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CNY Outdoors

Upstate NY Stargazing in January: Quadrantid meteors and Winter's best early evenings

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By Special to nyup.com

star1.jpg

The Flame and Horsehead Nebulae in the constellation Orion the Hunter. The belt star Alnitak is the brightest star in the image, just above the Flame Nebula. Image by Mike Selby, Andrew Chatman (member of ASRAS-Rochester Astronomy Club) and Stefan Schmidt at SC Observatory, Samphran, Thailand.

Once upon a time, amateur astrophotography was a real pain in the asterism. You had to deal with focus, stray light, random satellites, cloud cover, slow-moving planes, the random stiff breeze, and a host of other issues - all in the dark and for varyingly long exposure times - even before the ordeal of developing the film or plate. You still have the same problems today of composing your shot, hoping for clear skies, and weighing down your tripod to keep the camera from shaking, but we've one major advantage over days gone by - you only have to pay for the camera nowadays, and not the film and darkroom kits.

Modern astrophotography has grown by leaps and bounds thanks to the same improvements in technology that have miniaturized +20 megapixel cameras into the thinnest smartphones. When quality equipment combines with knowledgeable users, images like the absolutely captivating one above are ready to go head-to-head with any space gallery contenders you might find online. The long exposure shots used to generate such images capture all shades of subtle detail in faint galaxies and nebulae, all while making visible a dense starry backdrop our eyes simply never evolved to account for.

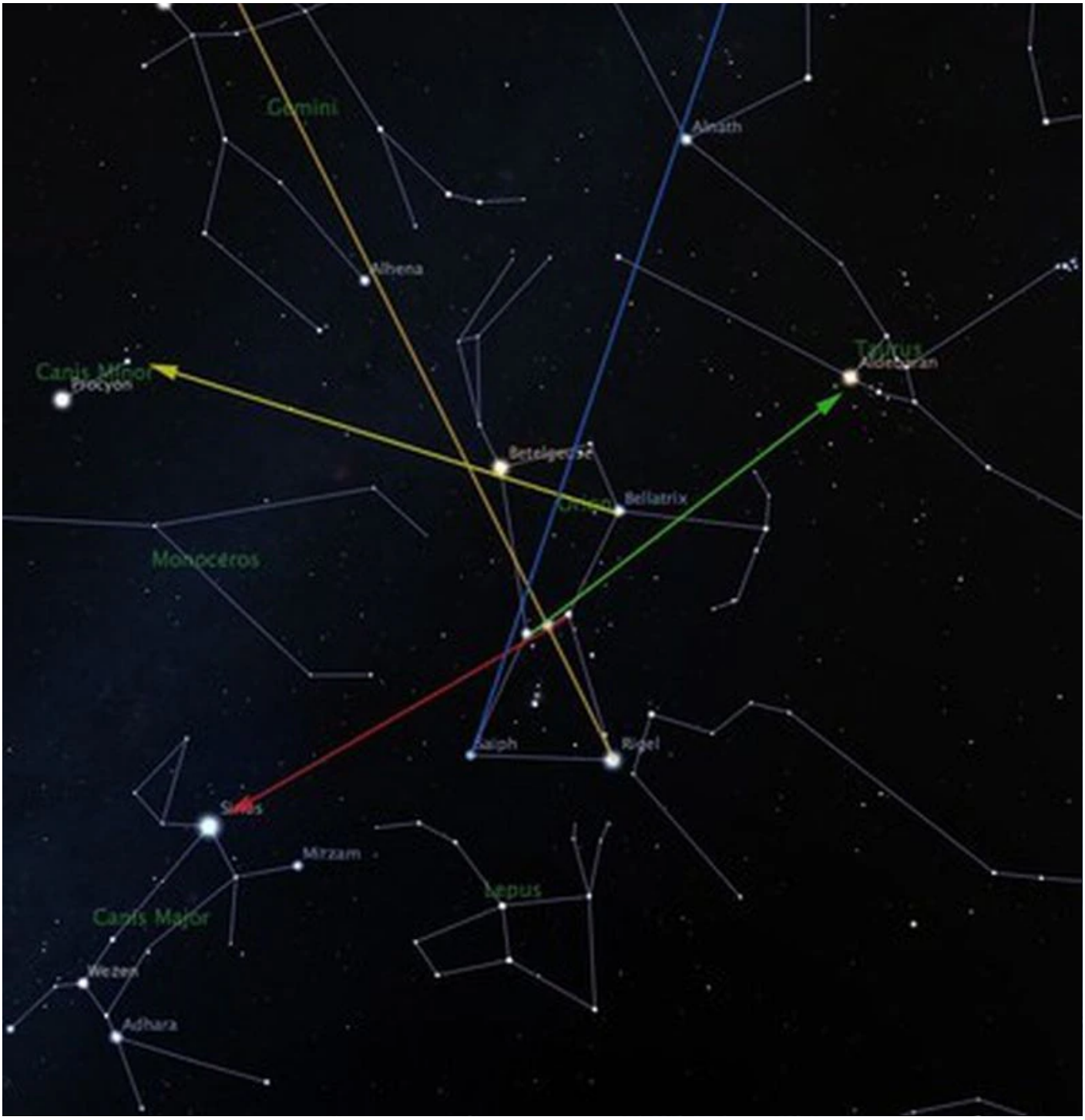
Images like the above represent more than just a visually stunning view of the famous Horsehead and Flame Nebulae in the constellation Orion - the above image shows us some of our nearest galactic neighbors in shining detail. While the times and sights seem to change ever more rapidly here on Earth, most of the stars you can see in this picture have been within its cropped borders for many millions of years as this neighborhood has traveled around the supermassive black hole at the center of the Milky Way Galaxy. Many, many generations on, any future astrophotographers still stuck imaging from Earth will be able to capture the same piece of celestial real estate and overlay the images, giving astronomers information about the motions of stars in the frame, changes to the shape of the gas clouds, and a host of other subtler information.

