The Monthly Newsletter of the Magic Valley Astronomical Society

January Highlights

Tues the 4th, 6:15 - 9:00 pm **Family night telescope viewing** at the Centennial Observatory.

Fri., the 7th, 7:15 - 8:15 pm **Bimonthly astronomy talk:** "Introducing Aries, the Ram" Rick Allen Rm. Herrett Cntr.

Sat., the 8th, 1:00 - 3:30 pm **Cabin Fever Day solar viewing** on the Stargazer's Deck Centennial Obs.

Sat., the 8th, 6:15 - Midnight **Monthly star party. There is no meeting this month.** Join the Society at the Centennial Observatory for views of Jupiter, crescent Moon, Uranus, Neptune, Andromeda galaxy, Orion nebula and much more.

Tues the 18th, 6:15 - 9:00 pm **Family night telescope viewing** at the Centennial Observatory.

Notes from the President

Welcome! You have now officially entered the second decade of the 21st -Centaury and the first decade to completely take place in the Third Millennium.

I have read that the two scientific endeavors that are advancing faster than all others are Medicine and Astronomy. Looking back over the past few years that certainly seems true. Discoveries are brought to our attention continuously in both disciplines. Lately there have been some developments in Astronomy and Biology that may prove to be the stories of the year, if not the stories of the decade, or more!

2011 promises to be even better and many astronomy clubs are being pushed from a variety of sources (Astronomy Magazine, Astronomical League and Sky & Telescope to name a few.) to improve their educational outreach and bring more people into our hobby.

Your board of director's has been discussing this issue and with budget cutbacks and lower attendance at star parties added to a dramatic drop in school field trips, we want to begin using the SHARE equipment to improve our educational outreach. We want to hear from you, the club members, for other ways we can improve our outreach abilities. If you have an idea by all means contact one of the board members. Our contact information can be a simple e-mail to the members list or directly off of this newsletter (addresses on the back page).

Join us in 2011 in improving our educational efforts and helping to "Discover the Universe" throughout the Magic Valley.

Clear skies until next month - Terry Wofford, President

MVAS Memberships

MVAS Mission

The Magic Valley Astronomical Society was founded in 1976, the Society is a non-profit [501(c) 3] educational and scientific organization dedicated to bringing together people with an interest in astronomy. The society serves as a source of astronomical phenomena, history and lore by providing educational and observing opportunities and information for its members and the general public and promotes viewing of celestial objects with special events for adults and children in south central Idaho.

Welcome to the Magic Valley Astronomical Society

Welcome to the society and hello. We hope you have a good time, enjoy the hobby, & bring good skies with you.

We hold indoor meetings each month at the Herrett Center for Arts & Science College of Southern Idaho campus in Twin Falls, ID, USA . Our meetings start at 7:00 pm on the second Saturday of the month. There will always be a very interesting program, class or presentation at these meetings, as well as good fellowship. There is always something new to learn.

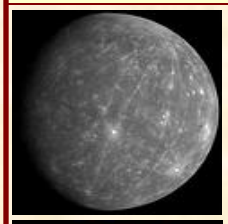
Following our meetings we have a star party (weather permitting) at the Centennial Observatory, also at the Herrett Center.

Our star parties are free and you don't have to bring your own telescope. Telescopes are also set up outside on the stargazer's deck. Star Parties are held year round, so please dress accordingly as the Observatory is not heated, nor air conditioned.

Wishing you dark skies and clear nights!

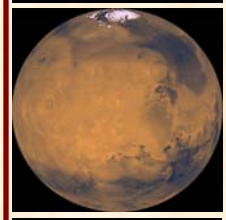
MVAS Board

January Celestial Sky Events



Mercury - In the southeastern dawn sky during the first half of January. For observers in the Western Hemisphere on the 2nd Mercury is 4° North of the crescent Moon. Greatest elongation on the 9th(23°) About 1.5 before Sunrise. Mercury will be at its best all year.

Venus - Brilliant in the eastern morning sky. Greatest elongation on the 8th. (47°) This means it will rise around 3 hours before the Sun. Lies within 8° North of Antares on the 15th and 3° North of the Moon on the 30th.



Mars - Will not be visible this month as Mars will be approaching conjunction with the Sun (Feb. 4th)

Jupiter - In the early evening sky in Pieces. Sets in the late evening. Uranus lies 0.6° North of Jupiter on the 2nd, the last of the recent triplet of Jupiter-Uranus geocentric conjunctions and the last one until 2024.

Saturn - Morning sky in Virgo, 4° South of the Celestial Equator, rising near midnight. Begins retrograde motion on the 27th. The North side of Saturn's rings will visible in 2011, their tilt varying from 10.1° in January to 7.3° in early June.

Uranus - In the Western evening sky in Pieces and sets in the late evening. Lying 0.6° North of Jupiter on the 2nd, the last of the recent triplet of Jupiter-Uranus geocentric conjunctions and the last conjunction of these two planets until 2024.

Neptune - Low in the Western early evening sky on the Aquarius-Capricorn border. Vanishes in the evening twilight by month-end, approaching conjunction.

2 Moon Greatest S. Declination – 24.2°
4 New Moon
10 Moon at apogee (farthest from Earth)
12 Moon First Quarter .
16 Moon Greatest N. Declination + 24.2°
19 Full Moon (Wolf Moon - Algonquian Nation)
22 Moon at perigee (closest to Earth)
26 Moon Last Quarter

Other Observing Highlights

1 Begin the second decade of the third millennium.
3 Earth at Perihelion (closest to Sun) The Sun-Earth distance is .983341 a.u. or 147.1 million kilometers.
3 Jupiter Double shadow transit
10 Jupiter Double satellite transit / 7° South of the Moon
14 Mercury 1.9° North of the Lagoon Nebula (M 8)
17 Jupiter Double satellite transit
21 Mercury at descending node.
22 Juno (asteroid) stationary.
25 Jupiter Double satellite transit
27 Saturn stationary
30 Ceres (Dwarf Planet) in conjunction with the Sun
31 Mercury at aphelion

