

Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

www.mvastro.org

Membership Meeting

Saturday, January 12th 2019
7:00pm at the
Herrett Center for Arts & Science
College of Southern Idaho.
Public Star Party follows at the
Centennial Observatory

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Magic Valley Astronomical Society is a
member of the Astronomical League



M-51 imaged by
Rick Widmer &
Ken Thomason
Herrett Telescope
Shotwell Camera

MVAS President's Message

January 2019

Colleagues,

Let's remember Isaac Newton this past month.

At the MVAS Christmas Party, several books were available for free, and I picked up his biography. The book has been both fascinating and challenging to read, yet events of the past few weeks have reminded us of one of Newton's seminal works. Newton's development of the laws of universal gravitation were tested by Edmond Halley, and that led to the comet that both holds Halley's name and has a period of Mark Twain's lifetime.

Thanks to our modern-day application of Newton's laws, we have been able to track two bright comets the past few weeks. In any other year, 38P/Stephan-Oterma would have been a great item to catch. However, it was overshadowed by 46P/Wirtanen, enough for MVAS members to land pictures and memories.

Newton's laws also helped determined the moon's relationship to the tides, and the end of this month, we'll get to see another lunar activity. Between the evening of Jan. 20 and the morning of Jan. 21, we will have a lunar eclipse. We look forward to your pictures.

As for our MVAS meeting this month, Newton's fingerprints will still be figuratively visible. Saturday, Jan. 12 will be our annual telescope clinic. We will be talking about refractors (see Newton's *Optics*) and reflectors (his own invention). Not only will we have publicity, but feel free to invite friends and neighbors. This will be an opportunity for us to share the insights of our field and spark some interest in this field of dreams for us.

Until then, I wish you clear views,

Rob Mayer

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Calendar

January 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 New Year's Day 	2	3	4	5 Twin Falls Parks & Recreation "Cabin Fever Day" Solar Viewing at the Centennial Obs. See page 13
6 New Moon Lunation 1188 1% Visible ↑ 	7	8 Telescope Tuesday at the Centennial Obs. 6:30pm to 9:00pm \$1.50 Admission	9	10	11	12 MVAS Meeting at 7:00pm at the Herrett Center Faulkner Planetarium Public Star Party Centennial Obs. 6:30p - 12:00a
13	14 First Quarter 49% Visible ↑ Age: 7.28 Days 	15	16	17	18	19
20 Total Lunar Eclipse. See page 8 for details 	21 Full Moon 100% Visible 	22 Telescope Tuesday at the Centennial Obs. 6:30pm to 9:00pm \$1.50 Admission	23	24	25	26
27 Last Quarter Visible 50% ↓ Age: 22.24 Days 	28	29	30	31		

Snake River Skies is the Newsletter of the Magic Valley Astronomical Society and is published electronically once a month.
 Snake River Skies © 2019 by David Olsen for the Magic Valley Astronomical Society, All Rights Reserved. Images used in this newsletter, unless otherwise noted, are in the public domain and are courtesy of NASA, Wikimedia, or from MVAS File Photos. Full Moon names follow the traditional Algonquin First Nation history.