Evening and nighttime guide

The view looking south at 8 p.m. on Jan. 15 (except for the changing Moon position, this mid-month view is accurate for all of January). Click for a larger view.

Items and events listed below assume you're outside and observing most anywhere in New York state. The longer you're outside and away from indoor or bright lights, the better your dark adaption will be. If you have to use your smartphone, find a red light app or piece of red acetate, else set your brightness as low as possible.

Southern Sights: The "Best of Winter" is in full effect after 9 p.m. this month, with the prominent constellations Taurus, Orion, Canis Major, Gemini, Auriga, and Canis Minor all visible to the south. What makes these constellations prominent are the number and brightness of some of their stars. Orion's body is an easy find to all observers, with the three stars of the belt likely jumping out first. Aldebaran serves as your anchor for Taurus, Sirius an anchor for Canis Major, Procyon is a bright star in a less-populated area to help mark Canis Minor, Capella marks Auriga, and Castor and Pollux help orient Gemini.

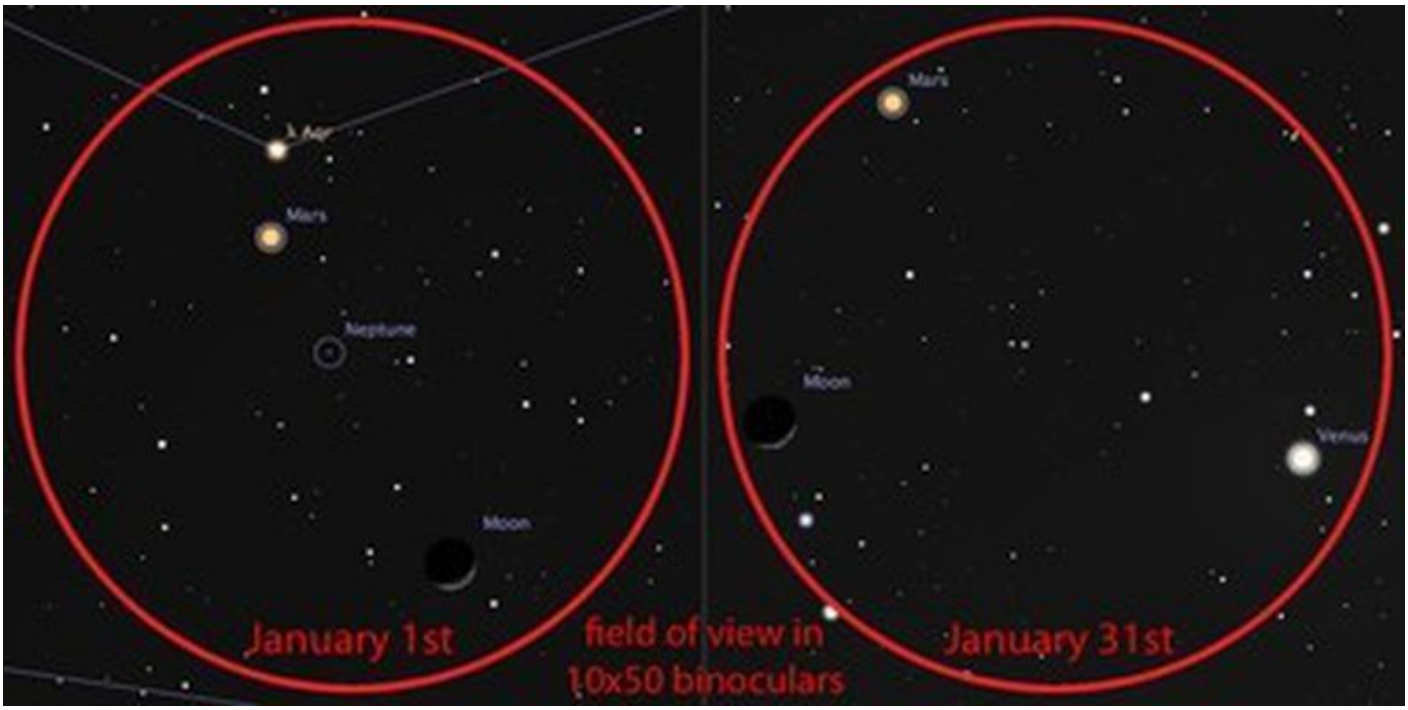


Orion can guide you around its neighborhood. Red = belt stars to Sirius and Canis Major; Orange = Rigel and belt center to Gemini; Yellow = Bellatrix and Betelgeuse to Canis Major; Green = Belt stars to Aldebaran and Taurus; Blue = Saiph and Orion's head to Capella in Auriga.Click for a larger view.

Mars:

Mars continues its slow migration along the horizon from southwest to west this month, setting at around 9 p.m. each night in the process. Mars and Neptune rang in the New Year together on the evening of Jan. 1, although you needed magnification and good conditions to see Neptune in your field of view. The Moon joined this pair on Jan. 2 for a pleasant sight in low-power binoculars, but the bright Moon made finding Neptune even more difficult. Mars makes for a second planet/Moon pairing on Jan. 31

with Venus, which will make for a great sight at low-power.



On Jan. 1, Mars and Neptune were at their closest in an eyepiece for 2017. On Jan. 2, the Moon joined the line. On Jan. 31, Mars, Venus, and the Moon just fit within 10x50 binoculars. Click for a larger view.

Venus:

Venus remains unmissable this month after sunset to the south/southwest, second only in brightness to the Moon. We gain just under two additional minutes of Venus viewing each night this month, setting close to 8 p.m. on Jan. 1 and 8:45 p.m. on the 31st. You'll have plenty of time to work on training your eyes to see first sight of Venus in the sky, as it remains with us near sunset until well into March of 2017. Venus and Neptune will be very closely spaced on Jan. 12, and then Venus plays celestial catch-up with Mars for the rest of the month, culminating in an excellent sight on Jan. 31 - the crescent Moon, Mars, and Venus all within the field of view of 10x50 binoculars.

Early riser alert

Jupiter:

Jupiter rose brightly above the eastern horizon near 1:30 a.m. on Jan. 1 and by 11:45 p.m. at month's end - placing it high in the southern sky for those out before sunrise. Its four Galilean Moons - Callisto, Io, Europa, and Ganymede - are all visible in low-power binoculars when Jupiter rises, but are washed out early by sunlight even before sunrise approaches. Jupiter and a waning crescent moon will make a very nice pairing after 12:30 a.m. on Jan. 19.

