brightest star in the constellation is ***Rigel (beta Orionis)***, marking Orion's left foot. Rigel is truly an extraordinary star which contrasts strongly with Betelgeuse. Although 65 times the size of the sun, it is nowhere near as large as Betelgeuse although it is far denser and hotter. Rigel radiates nearly one hundred time more energy than Betelgeuse and shines brilliant white. Astronomers use a standard distance to compare the brightness (luminosity) of stars. The luminosity of a star is calculated as it would appear if it were placed at a distance equal to 10 parsecs from Earth; a parsec being 3.26 light-years, so 10 parsecs is equal to 32.6 light-years. If both the Sun and Rigel where placed side by side at a distance of 10 parsecs, Rigel (which actually lies at the remote distance of 1000 light-years) would shine as brightly as a crescent Moon, while the Sun would appear as a very faint star barely visible to the naked eye– in short Rigel's luminosity is some 50,000 time greater than our

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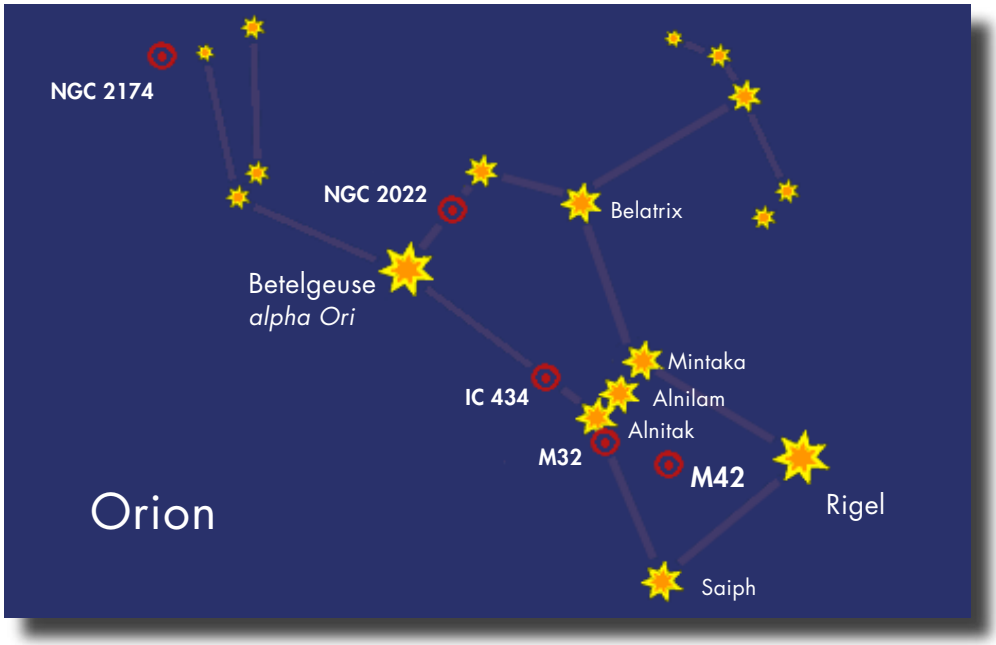
THE CONSTELLATION ORION is perhaps the most visible in the winter sky. It is a celestial marker– if you draw a straight line through the belt, it will bring you to Aldebaran in the east and to Sirius in the west. A line from Rigel north through Betelgeuse will take you to Castor and Pollux in Gemini and a line drawn from Belatrix west through Betelgeuse will take you to Procyon in Canis Minor.



CONSTELLATIONS

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own Sun and its surface temperature twice as hot. If we were able to cross the void and visit this gigantic powerful star we would be greeted by a spectacular sight– Rigel is actually a triple star system with ***Rigel B***, a smaller blue companion which orbits Rigel, and ***Rigel C*** which orbits Rigel B. The distance between Rigel and Rigel B is about 23 light days, while Rigel B and C are extremely close companions separated by about the diameter of our solar system. A small telescope will show Rigel B.

With ***Bellatrix (gamma Orionis)*** forming Orion's left shoulder and ***Saiph (kappa Orionis)*** his right leg, the constellation is rare in actually resembling the mythological character it supposed to depict. All the objects that you see in Orion are located in the spiral arm of the galaxy adjacent to the one that we live in.

IC 434 (Barnard 33) (Mag. 11.0) The

Horsehead Nebula is an intriguing and devilishly difficult dark nebula found just between ***zeta Orionis*** and ***sigma Orionis***, visible in medium to large telescopes given the right sky conditions. An H-Beta filter is also helpful

M43 (NGC 1982) (Mag. 9.0)

DeMairan's Nebula is a detached part of the Orion Nebula, with a ninth magnitude central star. A dark lane of gas separates M43 from M42, although the two are actually part of the same vast cloud.

M78 (NGC 2024) (Mag. 10) A faint

reflection nebula NE of ***Alnitak (zeta Ori)***, that looks best in long-exposure photographs. This object is a challenge to find in small telescopes. However, under clear steady skies and larger apertures, you'll find the view interesting.

NGC 2024 (Mag. 6.3) The Flame

Nebula is near the easternmost star in Orion's Belt, Alnitak. ***Alnitak***, also known as ***Zeta Orionis***, ionizes the nebula and is responsible for its glow. The Flame Nebula is part of the Orion Molecular Cloud Complex.