Be Careful – Be Safe – Get Out There – Explore Your Universe

Celestial Calendar by Dave Mitsky

- 1/1 The Moon is 1.3 degrees north of Venus at 22:00
- 1/2 Mercury is at the descending node through the ecliptic plane at 0:00; Mars crosses north of the celestial equator at 1:00; Saturn is in conjunction with the Sun at 6:00
- 1/3 The Moon is 8.4 degrees north-northeast of first-magnitude star Antares (Alpha Scorpii) at 5:00; the Earth is at perihelion (147,099,761 kilometers or 91,403,554 miles distant from the Sun) at 5:20; the Moon is 3.1 degrees north-northeast of Jupiter at 10:00
- 1/4 The latest sunrise of 2019 at latitude 40 degrees north occurs today; the peak of the Quadrantid meteor shower (40 to 120 or more per hour) is predicted to occur at 2:30; the Moon is 2.8 degrees north of Mercury at 19:00
- 1/5 The Moon is 0.9 degree north of Saturn at 19:00; Venus is at dichotomy (50% illuminated) at 19:00; a partial solar eclipse visible from China, Korea, Japan, Russia, the northern Pacific Ocean, and the Aleutian Islands begins at 23:34
- 1/6 New Moon (lunation 1188) occurs at 1:28; the instant of greatest eclipse for the ongoing partial solar eclipse takes place at 01:41; the partial solar eclipse ends at 3:48; Venus is at greatest western elongation (46.9 degrees) at 5:00; Uranus is stationary in longitude at 18:00
- 1/7 Uranus is stationary in right ascension, with direct motion to resume, at 0:00; the Moon is at descending node (longitude 296.7 degrees) at 0:08; the Moon displays minimum libration for the year (1.2 degrees) at 15:00
- 1/8 The latest onset of morning twilight of 2019 at latitude 40 degrees north occurs today
- 1/9 The Moon is at apogee, subtending 29' 25" from a distance of 406,117 kilometers (252,850 miles), at 4:00
- 1/10 Mercury is at its southernmost declination (-24.1 degrees) at 18:00; the Moon is 3.0 degrees south of Neptune.
- 1/11 Pluto is in conjunction with the Sun at 12:00
- 1/12 Mercury is at aphelion (0.4667 a.u. from the Sun) at 8:00
- 1/13 The Moon is 5.0 degrees south-southeast of Mars at 1:00; Mercury (magnitude -0.6) is 1.7 degrees south of Saturn (magnitude +0.5) at 12:00; the Lunar X (the Purbach or Werner Cross), an X-shaped illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to be fully formed at approx. 12:35
- 1/14 First Quarter Moon occurs at 6:46; the Moon is 4.8 degrees south-southeast of Uranus at 17:00
- 1/15 Mars is at the ascending node through the ecliptic plane at 5:00
- 1/16 Venus (magnitude -4.4) is 7.8 degrees north of the first-magnitude star Antares at 23:00
- 1/17 The Moon is 8.5 degrees south-southeast of the bright open cluster M45 (the Pleiades or Subaru) in Taurus at 3:00; the middle of the eclipse season (the Sun is at same longitude as the descending node of the Moon, 296.7 degrees) occurs at 8:00; Venus is at its northernmost latitude from the ecliptic plane (3.4 degrees) at 8:00; the Moon is 1.6 degrees north of the first magnitude star Aldebaran (Alpha Scorpii) at 19:00
- 1/18 Mercury (magnitude -0.8) is 1.5 degrees south of Pluto (magnitude +14.3) at 20:00
- 1/19 Uranus is at eastern quadrature (90 degrees from the Sun) at 1:00
- 1/20 The Sun enters Capricornus (ecliptic longitude 299.7 degrees) at 2:00; the Moon is 7.0 degrees south of the first-magnitude star Pollux (Beta Geminorum) at 19:00; the Moon is at the ascending node (longitude 116.8 degrees) at 22:48
- 1/21 A partial lunar eclipse begins at 3:34; the instant of greatest eclipse occurs at 5:12; Full Moon (known as the Ice Moon, the Moon after Yule, the Old Moon, and the Wolf Moon) occurs at 5:16; the partial lunar eclipse ends at 6:51; the Moon is 0.6 degree south of the bright open cluster M44 (the Beehive Cluster or Praesepe) in Cancer at 15:32; the Moon is at perigee (just 14.7 hours after Full Moon), subtending 33' 26" from a distance of 357,342 kilometers (222,042 miles), at 20:00
- 1/22 Venus (magnitude -4.3) is 2.4 degrees north of Jupiter (magnitude -1.8) at 16:00
- 1/23 The Moon is 2.5 degrees north-northeast of the first-magnitude star Regulus (Alpha Leonis) at 4:00
- 1/26 The Moon is 7.3 degrees north-northeast of the first-magnitude star Spica (Alpha Virginis), at 21:00
- 1/27 The Moon displays maximum libration for the year (10.1 degrees) at 17:00; Last Quarter Moon occurs at 21:10
- 1/29 The Curtiss Cross, an X-shaped clair-obscure illumination effect located between the craters Parry and Gambart, is predicted to be fully formed at 15:54
- 1/30 Mercury is at superior conjunction with the Sun (latitude -6.9 degrees) at 3:00; the Moon is 8.4 degrees north-northeast of Antares at 11:00
- 1/31 The Moon is 2.7 degrees north-northeast of Jupiter at 2:00; the Moon is 0.1 degree east-northeast of Venus, with an occultation occurring in western South America and Polynesia, at 18:00