Saturn: Saturn returns earlier and earlier this month, but still may be a tough catch

during the first few weeks. Saturn is not impressively bright and rises close to sunrise, meaning it can get washed out by sunlight in short order. Intrepid observers should check to the southeast after 6:30 a.m. after 4:45 a.m. by month's end. Low-power binoculars will show you an oval star, while higher magnification should give you views of the planet and rings. The very waning crescent moon and Saturn will make a very nice pairing the morning of Jan. 24 after 5:30 a.m.

Mercury: Mercury replaces Saturn as our just-before-sunrise planet to catch in January. Your best chance of seeing it occurs on the morning of Jan. 15, when it rises just over the southeast horizon after 6:20 a.m. Mercury is a fair bit brighter than Saturn in the morning and is not close to bright stars, so should be a reasonable catch.

January observing opportunities In Upstate/Central New York

New York has several evenly-spaced astronomers, astronomy clubs, and observatories that host sessions throughout the year. Many of these sessions are free and open to the public, often close to the New Moon when skies are darkest and the chance for seeing deep, distant objects is greatest. These observers and facilities are the very best places to see the month's best objects using some of the best equipment, all while having very knowledgeable observers at your side to answer questions and guide discussion. Many of these organizations also hold monthly meetings, where seasoned amateurs can learn about recent news and discoveries from guest lecturers, and brand new observers are encouraged to join and begin the path towards seasoned amateur status.

Announced public sessions from several respondent NY astronomy organizations are provided below for January. As wind and cloud cover are always factors when observing, please check the website links or email the groups for directions and to find out about an event a day-or-so before the announced session. Also note that some groups will include weather-alternate dates for scheduled sessions.

Astronomy Events Calendar

Organizer	Location	Event	Date	Time	Contact Info
Adirondack Public Observatory	Tupper Lake	Public Star Gazing	Jan. 6	6:00 PM	email, website
Adirondack Public Observatory	Tupper Lake	Public Star Gazing	Jan. 20	6:00 PM	email, website
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	Senior Science Day	Jan. 2	3:00 - 4:00 PM	email, website
Albany Area Amateur Astronomers & Dudley	Schenectady	Night Sky Adventure	Jan. 17	7:00 - 8:30 PM	email, website

Observatory					
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	AAAA Meetings	Jan. 19	7:30 - 9:00 PM	email, website
Baltimore Woods	Marcellus	Winter Skies With Bob Piekiel	Jan. 20	6:30 - 8:30 PM	email, website
Green Lakes State Park	Fayetteville	Solar Observing With Bob Piekiel	Jan. 14	1:00 - 3:00 PM	(315) 637-6111, website
Kopernik Observatory & Science Center	Vestal	KoperniKids All In A winter's Day	Jan. 7	10:30 AM - 12:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	Winter Stars	Jan. 13	7:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	KoperniKids A Visit To The Moon	Jan. 14	10:30 AM - 12:00 PM	email, website
Mohawk Valley Astronomical Society	Waterville	Public Star Gazing	Jan. 28	7:30 PM - 11:00 PM	email, website

ISS And Other Bright Flyovers

Satellite flyovers are commonplace, with several bright passes per hour, yet a thrill to new observers of all ages. Few flyovers compare in brightness or interest to the International Space Station. The flyovers of the football-sized craft with its massive solar panel arrays can be predicted to within several seconds and take several minutes to complete.

January ISS observers will need to sneak a second cup of coffee in the afternoon, as all visible ISS flyovers occur between 5 and 7 a.m. until the 27th. With luck and clear skies, early risers will have opportunity to see double flyovers on the 3rd, 5th, 16th, and 18th. Late-January flyovers occur soon after sunset, making them easy targets for early-sleepers as well.

Simply go out a few minutes before the start time, orient yourself, and look for what will at first seem like a distant plane.