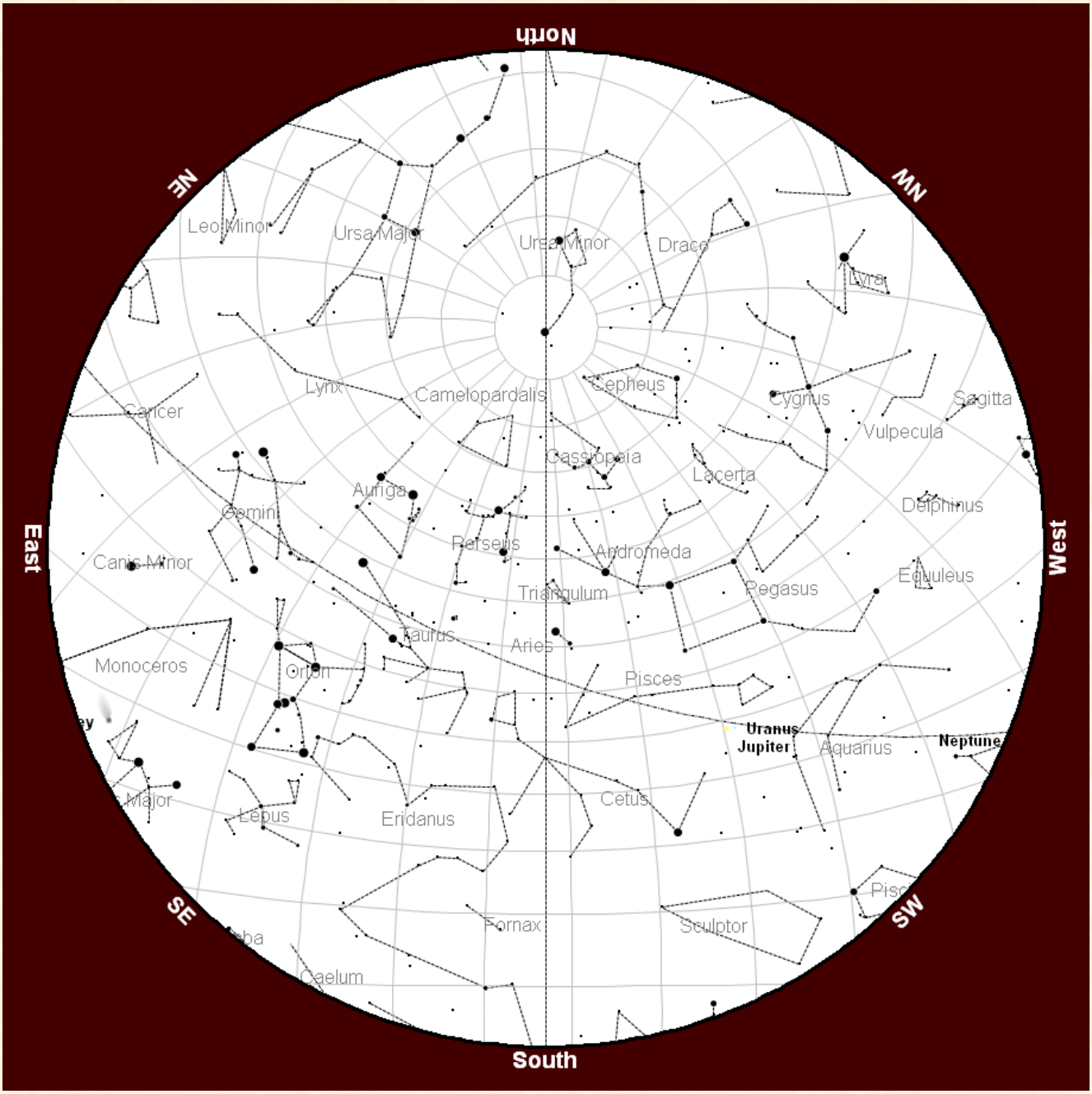
The Quadrantid Meteor Shower

The Quadrantid meteor shower is one of the strongest meteor showers of the year, but observers can be disappointed if conditions are not just right. The point from where the Quadrantid meteors appear to radiate is located within the extinct constellation Quadrans Muralis. On modern star charts, this radiant is located where the constellations Hercules, Boötes, and Draco meet in the sky. Overnight from January 3 to 4, the Quadrantid meteor shower rains down as many as 90 meteors an hour. The comet 2003 EH1 is the parent of this debris path that creates the meteors.

Got clouds? No problem. You can stay inside and listen to the Quadrantids. Tune into Space Weather Radio for a live audio stream from the Air Force Space Surveillance Radar. When a Quadrantid passes over the facility, you will hear a "ping" caused by the radar's powerful transmitter echoing from the meteor's ion trail. During the shower's peak, the soundtrack is guaranteed to entertain. You may find the Space Weather Radio visit the following link. http://spaceweatherradio.com/

Images used on this page are courtesy of NASA

Planisphere for January



Did You Know?

Forty years ago on 31 January 1971, Apollo 14 launched for the Moon, which was the eighth manned mission in the Apollo program, the third to land on the Moon. It was the last of the "H Missions", targeted landings with two-day stays on the Moon with two lunar EVA's, or moonwalks. Alan Shepard and Edgar Mitchell made their lunar landing on February 5 in the Fra Mauro formation; this had originally been the target of the aborted Apollo 13 mission. During the two lunar EVA's, 42 kilograms (93 lb) of Moon rocks were collected and several surface experiments, including seismic studies, were carried out. Commander Alan Shepard famously hit two golf balls on the lunar surface with a make-shift club he had brought from Earth.

Image: Astronaut Alan Shepard raises the American flag on the surface of the Moon during the Apollo 14 mission. Credit: NASA

Looking through the Eyepiece - Orion, the Hunter

Orion, often referred to as **The Hunter**, is a prominent constellation located on the celestial equator and visible throughout the world. It is one of the most conspicuous and most recognizable constellations in the night sky. Its name refers to Orion, a hunter in Greek mythology.

Orion includes the prominent asterism known as the Belt of Orion: three bright stars in a row. Surrounding the belt at roughly similar distances are four bright stars, which are considered to represent the outline of the hunter's body. Descending from the 'belt' is a smaller line of three stars (the middle of which is in fact not a star but the Orion Nebula), known as the hunter's 'sword'.