Johannes Hevelius (1611-1687), Ernst Abbe (1840-1905), George Van Biesbroeck (1880-1974), Luboš Kohoutek (1935), and Stephen Hawking (1942) were born this month.

The Sun, the Moon, & the Planets



The Moon is 24.5 days old, is illuminated 25.0%, subtends 30.4 arc minutes, and is located in Libra on January 1st at 0:00 UT. The Moon is at apogee (distance 63.67 Earth-radii) on January 9th and is at perigee (distance 56.03 Earth-radii) on January 21st. New Moon occurs on January 6th. A so-called supermoon, the first of three for 2019, occurs on January 21st. A supermoon is more accurately described as a perigee syzygy of the Earth-Moon-Sun system or more simply as a perigean Full Moon. A total lunar eclipse, the 27th of Saros 134, takes place throughout most of North America, South America, the eastern Pacific Ocean, the western Atlantic Ocean, extreme western Europe, and extreme western Africa on January 21st. The Moon is located in Gemini during this event. The first penumbral contact occurs at 2:36 UT and the fourth at 7:48 UT. The partial phase begins at 3:34 UT and ends at 6:51 UT. Totality starts at 7:41 UT and ends at 7:44 UT. The instant of greatest eclipse takes place at 5:12 UT. The bright open cluster M44 lies some seven degrees to the east of the Moon during the eclipse. For more on this event, browse <https://eclipse.gsfc...E2019Jan21T.pdf> and <http://www.eclipsewi...an21Tprime.html> or see pages 18-21 of the January 2019 issue of Sky & Telescope and page 36 of the January 2019 issue of Astronomy. The Moon occults Venus on January 31st from western South America and Polynesia. See <http://www.lunar-occ...s/0131venus.htm> for further information. Click on <http://www.lunar-occ...ota/iotandx.htm> for information on other lunar occultation events. Visit <https://saberdoesthe...does-the-stars/> for tips on spotting extreme crescent Moons and <http://www.curtrenz.com/moon06.html> for Full Moon data. Times and dates for the lunar crater light rays predicted to occur this month are available at <http://www.lunar-occ...o/rays/rays.htm>

The Sun is located in Sagittarius on January 1st. It enters Capricornus on January 20th. A partial solar eclipse, the 58th of Saros 102, will be visible from parts of northeastern Asia and the northern Pacific Ocean on January 6th. For more on this eclipse, see <https://eclipse.gsfc...E2019Jan06P.GIF> and <http://www.eclipsewi...an06Pprime.html>

Data (magnitude, apparent size, illumination, and distance from the Earth in astronomical units) for the planets and Pluto on January 1st: Mercury (-0.4, 5.2", 89%, 1.30 a.u., Ophiuchus), Venus (-4.6, 26.3", 47%, 0.64 a.u., Libra), Mars (+0.5, 7.4", 87%, 1.26 a.u., Pisces), Jupiter (-1.8, 31.8", 100%, 6.19 a.u., Ophiuchus), Saturn (+0.5, 15.0", 100%, 11.04 a.u., Sagittarius), Uranus (+5.8, 3.6", 100%, 19.78 a.u. on January 16th, Pisces), Neptune (+7.9, 2.2", 100%, 30.58 a.u. on January 16th, Aquarius), Pluto (+14.3, 0.1", 100%, 34.70 a.u. on January 16th, Sagittarius).