ISS fly-bys

Date	Brightness	Approx. Start	Start Direction	Approx. End	End Direction
1/1	moderately	5:29 AM	S	5:33 AM	E/NE
1/2	extremely	6:13 AM	W/SW	6:18 AM	NE
1/3	very	5:24 AM	E/NE	5:26 AM	E/NE
1/3	very	6:57 AM	W/NW	7:02 AM	NE
1/4	extremely	6:07 AM	NW	6:10 AM	NE
1/5	very	6:50 AM	W/NW	6:54 AM	NE
1/5	somewhat	5:17 AM	NE	5:18 AM	NE
1/6	very	6:00 AM	N	6:02 AM	NE
1/7	moderately	6:42 AM	NW	6:47 AM	NE

1/8	moderately	5:52 AM	N	5:54 AM	NE
1/9	moderately	6:35 AM	NW	6:39 AM	NE
1/10	moderately	5:45 AM	N	5:47 AM	NE
1/11	very	6:27 AM	N/NW	6:32 AM	E/NE
1/12	moderately	5:37 AM	N/NE	5:39 AM	E/NE
1/13	very	6:19 AM	N/NW	6:24 AM	E
1/14	very	5:29 AM	N/NE	5:32 AM	E/NE
1/15	extremely	6:12 AM	NW	6:17 AM	E/SE
1/16	very	6:54 AM	W/NW	7:00 AM	S/SE
1/16	very	5:22 AM	E/NE	5:24 AM	E
1/17	extremely	6:04 AM	W	6:08 AM	SE
1/18	very	5:14 AM	E/SE	5:16 AM	E/SE
1/18	moderately	6:47 AM	W	6:51 AM	S/SW
1/19	very	5:57 AM	SW	6:00 AM	S/SE
1/27	very	6:48 PM	S/SW	6:50 PM	S/SE
1/28	moderately	5:57 PM	S/SE	6:00 PM	E/SE
1/28	moderately	7:31 PM	W/SW	7:33 PM	W/SW
1/29	extremely	6:39 PM	SW	6:43 PM	E
1/30	very	5:47 PM	S/SW	5:53 PM	E/NE
1/30	very	7:23 PM	W	7:25 PM	W/NW
1/31	extremely	6:30 PM	W/SW	6:35 PM	NE

Predictions courtesy of heavens-above.com.

Moon:

Lunar Phases

New:	**First Quarter:**	**Full:**	**Third Quarter:**	**New:**
Dec. 29, 1:53 AM	Jan. 5, 2:47 PM	Jan. 12, 6:34 AM	Jan. 19, 5:14 PM	Jan. 27, 7:07 PM