We begin our tour of Orion with easy to see (naked eye) **Stars, meteors and asterisms:**

Betelgeuse, also known by its Bayer designation **Alpha Orionis** (**α Orionis**, **α Ori**), is the ninth brightest star in the night sky and second brightest star in the constellation of Orion, outshining its neighbor Rigel (Beta Orionis) only rarely. Distinctly reddish-tinted, it is a semi-regular variable star whose apparent magnitude varies between 0.2 and 1.2, the widest range of any first magnitude star. The star marks the upper right vertex of the Winter Triangle and center of the Winter Hexagon.

Observational Data for Betelgeuse

Right ascension $05^h\ 55^m\ 10.3053^s$
Declination +07° 24′ 25.426″

Rigel (β Ori, β Orionis, Beta Orionis) is the brightest star in the constellation Orion and the sixth brightest star in the sky, with visual magnitude 0.18. Although it has the Bayer designation "beta", it is almost always brighter than Alpha Orionis (Betelgeuse).

Observational Data for Rigel

Right ascension $05^h\ 14^m\ 32.272^s$
Declination −08° 12′ 05.91″

Gamma Orionis (γ Ori, γ Orionis), or **Bellatrix**, is the third brightest star in the constellation Orion and the twenty-seventh brightest star in the night sky. The name *Bellatrix* is Latin for *female warrior*. It is also known as the Amazon Star. It was once thought to belong to the physical association of stars that comprise much of the constellation of Orion, but this is no longer believed to be the case, as Gamma Orionis is much closer to us than the rest of the group.

Observational Data for Bellatrix

Right ascension 05h 25m 07.9s
Declination +06° 20' 59"

Delta Orionis (δ Ori), traditionally known as **Mintaka** (from m*anṭaqah*, which means "area or region" in Arabic), is a star some 900 light years distant in the constellation Orion. Together with Zeta Orionis (Alnitak) and Epsilon Orionis (Alnilam), the three stars make up the belt of Orion, known by many names across many ancient cultures. When Orion is close to the meridian, Mintaka is the right-most of the belt's stars as seen by an observer in the Northern Hemisphere facing south. Mintaka is 90,000 times more luminous than the Sun and is a double star: the two orbit each other every 5.73 days

Observational Data for Mintaka

Right ascension $05^h\ 32^m\ 00.4^s$
Declination −00° 17′ 57″

Zeta Orionis (ζ Ori), traditionally known as **Alnitak** is a triple star some 800 light years distant in the constellation Orion it is part of Orion's Belt along with Delta Orionis (Mintaka) and Epsilon Orionis (Alnilam).

The primary star is a hot blue supergiant with an absolute magnitude of -5.25, and is the brightest class O star in the night sky with a visual magnitude of 1.70. It has two bluish 4th magnitude companions. The stars are members of The Orion OB1 Association.

Observational Data for Alnitak

Right ascension $05^h\ 40^m\ 45.5^s$
Declination −01° 56′ 34″

Looking through the Eyepiece - Orion, the Hunter

Kappa Orionis (κ Ori, κ Orionis, 53 Orionis) is the sixth-brightest star in the constellation of Orion. It has the traditional name **Saiph**. Of the four bright stars that compose Orion's main quadrangle, it is the star at the south-eastern corner. A northern-hemisphere observer facing south would see it at the lower left of Orion.

Observational Data for Saiph

Right ascension $05^h\ 47^m\ 45.4^s$
Declination -09° 40′ 11″

Iota Orionis (ι Ori, ι Orionis) is the brightest star in Orion's sword, and is located at the tip of the sword. It has the traditional names **Hatsya** (sometimes with the typographic error *Hatysa*), or in Arabic, **Na'ir al Saif**, which means simply "the Bright One of the Sword."+-9 Iota Orionis is a quadruple system dominated by a massive spectroscopic binary with an eccentric (e=0.764), 29-day orbit. The binary is composed of a class O9 III star (blue giant) and a class B1 III star. The collision of the stellar winds from this pair makes the system a strong X-ray source.

Observational Data for Hatsya

Right ascension $05^h\ 35^m\ 26^s$
Declination -05° 54′ 36″

Meteor showers:

Around October 21 or 22 each year the famous Orionid meteor shower reaches its peak. Coming from the border with the constellation Gemini as many as 20 meteors per hour can be seen.

Asterisms:

The Belt of Orion is an asterism in the constellation Orion. It consists of the three bright stars previously mentioned: Alnitak, Alnilam) and (Mintaka). Looking for Orion's Belt in the night sky is the easiest way to locate the constellation. In the Northern Hemisphere, Orion's Belt is best visible in the night sky during the month of January at around 9:00 pm, when it is approximately around the local meridian. The same three stars are known in Latin America as "The Three Marys". They also mark the northern night sky when the sun is at its lowest point, and were a clear marker for ancient timekeeping.

The shield: Located on the upper right of the Orion constellation where the mighty Orion carries it in his raised arm. Pliny considering the significance of Orion Shield described it as a separate constellation. Besotted with great stars in a vertical string the shield is the first to rise in the east when Orion appears after his daily slumber. There are six stars: Bayer classified these as Pi 1 to Pi 6 Orionis. Out of these six stars Pi 3 Orionis is in the west most direction, hence is the first to rise in the east followed by Pi 2, Pi 4, Pi 5, Pi 1 and finally Pi 6 with all of them having the name Orionis behind the respective numbers. It is not surprising that Pi 3 Orionis became the focus of the Orion Shield and subject of study by astronomers for centuries.

The club: Loosely made of a group of stars that are too faint to visualize without the darkest of skies. The faint group rises above the star Betelgeuse.