M42 (Mag. 4.0) The Orion Nebula

is one of the most interesting objects in the sky. To the naked eye, it looks like a star in the sword of the constellation Orion, but with binoculars or a telescope, you can see that it is actually a large glowing cloud of material. This is a huge star formation region about 1630 light years away. The bright part of the nebula is the glow of many luminous, newborn stars shining on the surrounding gas cloud that they collapsed from. The most important part of the Orion Nebula is the part we can't see: the opaque Orion Molecular Cloud. This is a huge clump of very cold gas that has a total mass of about 2000 times the mass of the Sun. The gas from this cloud slowly collapses due to gravity to form stars. Whenever a bright, new star is formed, its light evaporates the opaque gaseous "womb" from which it formed allowing us to see it.

The stars that are being born in the Orion Nebula are part of an "open cluster." What will remain is a clump of a few hundred to a thousand stars which are all roughly the same age (give or take a few tens of millions of years). These stellar siblings are dominated by a few very massive, very bright stars called the Trapezium. The Trapezium is made up of just a few stars, but it outshines all the rest of them combined. Astronomers believe that the majority of the glow from the gas in the nebula comes from light from the stars of the Trapezium.

NGC 1977 (Mag 5.5) The Running

Man Nebula is a blue reflection nebula so close to Orion as to most likely be part of the same nebulous cloud. Due to the placement of stars in front, in back and inside the nebula, we get widely varying views. Telescopes reveal it as a large, bright, bluish arc of nebulosity stretching between ***42 Orionis*** and two dimmer suns. To find NGC1977, simply move 1/2° north of M42.

NGC 1981 (Mag. 4.6) Moving up

Orion's sword we come to a beautiful Open Star Cluster NGC1981. You can notice the nebulosity visible in the image. You will find nebulosity throughout Orion, sometimes just little bits and pieces, but usually overwhelming amounts of the most amazing patterns and shapes. This is a large loosely structured cluster. There are about 10-20 true cluster members, plus background stars. ✶

IN THE NEWS

Superbright Supernove is First of its Kind

Lawrence Berkeley
National Labaratory

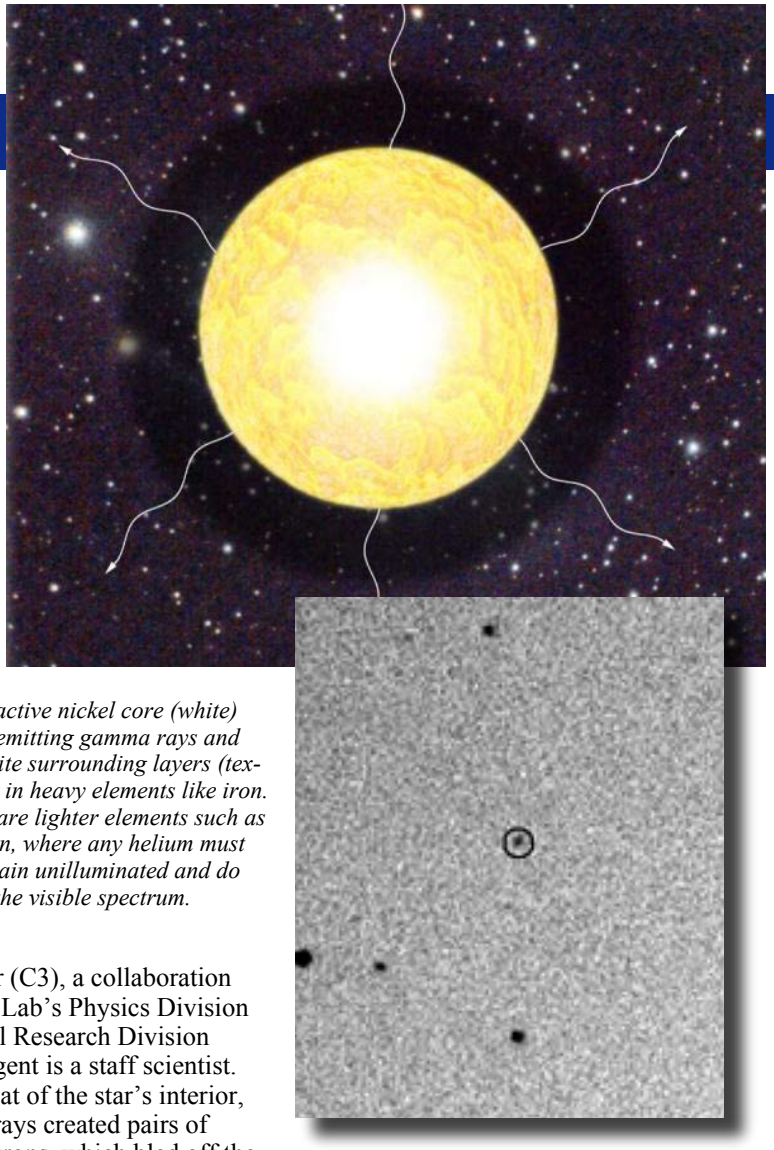


Illustration: Lawrence Berkeley National Laboratory

Above: the radioactive nickel core (white) decays to cobalt, emitting gamma rays and positrons that excite surrounding layers (textured yellow) rich in heavy elements like iron. The outer layers are lighter elements such as oxygen and carbon, where any helium must reside, which remain unilluminated and do not contribute to the visible spectrum.