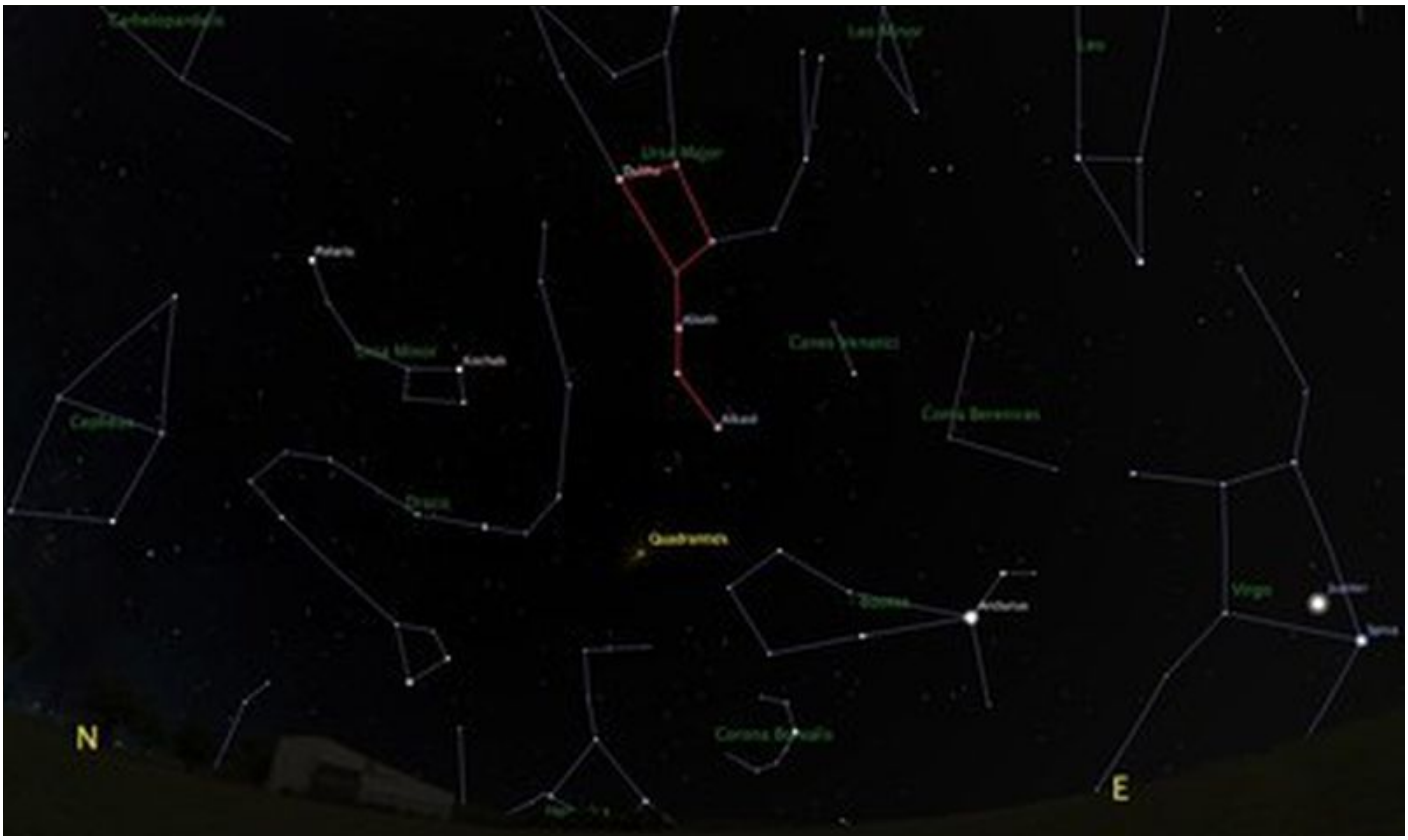
The moon's increasing brightness as full moon approaches washes out fainter stars, random meteors, and other celestial objects - this is bad for most observing, but excellent for new observers, as only the brightest stars (those that mark the major constellations) and planets remain visible for your easy identification. If you've never tried it, the moon is a wonderful binocular object.

Take note: Observers next month will be treated to a penumbral lunar eclipse on Feb. 11.

Meteor Showers: Quadrantids - Active Jan. 1-10, Peaking Jan. 3-4

Meteor showers occur when the Earth passes through the debris field of a comet or asteroid. As these objects approach the warming sun in their long orbits, they leave

asteroid. As these objects approach the warming sun in their long orbits, they leave tiny bits behind - imagine pebbles popping out the back of a large gravel truck on an increasingly bumpy road. In the case of meteor showers, the brilliant streaks you see are due to particles usually no larger than grains of sand. The Earth plows through the swarm of these tiny particles at up-to 12 miles-per-second. High in the upper atmosphere, these particles burn up due to friction and ionize the air around them, producing the long light trails we see. We can predict the peak observing nights for a meteor shower because we know when and where in Earth's orbit we'll pass through the same part of the Solar System - this yearly periodicity in meteor activity is what let us identify and name meteor showers well before we ever had evidence of what caused them.



Looking north and east at 2 a.m. on Jan 3. The easiest markers for the Quadrantid radiant are the handle of the Big Dipper above (red) and the bright star Arcturus in Bootes to the east. Click for a larger view.

The name of each meteor shower is based on the constellation from which the shooting stars appear to radiate - a position in the sky we call the

radiant

. Technically, this meteor shower should have the moniker Bootids, as it originates within the constellation borders of Bootes the Herdsman. The Quadrantids instead owe their name to the defunct constellation Quadrans Muralis, which existed in the late-18th/early-19th centuries just long enough to have the meteor shower named for it.