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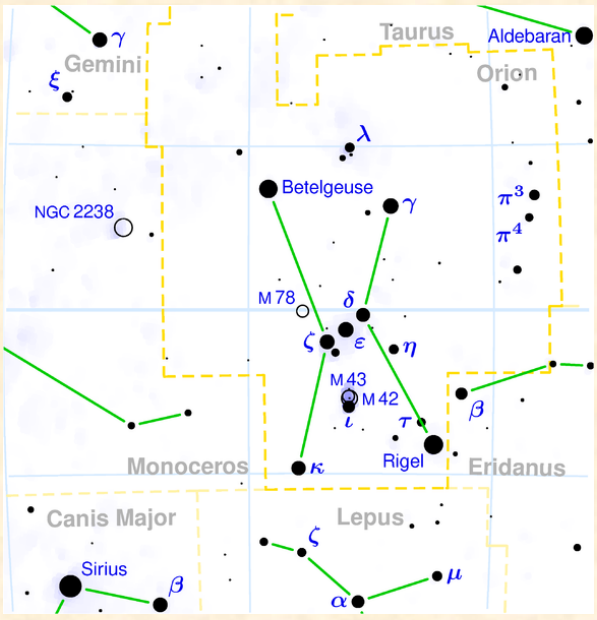


Images: Page 4 Image of Orion | NASA File Photo Page 5 Image of the Asterism "Belt of Orion" by Roberto Mura | Star Map of Orion by Torsten Bronger Creative Commons License used. For images on page 5

Looking through the Eyepiece - Orion, the Hunter

Deep Sky Objects:

On the continued Sky Tour of Orion using a Small Telescope. Hanging from Orion's belt is his sword, consisting of the multiple stars θ1 and θ2 Orionis, called the Trapezium and the Orion Nebula (M42). This is a spectacular object which can be clearly identified with the naked eye as something other than a star. Using binoculars, its swirling clouds of nascent stars, luminous gas, and dust can be observed.

Another famous nebula is IC 434, the Horsehead Nebula, near ζ Orionis. It contains a dark dust cloud whose shape gives the nebula its name. Besides these nebulae, surveying Orion with a small telescope will reveal a wealth of interesting deep-sky objects, including M43, M78, as well as multiple stars including Iota Orionis and Sigma Orionis. A larger telescope may reveal objects such as Barnard's Loop, the Flame Nebula (NGC 2024), as well as fainter and tighter multiple stars and nebulae.

All of these nebulae are part of the larger **Orion Molecular Cloud Complex** which is located approximately 1,500 light-years away and is hundreds of light-years across. It is one of the most intense regions of stellar formation visible in our galaxy.

M42: The **Orion Nebula** (also known as **Messier 42**, **M42**, or **NGC 1976**) is a diffuse nebula situated south of Orion's Belt. It is one of the brightest nebulae, and is visible to the naked eye in the night sky. M42 is located at a distance of 1,344 ± 20 light years and is the closest region of massive star formation to Earth. The M42 nebula is estimated to be 24 light years across. Older texts frequently referred to the Orion Nebula as the **Great Nebula** in Orion or the **Great Orion Nebula**.

The Orion Nebula is one of the most scrutinized and photographed objects in the night sky and is among the most intensely studied celestial features. The nebula has revealed much about the process of how stars and planetary systems are formed from collapsing clouds of gas and dust.

Observational Data for The Orion Nebula

Right ascension $05^h\ 35^m\ 17.3^s$
Declination -05° 23′ 28″

M43: Messier 43 (also known as **M43**, **De Mairan's Nebula**, and **NGC 1982**) is an H II region in the Orion constellation. It was discovered by Jean-Jacques Dortous de Mairan before 1731. The De Mairan's Nebula is part of the Orion Nebula, separated from the main nebula by a lane of dust.

Observational Data for De Mairan's Nebula

Right ascension $05^h\ 35.6^m$
Declination -05° 16′

Horsehead Nebula (also known as **Barnard 33** in emission nebula *IC 434*) is a dark nebula in the constellation Orion. The nebula is located just to the south of the star Alnitak, which is furthest east on Orion's Belt. The Horsehead Nebula is approximately 1500 light years from Earth. It is one of the most identifiable nebulae because of the shape of its swirling cloud of dark dust and gases, which is similar to that of a horse's head when viewed from Earth.

Observational Data for the Horsehead Nebula

Right ascension $05^h\ 40^m\ 59.0^s$
Declination −02° 27′ 30.0"

Images: Top, M42 | M43 Bottom, The Horsehead Nebula Credit: NASA/ESA/STScI

Looking through the Eyepiece - Orion, the Hunter

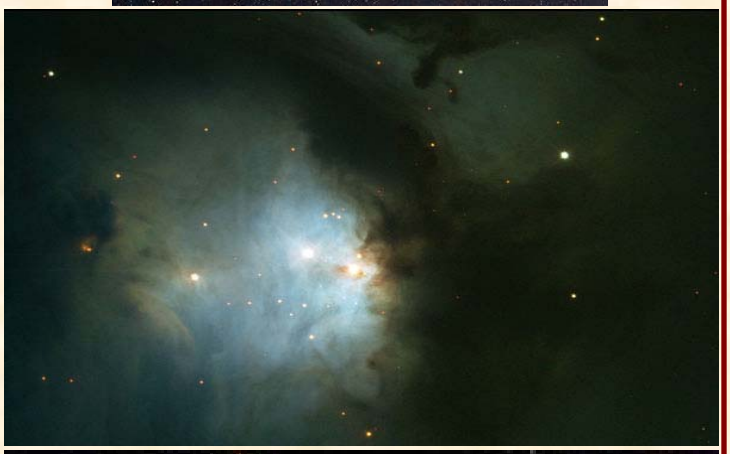
Barnard's Loop (catalogue designation **Sh 2-276**) is an emission nebula that is part of a giant molecular cloud which also contains the bright Horsehead and Orion nebulae. The loop takes the form of a large arc centered approximately on the Orion Nebula. The stars within the Orion Nebula are believed to be responsible for ionizing the loop.

Observational Data for Barnard's Loop

Right ascension $05^h\ 31^m$
Declination -04° 54′

Messier 78 (also known as **M 78** or **NGC 2068**) is a reflection nebula in the constellation Orion. It was discovered by Pierre Méchain in 1780 and included by Charles Messier in his catalog of comet-like objects that same year.