Inset: the supernove 2007bi, circled in the image above, might be the first confirmation of a pair-instability supernova.
Image Credit: Nearby Supernove Factory

BERKELEY, CA – An extraordinarily bright, extraordinarily long-lasting supernova named SN 2007bi, snagged in a search by a robotic telescope, turns out to be the first example of the kind of stars that first populated the Universe. The superbright supernova occurred in a nearby dwarf galaxy, a kind of galaxy that's common but has been little studied until now, and the unusual supernova could be the first of many such events soon to be discovered.

SN 2007bi was found early in 2007 by the international Nearby Supernova Factory (SNfactory) based at the U.S. Department of Energy's Lawrence Berkeley National Laboratory. The supernova's spectrum was unusual, and astronomers at the University of California at Berkeley subsequently obtained a more detailed spectrum. Over the next year and a half the Berkeley scientists participated in a collaboration led by Avishay Gal-Yam of Israel's Weizmann Institute of Science to collect and analyze much more data as the supernova slowly faded away.

The analysis indicated that the supernova's precursor star could only have been a giant weighing at least 200 times the mass of our Sun and initially containing few elements besides hydrogen and helium – a star like the very first stars in the early Universe.

"Because the core alone was some 100 solar masses, the long-hypothesized phenomenon called pair instability must have occurred," says astrophysicist Peter Nugent. A member of the SNfactory, Nu gent is the co-leader of the Computational Cosmology Center (C3), a collaboration between Berkeley Lab's Physics Division and Computational Research Division (CRD), where Nugent is a staff scientist. "In the extreme heat of the star's interior, energetic gamma rays created pairs of electrons and positrons, which bled off the pressure that sustained the core against collapse."

"SN 2007bi was the explosion of an exceedingly massive star," says Alex Filippenko, of UC Berkeley whose team helped obtain, analyze, and interpret the data. "But instead of turning into a black hole like many other heavyweight stars, its core went through a nuclear runaway that blew it to shreds. This type of behavior was predicted several decades ago by theorists, but never convincingly observed until now."

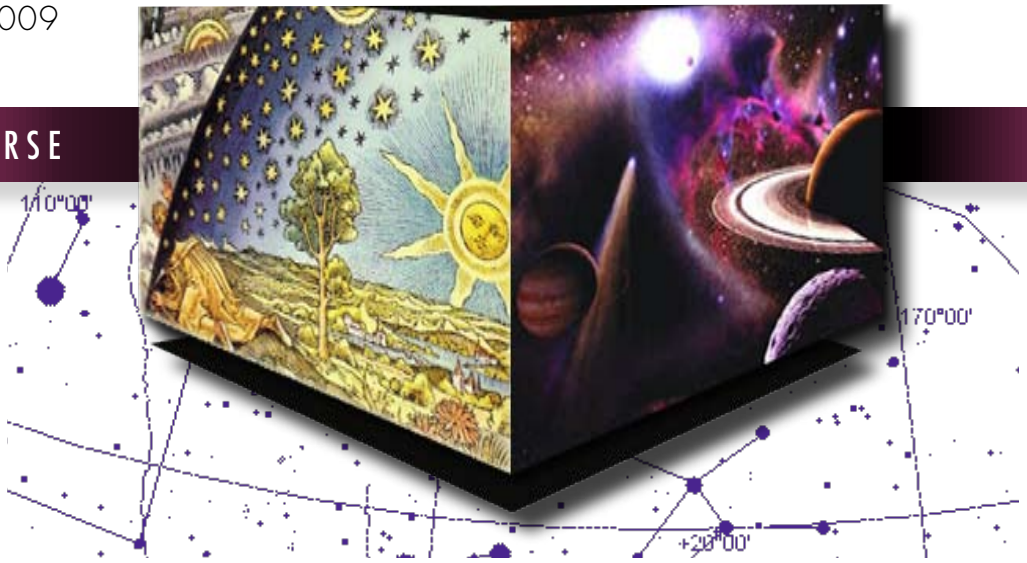
SN 2007bi was recorded on images taken as part of the Palomar-QUEST Survey, an automated search with the wide-field Oschin Telescope at the California Institute of Technology's Palomar Observatory, and was quickly detected and categorized as an unusual supernova by the SNfactory. The SNfactory has so far discovered nearly a thousand supernovae of all types and amassed thousands of spectra, but has focused on those designated Type Ia, the "standard candles" used to study the expansion history of the Universe. SN 2007bi, however, turned out not to be a Type Ia. For one thing, it was at least ten times as bright.

"The thermonuclear runaway experienced by the core of SN 2007bi is reminiscent of that seen in the explosions of white dwarfs as Type Ia supernovae," says Filippenko, "but on a much larger scale and with a far greater amount of power."

"It's significant that the first unambiguous example of a pair-instability supernova was found in a dwarf galaxy," says Nugent. "These are incredibly small, very dim galaxies that contain few elements heavier than hydrogen and helium, so they are models of the early Universe." ✶

FRANK'S AMAZING UNIVERSE

Pulsars, Quasars, and Astronomical Equipment



Our Universe is an amazing place, Frank takes you on an intriguing and sometimes surprising journey of facts and information.

By Frank Bifulco
RAC Advisory Committee

Pulsars and Quasars are items I grew up with as a youngster in the 1970's, but now I look back on my readings of those celestial objects and I think, "What were they THINKING?!" It is amazing how much more information we have on these objects relative to just a few decades ago.