The Quadrantid radiant is an easy find if you can spot the Big Dipper - just look slightly beyond the handle to orient yourself. Unlike most of the meteor showers, the Quadrantids are not produced by a comet - asteroid 2003 EH1, an unassuming object not discovered until 2003, has a 5.5 year orbit that places it near the path of Earth's orbit.

How to observe: The Quadrantids can be impressive but usually peak during a very narrow window, with up to 120 meteors per hour possible. Observers this year will benefit from the absent Moon, which sets before 11 p.m. during peak nights. Observers out after midnight are treated to Jupiter low on the eastern horizon and the wealth of bright constellations stretching from southeast to southwest.

To optimize your experience, lie flat on the ground with your feet pointed towards the Big Dipper and your head elevated - meteors will then appear to fly right over and around you. Counts and brightness tend to increase the later you stay out, with peak observing times usually between 1 and 5 a.m. The swarm of tiny particles is distributed broadly in orbit, meaning some people may see shooting stars associated with the Quadrantids throughout the first third of the month.

Learn A Constellation: Orion The Hunter

Orion the Hunter. Click for a larger view.

Orion the Hunter is old, bright, and has never, ever missed a trek out during even the worst New York winter night.

How old? In last month's article, we mentioned that Taurus the Bull was arguably identified as a bull in a cave painting as far back as 15,500 B.C. Orion takes his club and clobbers that date - prehistoric carvings associated with the stars in Orion date back to roughly 35,000 years ago. The seven prominent stars of Orion have been associated with some mythical celestial object for as long as any civilization has a record - it is safe to say that every one of our ancestors with decent enough vision to see *any* stars knew the stars of Orion as something significant to their folklore.

How bright? Statistically, very bright. Five of Orion's stars crack the Top 50 brightest-from-Earth list, and its seven most prominent stars - Rigel, Betelgeuse, Bellatrix, Alnilam, Alnitak, Saiph, and Mintaka - make up what is arguably the most easily identified grouping in the night sky. As a human form, the three belt stars - Alnitak, Alnilam, and Mintaka - are unique for their brightness and near-perfect, straight line spacing. The red supergiant Betelgeuse is an odds-on favorite to go supernova in the next few million years - amateur astronomers have been crossing fingers to be around to witness this celestial lottery drawing for as long as we've known it was near the end of its lifespan. At the opposite corner, Rigel is the seventh-brightest star in the sky and is either a triplet or quadruple star system itself.

In our modern grouping, seven stars does not an Orion make! Once you've found the

bright body, work your way around the upper torso to identify the stars of the head and arms. To some, the one arm is holding a club and the other arm a shield, while others might see Orion represented with a bow in one hand and an arrow pulled from a quiver in the other.

With the Orion Nebula in sight, search for the close group of four bright stars known as Trapezium within. Click for a larger view.

Orion is a busy constellation at all magnifications, with several sights for low-power binoculars and many targets for quality telescopes. The most famous of these regions is M42, the great Orion Nebula, which lies just below the belt. This wispiness is apparent even without magnification - there is clearly something more than just a star there to see. The Orion Nebula is a local stellar nursery, where gas clouds are slowly condensing into brand new stars. With good skies and higher magnification, you can see the Trapezium within M42, possibly the newest open star cluster in our sky. Very good binoculars and a steady tripod may even help you see De Mairan's Nebula, designated M43, nearby.

There is much more to Orion than the unaided eyes can see, including numerous nebulae and other deep sky objects.

The Horsehead and Flame Nebulae from the opening image lie next to the belt star Alnitak and are not easy to pull detail out of without quality scopes or good imaging equipment. These two objects are not alone in their need for more dedicated

observing - even with the wealth of objects ready for binocular viewing, our eyes are simply not equipped to handle all of the subtle detail that surrounds Orion. An image from October 2010 that currently resides on Orion's Wikipedia page does begin to reveal all of this amazing detail.

Dr. Damian Allis is the director of CNY Observers and a NASA Solar System Ambassador.

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