M78 is the brightest diffuse reflection nebula of a group of nebulae that include NGC 2064, NGC 2067 and NGC 2071. This group belongs to the Orion Molecular Cloud Complex and is about 1,600 light years distant from Earth. M78 is easily found in small telescopes as a hazy patch and involves two stars of 10th magnitude.



Observational Data for M78

Right ascension $05^h\ 46.7^m$
Declination +00° 03′

Flame Nebula, designated as **NGC 2024** and **Sh2-277**, is an emission nebula in the constellation Orion. It is about 900 to 1,500 light-years away.

The bright star Alnitak (ζ Ori), the easternmost star in the Belt of Orion, shines energetic ultraviolet light into the Flame and this knocks electrons away from the great clouds of hydrogen gas that reside there. Much of the glow results when the electrons and ionized hydrogen recombine. Additional dark gas and dust lies in front of the bright part of the nebula and this is what causes the dark network that appears in the center of the glowing gas.

Observational Data for the Flame Nebula

Right ascension $05^h\ 41^m\ 54^s$
Declination -1° 51′ 0.0"

This article and the Sky tour is concluded on the back page.

Images on this page: Top, Bernard's Loop; Credit HeWhoLooks, used with Creative Commons license. Middle: M78 Credit Unknown Source Wikimedia | Creative Commons license. Bottom: Flame Nebula courtesy of 2MASS/UMass/IPAC-Caltech/NASA/NSF.

Resources for Astronomy

A while back you became interested in astronomy and viewing the nighttime sky. You may have even bought a telescope or the very least used binoculars. Then for what ever reason you suddenly dropped the hobby.

Perhaps the reasons were simply no good sky objects that you haven't seen before. Maybe there is a lack of Celestial objects like comet Hale-Bopp. You could have given up on viewing simply for the rapidly encroaching light pollution here in the Magic Valley (or elsewhere) or maybe something in the Hellawhack-Shiznit inside your Brizzle went Fizzle and you simply have lost your way around the night sky.

Relax there is hope for you and it comes from a variety of sources. First we look at taking a local astronomy class. Yes, it is still offered at the College of Southern Idaho in Twin Falls and is still being taught by Wallace Blacker, or if you prefer you may travel to Boise / Nampa and take the class from Dr. Irwin Horowitz at the College of Western Idaho. Okay, so maybe that is out of the question and out of the budget. So now what?

Well there are always Cellular phone applications known as "Smartphone apps." You just need a Smartphone. Some of these apps are free and some are relatively inexpensive. We do not recommend one over the other, but some we are familiar with are:

Star Walk is specially designed for amateur star gazers but will also pleasantly surprise professional astronomers. Star Walk is fun & educating at the same time! Star Walk is an excellent guide to stars, planets, and constellations. You can play and learn them all while sitting comfortably in the arm-chair at home or during actual star gazing outside. Visit http://starwalk.mobi/ for more information.

Starmap is another excellent program where you can discover the power of a professional sky atlas in the palm of your hand. You can point telescopes easily on faint objects using the eyepiece mode. Prepare your observations with the automatic selection of tonight's best objects. Visit http://star-map.fr/?home for more information

While there are many more apps available and no doubt too many to list here there are other resources to help you such as an online classroom.

Robert Nemiroff, at Michigan Technological University published his lectures of introductory astronomy course that he taught in the past and is now offering them free of charge to everyone who is interested. To attend this virtual classroom, or take other classes visit http://bb.nightskylive.net/asterisk/viewforum.php?f=24

Teaching yourself astronomy would not be too difficult these days thanks to software and the internet.

The conventional methods of learning astronomy as a beginner with a telescope in the backyard have given way to more comfortable and all weather learning systems like astronomy software and internet accessible robotic telescopes. The software available on the internet are umpteen in number and need a comprehensive research of available features before venturing to buy one for your computer.

Two programs that come to mind are:

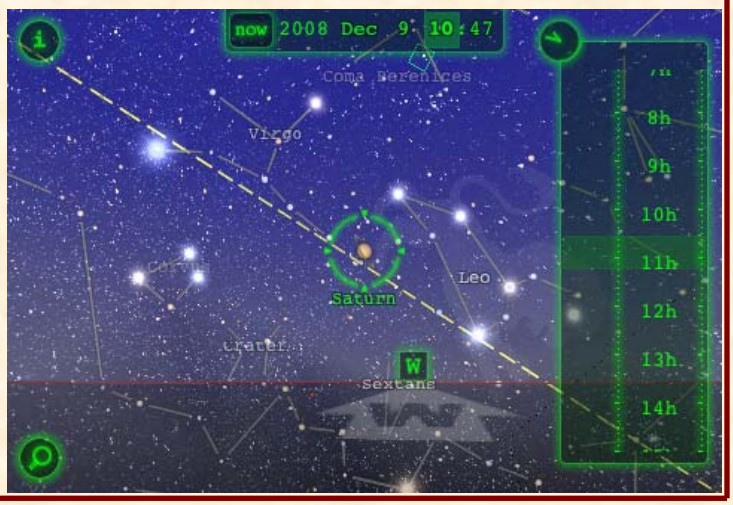
CyberSky: CyberSky is an accurate, yet easy-to-use planetarium program that provides an excellent way to learn about astronomy and explore the sky visible in the distant past, the present, and the far-off future. CyberSky can display and print attractive, highly-customizable maps of the sky as seen from your home, your favorite vacation spot, or any other location on the Earth. The program's clean, user-friendly interface makes it easy to identify the objects you see in the sky and find the objects you want to see.

Celestia is a 3D astronomy program created by Chris Laurel. The program is based on the Hipparcos Catalogue (HIP) and allows users to travel through an extensive universe, modeled after reality, at any speed, in any direction and at any time in history. Celestia displays and interacts with objects ranging in scale from small Spacecraft to entire galaxies in three dimensions using OpenGL, from perspectives which would not be possible from a classic planetarium or other ground based display.

NASA and ESA have used Celestia in their educational and outreach programs, as well as for interfacing to trajectory analysis software.