Pulsars are basically neutron stars that are rotating very quickly. Neutron stars are of course the densest objects that a star can collapse into, second only to a black hole. Quasars (which stands for "quasi-stellar radio source") are emitters of radio waves and other electromagnetic emissions, but my textbooks of the early-1970's didn't even know they were galaxies. Today, we know they are very large and very distant galaxies with energetic galactic centers which spew radiation and materials from the center.

Part of the problem in identifying these objects was the limits of astronomy at that time. Most of the work during the 20th century involved visual observation of objects in visible light: we made observations and conjectures based on what we saw with the naked eye or what film could show. Today, we have a wide array of imaging options with far more sensitive CCD cameras for visual acuity and a wide array of electromagnetic spectrum analyses to determine chemical composition, emissions, red shifts, etc. These technologies were not available or were just on the cusp of being used in the 1960's and 1970's. At the time, there were believed to be just a few dozen quasars. Today, we have catalogued over 200,000. As for pulsars, we knew there were at least several hundred in the Milky Way in 1970— in fact, today we believe there are over 100,000 in our galaxy alone!

The physics of pulsars and quasars is truly fascinating as our knowledge of them has expanded. Decades ago, we knew that a neutron star, the heart of the pulsar, was so dense that a bucket of material from such an object would weigh as much as an aircraft carrier. But we knew little about electromagnetic emissions from such dense objects since we had nothing to go on but our theories of quantum mechanics. Today, we have electromagnetic wavelength scans of neutron stars and analyses of them in multitudes of pictures other than in visible light. Similarly, we can more closely identify quasars in our local network of galaxies: 3C 273 in the Virgo constellation is just under magnitude 13 (visible in an 8" or larger scope) despite being almost 2.5 billion light-years away! If this object were 33 light-years away— about 8 times further than Alpha Centauri— it would shine as brightly as the Sun in our sky. This quasar is 2 trillion times more luminous than the Sun, or about 100 times the total light emitted by an average giant spiral galaxy like the Milky Way.

The evolving nature of our discussion and analysis of pulsars and quasars are important because each represents elements relating to the age of the universe, stellar decay, and the evolution of matter in the universe. As our understanding of these objects grows, our knowledge of the universe deepens.

We have only recently placed probing electromagnetic and CCD equipment into orbit such as the Hubble and the Spitzer Space Telescopes. Continually updating this equipment and the equipment software has allowed these instruments to remain state-of-the-art and has allowed us to gain quantum leaps in the gathering of new information on distant and previously unknown or little-known objects such as pulsars and quasars. ✶

NATIVE AMERICAN SKY LORE

The End of Saynday
from the Kiowa Indian Tribe

As re-told by Audrey Salvatore
RAC Advisory Committee

Saynday is the traditional Kiowa Indian trickster/hero that was used in stories to teach their children lessons and morals.

When Saynday had finished all his good work and all his bad work in this world, he called all his friends together just as sundown was coming. They all came: the deer and magpie and dragonfly and coyote, and even the prairie dogs, and bobcat, and the old spider. They all gathered around Saynday, and listened to him.

"Here is my world," He said, "all ready for you to live in, I've fixed it up, and made it just as nice as I can. There's just one more thing I'm going to fix, over there in the east, on the rim of the sky as the sun goes down, there's a space without any stars." He stretched out his hand, away and away to the east and five bright stars came out on the rim of the sky, one for each of his fingers.

"Now, that's where I am going," said Saynday, "Up there where the fingers of my hand are, all summer long you will see my hand there in the sky at sundown. Then you will know that I am watching out for things that are living and growing in my world, and as long as I'm watching you from the east, you mustn't tell my stories. But when winter comes and you can't see my hand, you will know that I am resting, and then is when my stories can be told. Now I am going away—goodbye."

And before they could look or know, he was gone, and nothing but his hand in the sky remained to show that he was still watching over them.

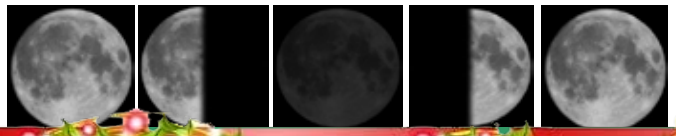
And that's the way it was, and that's the way it is—
to this good day. ✶

Why Legends?

By Audrey Salvatore
RAC Advisory Committee

There are many different kinds of stories. There are some that are called "hero stories"— these are stories of people who lived at one time, and who were immortalized by these stories of them. There are "trickster stories", about the different trickster figures of the tribes (Saynday for the Kiowa; Coyote for the Navajo); who were both helpful and also dangerous figures in the belief. There are tales that are simply warnings; they warn against doing something that may harm in some way. And there are many other types of stories as well. In reading these tales, you may notice that many, if not all, have morals or some form of belief that is being taught; these are the teachings of the storytellers. This is how the things were remembered.

If you retell these tales, please remember; many of these begin or end in a certain way. Try and keep them as they are... that way, generations from now, many people can enjoy the same legends that you are reading now. ✶



DECEMBER SKYDATA

Highlights

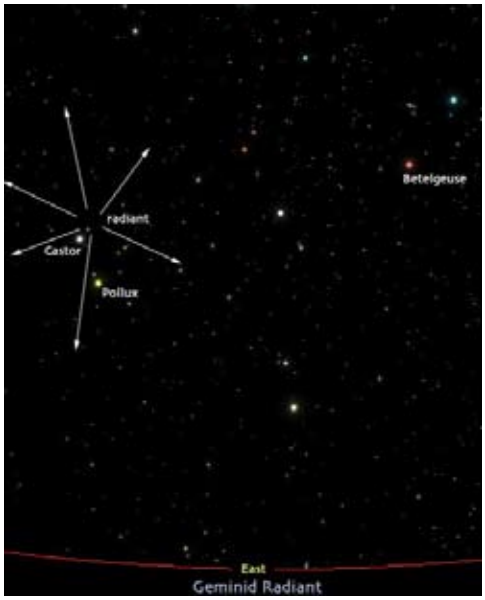
Dec 6 01:19	Beehive 3.1° North of the Moon
Dec 13 24:00	Geminid Shower: ZHR = 120
Dec 18 03:14	Mercury 1.5° South of the Moon
Dec 18 11:59	Mercury East Elongation: 20.3° E
Dec 21 10:04	Jupiter 4.6° South of the Moon
Dec 21 12:47	Winter Solstice
Dec 22 08:00	Ursid Shower: ZHR = 10
Dec 28 20:17	Moon-Pleiades: Occultation

Moon Pleiades Occultation

Occultations of stars by the Moon are an interesting and favorite event in the sky. The Moon is currently ending a period in its 18.6-year cycle of nodes during which it can occult the Pleiades star cluster in Taurus.

It can be an amazing sight to watch each of the Pleiades sisters blink out one at a time before again reappearing individually. Get ready on the evening of the 28th for just such a show. With a nearly full moon, the sky will be bright, but the Pleadies will be clearly visable with the aid of binoculars or a small wide field telescope. The occultation will begin at 8:17 PM, for areas near the Mid Hudson Valley, Lower Catskills, Tappan Zee and Taconics, watch for the Moon to graze the Pleiades brightest star, Alcyone at magnitude 2.9 and play peek-a-boo among the mountains on the lunar north edge.

Since 2006 we have experienced repeated passes of the Moon across the Pleiades, but now the game is over. After the Pleiades show on December 28, the New York area has a long wait for the next one on September 22, 2024. The Moon will swing south until then and the Pleiades will be missed by the for the next 14 years! ✶



2009 Geminids

The best viewing window for the Geminids is Wednesday evening December 13th around 9 pm through Thursday morning December 14th. The Geminids are a beautiful, prolific and reliable shower. While December nights can be bone-chilling, for many areas sky transparency is better than it is during the August Perseids. This year, we will be close to new moon, so the viewing should be excellent. The radiant is highest in the sky at around 2am, but it can produce meteors from around 9pm until the beginning of morning twilight. The Geminids can produce observed rates of up to 100/hour at maximum.

This will be a shower that just about anyone can enjoy if the weather cooperates. ✶

Prime Observing Window

Saturday 12 through Monday Dec 21

Sun & Moon Rise & Set Times

Date	Sunrise	Set	Moonrise	Set
December 1	07:01	16:29	15:44	06:22
December 5	07:05	16:28	20:20	10:12
December 10	07:09	16:28	01:09	12:37
December 15	07:13	16:29	06:37	15:40
December 20	07:16	16:31	09:55	20:34
December 25	07:19	16:34	11:49	00:35
December 31	07:20	16:38	16:37	07:14

Planetary

Visible Planets in the Night Sky

Dec 1

	Rise	Transit	Set	Mag
Mercury	08:19	12:47	17:14	-0.5
Venus	06:11	11:04	15:57	-3.9
Mars	21:27	04:37	11:45	-0.1
Jupiter	11:40	16:47	21:55	-2.3
Saturn	01:24	07:29	13:33	1.0

Dec 15

	Rise	Transit	Set	Mag
Mercury	08:48	13:17	17:47	-0.5
Venus	06:41	11:22	16:02	-3.9
Mars	20:44	03:55	11:01	-0.4
Jupiter	10:54	16:04	21:15	-2.2
Saturn	00:36	06:40	12:44	0.9

Dec 31

	Rise	Transit	Set	Mag
Mercury	07:51	12:37	17:24	2.5
Venus	07:13	11:48	16:23	-3.9
Mars	19:33	02:47	09:57	-0.8
Jupiter	09:56	15:10	20:24	-2.1
Saturn	23:29	05:36	11:40	0.9

All data calculated for Suffern, New York, Eastern Time:
Latitude: 41:06:48 N; Longitude: 74:08:38 W

Articles and data on this page by Ed Siemenn; ephemeris data provided by US Naval Observatory, monthly highlights provided by NASA SkyCal

DECEMBER OBSERVING

FEATURED OBJECT
Orion Nebula

PROMINENT PLANET
Jupiter

December's Deep-sky

These objects offer particularly favorable viewing this month and will be high in the sky at mid evening.

Des	Object	Const	Location
M31	Galaxy	And	0h 43′, 41.3d
Mel 20	Moving Group	Per	3h 30′, 52.0 d
Pleiades	Open Cluster	Tau	3h 47′, 24.2d
Hind's Crimson Star		Lep	5h 0′, -14.8d
M42	Nebula	Ori.	5h 36′, -5.4d
M37	Open Cluster	Aur	5h 52′, 32.5d
M35	Open Cluster	Gem	6h 8′, 24.3d

The Solar System

JUPITER is the brilliant star low in the southwest in the early evening sky. Catch your last look at Jupiter's complex cloud bands and the Galilean Moons before it sets for the year.