Celestia is available for Linux, Mac OS X, and Microsoft Windows. Released under the GNU General Public License, Celestia is free software. For more information on Celestia visit http://www.shatters.net/celestia/

Image showing Saturn from the Star Walk app. Courtesy of Star Walk.mobi



Astronomers Stumble onto Huge Space Molecules

By Trudy E. Bell and Tony Phillips

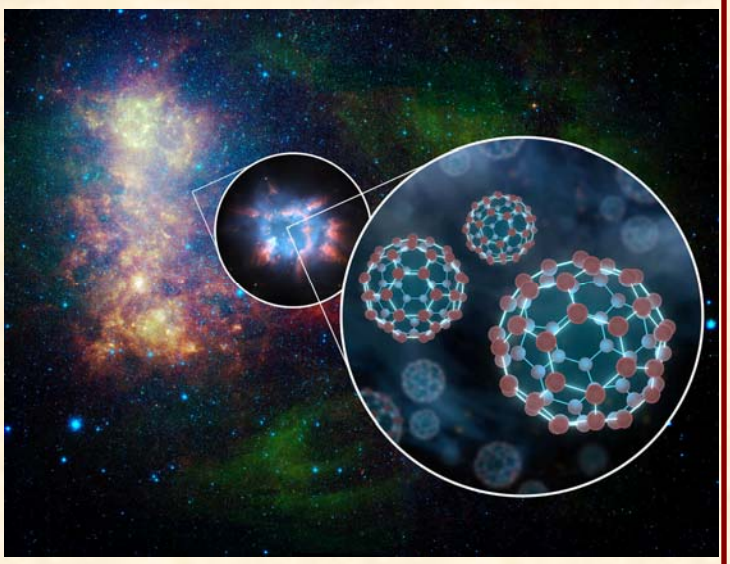
This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Deep in interstellar space, in a the swirling gaseous envelope of a planetary nebula, hosts of carbon atoms have joined together to form large three-dimensional molecules of a special type previously seen only on Earth. Astronomers discovered them almost accidentally using NASA's Spitzer Space Telescope.

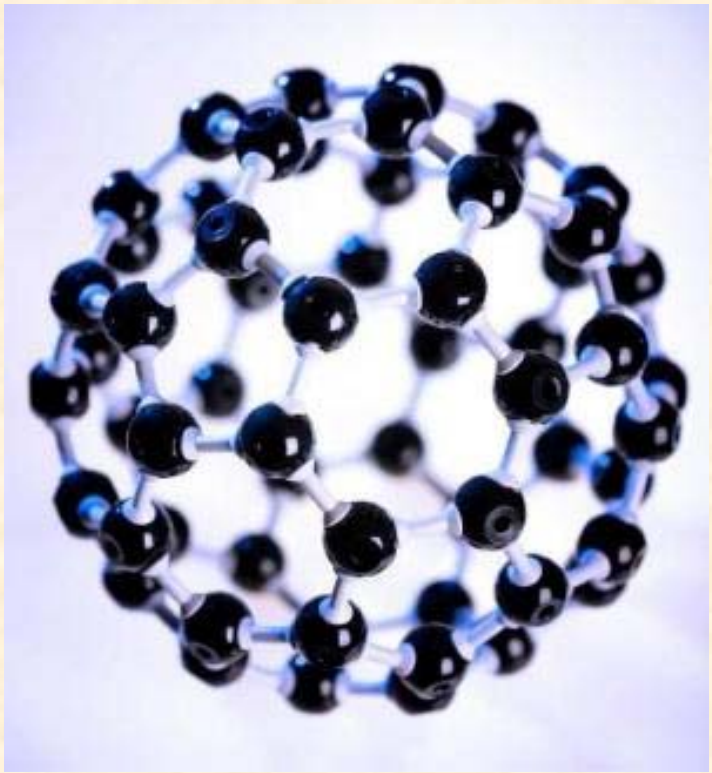
"They are the largest molecules known in space," declared Jan Cami of the University of Western Ontario, lead author of a paper with three colleagues published in *Science* online on July 22, 2010, and in print on September 3.
Not only are the molecules big: they are of a special class of carbon molecules known as "fullerenes" because their structure resembles the geodesic domes popularized by architect Buckminster Fuller. Spitzer found evidence of two types of fullerenes. The smaller type, nicknamed the "buckyball," is chemical formula C_{60}, made of 60 carbon atoms joined in a series of hexagons and pentagons to form a spherical closed cage exactly like a black-and-white soccer ball. Spitzer also found a larger fullerene, chemical formula C_{70}, consisting of 70 carbon atoms in an elongated closed cage more resembling an oval rugby ball.
Neither type of fullerene is rigid; instead, their carbon atoms vibrate in and out, rather like the surface of a large soap bubble changes shape as it floats through the air. "Those vibrations correspond to wavelengths of infrared light emitted or absorbed—and that infrared emission is what Spitzer recorded," Cami explained.

Although fullerenes have been sought in space for the last 25 years, ever since they were first identified in the laboratory, the astronomers practically stumbled into the discovery. Co-author Jeronimo Bernard-Salas of Cornell University, an expert in gas and dust in planetary nebulae, was doing routine research with Spitzer's infrared observations of planetary nebulae with its spectroscopy instrument. When he studied the spectrum (infrared signature) of a dim planetary nebula called Tc 1 in the southern-hemisphere constellation of Ara, he noticed several clear peaks he had not seen before in the spectra of other planetary nebulae. "When he came to me," recounted Cami, an astrophysicist who specializes in molecular chemistry, "I immediately and intuitively knew it I was looking at buckyballs in space. I've never been that excited!" The authors confirmed his hunch by carefully comparing the Tc 1 spectrum to laboratory experiments described in the literature.

"This discovery shows that it is possible—even easy—for complex carbonaceous molecules to form spontaneously in space," Cami said. "Now that we know fullerenes are out there, we can figure out their roles in the physics and chemistry of deep space. Who knows what other complex chemical compounds exist—maybe even some relevant to the formation of life in the universe!"
Stay tuned!



Caption: Superimposed on a Spitzer infrared photo of the Small Magellanic Cloud is an artist's illustration depicting a magnified view of a planetary nebula and an even further magnified view of buckyballs, which consist of 60 carbon atoms arranged like soccer balls.