MARS is a prominent red star visiting Cancer, steadily brightening as it moves towards opposition in late January. It is already possible to see the bright white Polar Cap and some dark surface markings.

SATURN rises around 10 pm, with rings almost edge-on to Earth. The ring shadow on Saturn's disk is especially dramatic. At least five moons can be seen in a dark sky with good seeing.

This Months Observing

Winter Solstice on Dec. 21 brings the year's longest night, ending the dark-sky window. Many treasures are hiddden in the outer arms of the Milky Way, which spans the sky from Cassiopeia in the Northwest to Canis Major in the Southeast. Using binoculars, enjoy the huge 3-degree span of the Alpha Perseus Association, a moving group born from the same molecular cloud. How many stars can you count? Compare its size to the Andromeda Galaxy, it's 4000x more distant, but covers a similar span. December features a treasure-trove of rubies and garnets, from the orange of Betelgeuse in Orion and Aldebaran in Taurus, Mars in Cancer, the ruby-red gem in the center of M37, thru Hind's Crimson Star in Lepus below Orion – possibly the reddest star you will ever see! ✶

USING THE CHART

This chart will match the sky if used on or near the first of the month at 10 PM or on or near the 15th of the month at 9 PM

Aligning

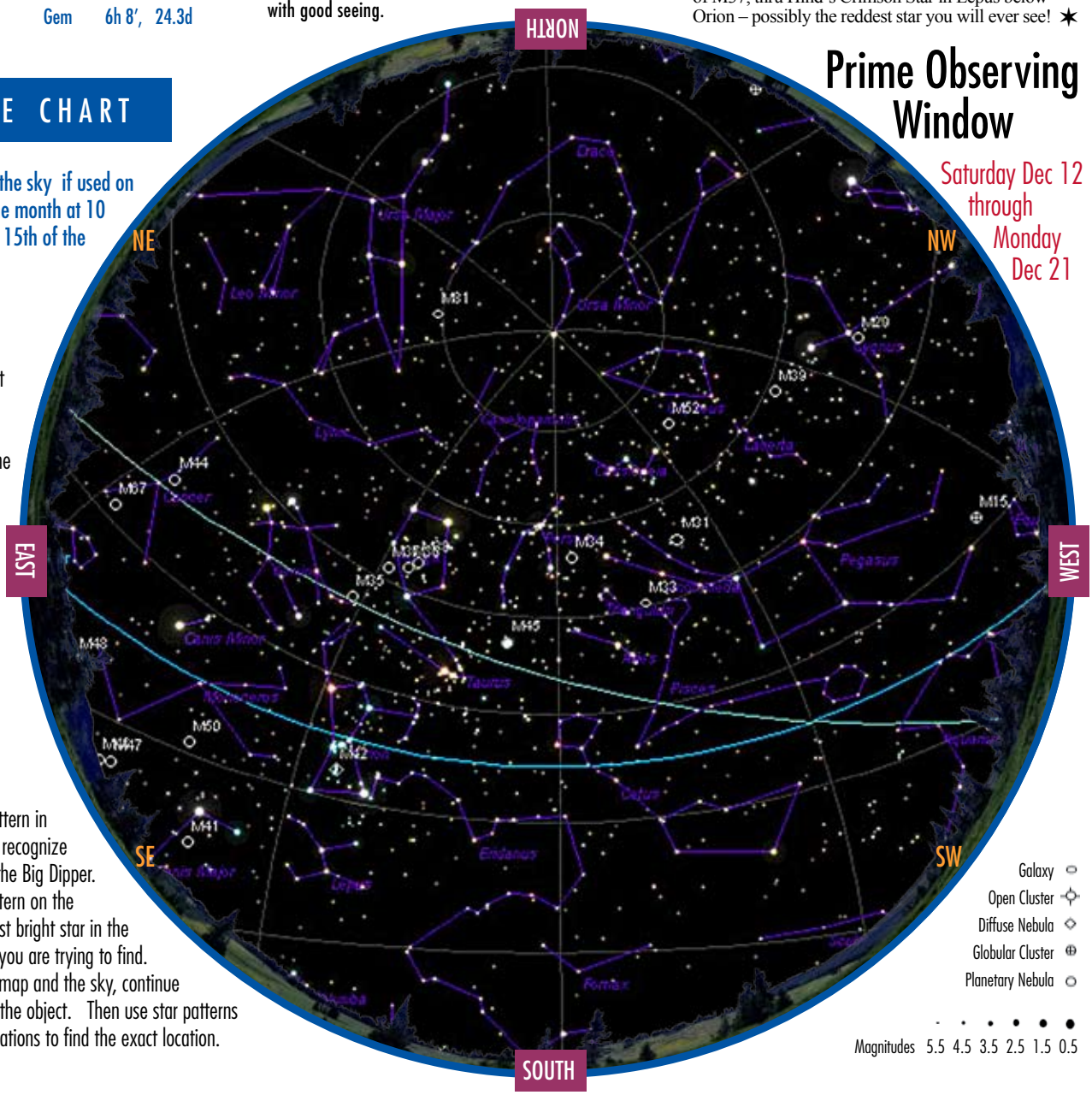
While holding the chart in front of you, rotate the page so that the direction indicator at the bottom matches the direction that you are facing. The center of the map represents the portion of the sky that is directly overhead.

Finding Objects

Locate a bright star pattern in the sky that is easy to recognize such as Cassiopeia or the Big Dipper. Once you find that pattern on the map, hop to the nearest bright star in the direction of the object you are trying to find. Glancing between the map and the sky, continue this until you are near the object. Then use star patterns and distance approximations to find the exact location.

Prime Observing Window

Saturday Dec 12 through Monday Dec 21



Star map created using Skychart III. Original artwork by Angela Yanette. Observing information on this page compiled and written by Keith Murdock.

The RAC Essentials

MONTHLY CALENDAR

201-768-2238 or 845-47STARS	Message Hotline: The latest information or last minute changes to club events.
Fri, Dec 4, 8PM	Winter Planetarium Show Clarkstown South Planetarium West Nyack, NY
Tue, Dec 8, 8PM	Advisory Committee Meeting LHVCC, Airmont, N.Y.
Fri, Sat Dec 11, 12	Observing at Wawayanda (members night)*
Sat, Dec 12	Up All Night: Observing at Taghkanic State Park (members night)*
Sat, Dec 18	Observing at Wawayanda (members night)*
Sat, Dec 19	Up All Night: Observing at Taghkanic State Park (members night)*
Sat, Dec 19, 6PM	Holiday Viewing Extravangaza Anthony Wayne Recreation Area

RAC ADVISORY CMTE.& DIRECTORS

RAC ADVISORY COMMITTEE:

Ed Siemenn, Chairman

Jose Alvira
Frank Bifulco
Jim Burnell
Mark Hettinger
Bob Moore
Keith Murdock
Al Nagler
Dr. Jack Rosen
Audry Salvatore
Len Salvatore
Bernie Sokoloski
Bill Thys
Alan Traino

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Editor@RocklandAstronomy.com

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NEAIC & Webmaster
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Jim Burnell@RocklandAstronomy.com

Club Chairman/ Educational Programs
Ed Siemenn, 845-461-4799
EdSiemenn@RocklandAstronomy.com

Senior Advisor
Al Nagler

EVENT LOCATIONS

PLANETARIUM SHOWS:

Clarkstown South Planetarium, 31 Demarest Mill Rd, West Nyack, NY- From Palisades Parkway take Exit 8E, to Rt. 59 East. Drive 3/4 mile to first traffic light, Turn LEFT onto Crossfield Ave. After 1/4 mile, RIGHT onto W. Nyack Rd. 1/4 mile later, LEFT onto Strawtown Rd. Go 0.7 mi, LEFT onto Germonds Rd. Drive 0.3 mi, LEFT onto Demarest Mill Rd. Clarkstown South HS is the first LEFT turn. Bear RIGHT in drive then LEFT.

NEAF, NEAIC & SPECIAL EVENTS:

Rockland Community College, College Road, Suffern, NY - From the NY Thruway (I-87) take Exit 14B (Airmont Road).Turn NORTH onto Airmont Road. Proceed 1.5 miles, then turn LEFT onto College Road. RCC will be approximately one mile on the LEFT.

BOARD MEETINGS & SPECIAL EVENTS:

Lower Hudson Valley Challenger Center, Rt. 59, Suffern, NY - From the NY Thruway (I-87) take Exit 14B (Airmont Road).Turn SOUTH onto Airmont Road. Proceed .5 miles, to 2nd light and turn LEFT onto Rt 59. Take first RIGHT into parking area.

JOY OF THE UNIVERSE:

Anthony Wayne Recreation Area, Exit 17, P.I.P., NY - Take the Palisades Parkway North/South to Harriman State Park. Take exit 17 to the Anthony Wayne Recreation Area. Exit 17 is located 1 mi. NORTH of the Harriman State Park visitor center and book store.

MEMBER OBSERVING:

Wawayanda State Park, Highland Lakes, NJ - See permit for special rules and driving directions.

Tahgkanic State Park, Taconic State Parkway, Ancram, NY - See permit for special rules and driving directions.

MEMBERSHIP FORM

Club members receive this journal, enjoy special prices for annual subscriptions to S&T and ASTRONOMY magazines, discounts to club events and much more.

Make checks payable to RAC and mail with this form to: Rockland Astronomy Club,Attn: Memberships, 225 Route 59, Suffern, New York 10901-5203.

Name
Address
City State Zip
Home Phone ( )
Email

Note: The Journal is sent to Members via email. For mailed hard copies, add $18/year.

Membership Type	1 Year	2 Year (Save $2)	3 Year (Save $5)	5 Year (Save $10)	Hard Copy (by US Mail)	Total
Family	$30	$58	$85	$140	+$18/yr.	
Individual	$20	$38	$55	$90	+$18/yr.	
Senior Citizen (65+)	$15	$28	$40	$65	+$18/yr.	
High School Student	$10	$18	$25	$40	+$18/yr.	
					Grand Total	

Rockland Astronomy Club

Distant Light Journal December 2009 printable supplement

Full Dec 1 | Last Qtr Dec9 | New Dec 16 | First Qtr Dec 24 | Full Dec 31

DECEMBER SKYGUIDE

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The Solar System

JUPITER dominates the early evening sky and is spectacular in almost any size telescope. It is unmistakable bright in the east and is best viewed shortly after sunset.