Caption: Close-Up of a Buckyball Molecule model. Credit: iStockphoto/ David Freund used with Creative Commons license.

Voyager Crosses the Point of Solar Stillness

The 33-year odyssey of NASA's Voyager 1 spacecraft has reached a distant point at the edge of our solar system where there is no outward motion of solar wind.

Now hurtling toward interstellar space some 17.4 billion kilometers (10.8 billion miles) from the Sun, Voyager 1 has crossed into an area where the velocity of the hot ionized gas, or plasma, emanating directly outward from the Sun has slowed to zero. Scientists suspect the solar wind has been turned sideways by the pressure from the interstellar wind in the region between stars.

The event is a major milestone in Voyager 1's passage through the heliosheath, the turbulent outer shell of the Sun's sphere of influence, and the spacecraft's upcoming departure from our solar system.

"The solar wind has turned the corner," said Ed Stone, Voyager project scientist based at the California Institute of Technology in Pasadena, Calif. "Voyager 1 is getting close to interstellar space."

Our sun gives off a stream of charged particles that form a bubble known as the heliosphere around our solar system. The solar wind travels at supersonic speed until it crosses a shockwave called the termination shock. At this point, the solar wind dramatically slows down and heats up in the heliosheath.

Launched on Sept. 5, 1977, Voyager 1 crossed the termination shock in December 2004 into the heliosheath. Scientists have used data from Voyager 1's Low-Energy Charged Particle Instrument to deduce the solar wind's velocity. When the speed of the charged particles hitting the outward face of Voyager 1 matched the spacecraft's speed, researchers knew that the net outward speed of the solar wind was zero. This occurred in June, when Voyager 1 was about 17 billion kilometers (10.6 billion miles) from the Sun.

Because the velocities can fluctuate, scientists watched four more monthly readings before they were convinced the solar wind's outward speed actually had slowed to zero. Analysis of the data shows the velocity of the solar wind has steadily slowed at a rate of about 20 kilometers per second each year (45,000 mph each year) since August 2007, when the solar wind was speeding outward at about 60 kilometers per second (130,000 mph). The outward speed has remained at zero since June.

The results were presented at the American Geophysical Union meeting in San Francisco.

"When I realized that we were getting solid zeroes, I was amazed," said Rob Decker, a Voyager Low-Energy Charged Particle Instrument co-investigator and senior staff scientist at the Johns Hopkins University Applied Physics Laboratory in Laurel, Md. "Here was Voyager, a spacecraft that has been a workhorse for 33 years, showing us something completely new again."

Scientists believe Voyager 1 has not crossed the heliosheath into interstellar space. Crossing into interstellar space would mean a sudden drop in the density of hot particles and an increase in the density of cold particles. Scientists are putting the data into their models of the heliosphere's structure and should be able to better estimate when Voyager 1 will reach interstellar space. Researchers currently estimate Voyager 1 will cross that frontier in about four years.

"In science, there is nothing like a reality check to shake things up, and Voyager 1 provided that with hard facts," said Tom Krimigis, principal investigator on the Low-Energy Charged Particle Instrument, who is based at the Applied Physics Laboratory and the Academy of Athens, Greece. "Once again, we face the predicament of redoing our models."

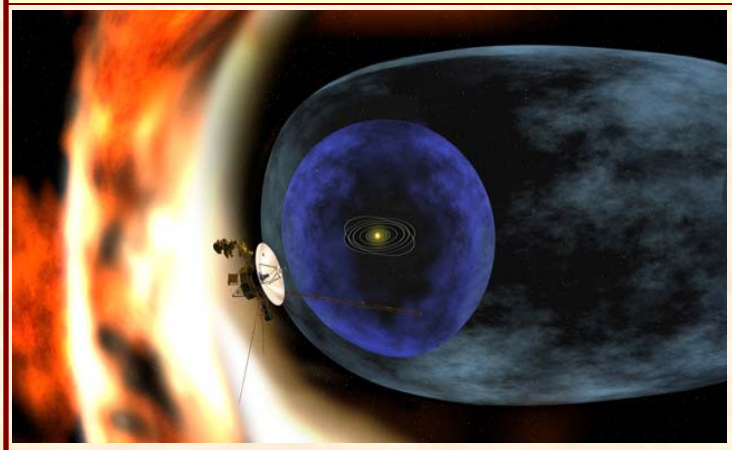
A sister spacecraft, Voyager 2, was launched in Aug. 20, 1977 and has reached a position 14.2 billion kilometers (8.8 billion miles) from the Sun. Both spacecraft have been traveling along different trajectories and at different speeds. Voyager 1 is traveling faster, at a speed of about 17 kilometers per second (38,000 mph), compared to Voyager 2's velocity of 15 kilometers per second (35,000 mph). In the next few years, scientists expect Voyager 2 to encounter the same kind of phenomenon as Voyager 1.

The Voyagers were built by NASA's Jet Propulsion Laboratory in Pasadena, Calif., which continues to operate both spacecraft.

These six narrow-angle color images were made from the first ever 'portrait' of the solar system taken by Voyager 1, which was more than 4 billion miles from Earth and about 32 degrees above the ecliptic. Credit: *NASA/JPL*

Jet Propulsion Laboratory
CALIFORNIA INSTITUTE OF TECHNOLOGY

Voyager 2 in Trouble?



NASA engineers have commanded the Voyager 2 probe to limit its transmissions to Earth, and only send back information on its health and status. This order was sent out after the spacecraft's pattern of communication unexpectedly changed.

Voyager 2 is currently at the edge of our solar system, about 13.8 billion kilometers, or 8.6 billion miles, from Earth. Preliminary engineering data received on May 1 show the spacecraft is basically healthy.

Engineers believe the source of the puzzling change is the flight data system, which is responsible for formatting the data to send back to Earth. The change in the data return pattern has prevented mission managers from decoding Voyager 2's science data.

The first changes in the return of data packets appeared on April 22, but engineers had to wait until April 30, after the spacecraft had executed a planned roll maneuver, before they could send commands to Voyager 2. The spacecraft is so far away that it takes nearly 13 hours for signals to reach the spacecraft, and nearly 13 hours for Voyager 2's response to reach NASA's Deep Space Network on Earth.