VENUS can be seen blazing in the pre dawn sky during the month of November. Use a small telescope to determine it's phase. A beautiful paring of the planet and the crescent moon can be seen at mid month.

SATURN rises in the early morning hours and is best viewed this month just before sunrise. With it's rings almost edge-on to Earth, the ring shadow on Saturn's disk is especially dramatic.

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Many treasures are hidden in the outer arms of the Milky Way, which spans the sky from Cassiopeia in the Northwest to Canis Major in the Southeast. Using binoculars, enjoy the huge 3-degree span of the Alpha Perseus Association, a moving group born from the same molecular cloud. How many stars can you count? Compare its size to the Andromeda Galaxy, it's 4000x more distant, but covers a similar span. December features a treasure-trove of rubies and garnets, from the orange of Betelgeuse in Orion and Aldebaran in Taurus, Mars in Cancer, the ruby-red gem in the center of M37, thru Hind's Crimson Star in Lepus below Orion – possibly the reddest star you will ever see! ★

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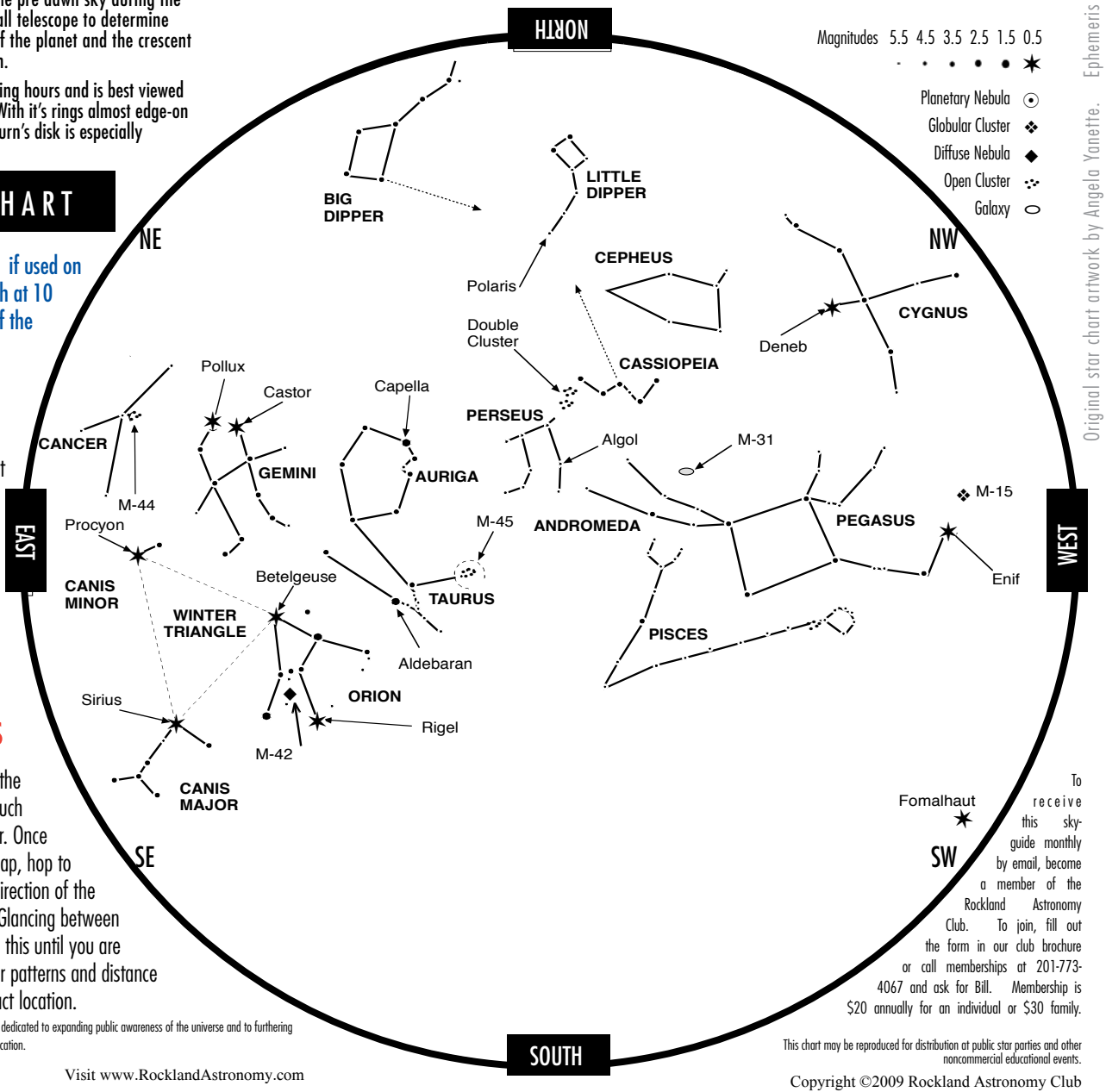

Rockland Astronomy Club is a non-profit organization dedicated to expanding public awareness of the universe and to furthering an appreciation of astronomy and space sciences education.

To receive this sky-guide monthly by email, become a member of the Rockland Astronomy Club. To join, fill out the form in our club brochure or call membership at 201-773-4067 and ask for Bill. Membership is $20 annually for an individual or $30 family.

Original star chart artwork by Angela Yanette. Ephemeris data by Ed Siemenn. Monthly observing written by Keith Murdock.

Visit www.RocklandAstronomy.com