Voyager 2 launched on August 20, 1977, about two weeks before its twin spacecraft, Voyager 1. The two spacecraft are out at the edge of the heliosphere, the bubble the Sun creates around the solar system, making them the most distant human-made objects.

Voyager 1 has traveled farther than Voyager 2 – it is currently about 16.9 billion kilometers (10.5 billion miles) away from Earth. Voyager 1 is in good health and performing normally, and mission managers are looking forward to the time when Voyager 1 leaves our solar system and enters interstellar space. This event is projected to occur in the next five years or so, with Voyager 2 on track to enter interstellar space shortly afterward.

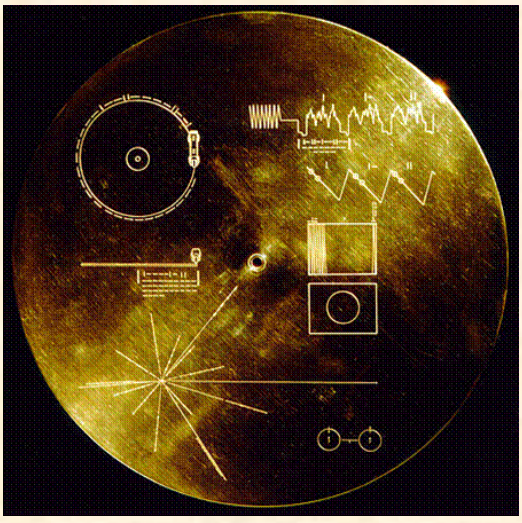
The original goals for the two Voyager spacecraft were to explore Jupiter and Saturn, but the mission was extended, and they are still returning data 33 years later.

As part of a mission extension, Voyager 2 flew by Uranus in 1986 and Neptune in 1989, taking advantage of a once-in-176-year alignment to take a grand tour of the outer planets. Among its many findings, Voyager 2 discovered Neptune's Great Dark Spot and 450-meter-per-second (1,000-mph) winds. It also detected geysers erupting from the pinkish-hued nitrogen ice that forms the polar cap of Neptune's moon Triton. Working in concert with Voyager 1, it also helped discover actively erupting volcanoes on Jupiter's moon Io, and waves and kinks in Saturn's icy rings from the tugs of nearby moons.

One of the most famous images taken by the Voyager mission was not of our distant planetary neighbors, but of Earth. Our planet appears as a speck of light in the vast darkness of the solar system. This was the image that inspired Carl Sagan to call our home planet "a pale blue dot."

As he wrote in a book by that name, "That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives. … There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world."

Ed Stone, Voyager project scientist at the California Institute of Technology in Pasadena, remarking on the important observations made by Voyager 2, said, "We will know soon what it will take for it to continue its epic journey of discovery."



Images: Upper left: Artist's rendering depicts NASAs Voyager 2 spacecraft as it studies the outer limits of the heliosphere - a magnetic 'bubble' around the solar system that is created by the solar wind. Lower Right: The Voyager 'Golden Record'. Credit: *NASA/JPL-Caltech*

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Images on the front page: 1. Centennial Observatory courtesy of Chris Anderson, Observatory Manager. The Centennial Observatory is located at the Herrett Center for Arts and Science, College of Southern Idaho, Twin Falls, ID, USA. Chris Anderson also provides the Planispheres usually on page 3.
2. Shoshone Falls is a major attraction to the Magic Valley and a prominent landmark on the Snake River. Falls image is used under "public domain;" unknown photographer.
3. M-51 on the front page was imaged with the Shotwell Camera and the Herrett Telescope at the Centennial Observatory by club members Rick Widmer & Ken Thomason. 4. Star explorers image is an open source photo, photographer unknown.

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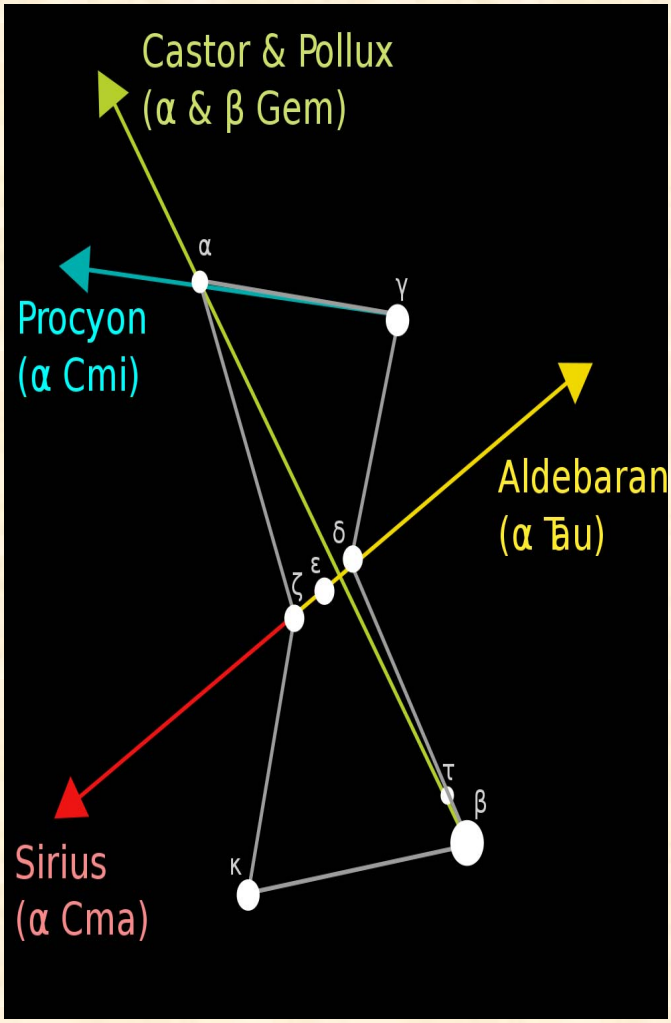
Looking through the Eyepiece - Orion, the Hunter

Orion as a Navigational Aid

You can use Orion to find stars in neighbor constellations Aldebaran, Procyon, Sirius, Castor and Pollux.



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