During the evening, Mars and Neptune lie in the southwest and Uranus lies in the south. At midnight, Uranus is in the west. Mercury, Venus, Jupiter, and Saturn can be seen in the southeast in the morning.

On New Year's Day, three bright planets (Mercury, Venus, and Jupiter) and a waning crescent Moon will form a 35-degree-long span across the southeast at dawn.

Mercury brightens this month but after January 4th grows too low to be seen as it heads sunward. A waning crescent Moon passes three degrees north of the planet on that date. Mercury reaches superior conjunction on January 30th.

Venus rises more than 3.5 hours before sunrise on New Year's Day for observers at 40 degrees north. The waning crescent Moon passes within five degrees of the planet that morning. Venus reaches maximum western elongation on January 6th. Venus, Jupiter, and Antares form a rough right triangle on January 19th. On January 22nd, Venus and Jupiter lie within 2.4 degrees of each other. Antares is located just a bit more than eight degrees from the pair. The two brightest planets are separated by a bit more than four degrees on January 26th. By the end of the month, that gap increases to over nine degrees. On the morning of January 31st, the waning crescent Moon lies between Venus and Jupiter and is situated about two degrees from Venus. During January, Venus decreases in apparent diameter from 26.3 arc seconds to 19.4 arc seconds but increases in illumination from 47% to 62%.

Earth is 0.9833 a.u. distant from the Sun at perihelion on January 3rd. On that date, it's 3% (5.0 million kilometers or 3.1 million miles) closer to the Sun than at aphelion on July 6th and about 2.7% closer to the Sun than on average. Mars fades from magnitude +0.5 to magnitude +0.9 this month and shrinks to an apparent diameter of 6.2 arc seconds. A waxing crescent Moon passes five degrees south-southeast of Mars on the night of January 12th/13th. The Red Planet sets by 11:00 p.m. local time

Jupiter's disk increases in apparent size from 31.8 arc seconds to 33.6 arc seconds as the planet brightens slightly from magnitude -1.8 to magnitude -1.9 during January. A slender waning crescent Moon lies about three degrees from Jupiter on the morning of January 3rd and about six degrees from the planet on January 30th. Data on Galilean satellite events is available online at <http://www.shallowsky.com/jupiter/> and <http://www.skyandtel...watching-tools/> and on page 51 of the

January 2019 issue of Sky & Telescope. Click on <http://www.skyandtel...watching-tools/> or consult page 50 of the January 2019 issue of Sky & Telescope to determine transit times of the central meridian by the Great Red Spot.

Saturn is in conjunction with the Sun on January 2nd and is not visible again until the second half of the month. The Ringed Planet attains an altitude of approximately seven degrees in the southeast about 45 minutes before sunrise on January 31st.

Uranus is located in extreme eastern Pisces. It's situated 1.2 degrees north of the fourth-magnitude star Omicron Piscium during the first half of the month. By January 31st, Uranus has moved to a position 1.4 degrees north-northeast of the star. Uranus is stationary on January 7th and is at eastern quadrature on January 19th. The First Quarter Moon passes five degrees south-southeast of Uranus on January 14th. The seventh planet sets after midnight.

As twilight ends in early January, **Neptune** lies about 30 degrees above the southwestern horizon. The eighth planet can be found halfway between the fourth-magnitude stars Lambda and Phi Aquarii. On January 1st, it is located 14 arc minutes southeast of the sixth-magnitude star 81 Aquarii. By the end of the month, Neptune lies 55 arc minutes east of that star and 46 arc minutes north of the fifth-magnitude star 83 Aquarii. The waxing crescent Moon passes three degrees south of Neptune on January 10th.

Online finder charts for Uranus and Neptune can be found at <http://www.nakedeyep...com/uranus.htm> and <http://www.nakedeyep...com/neptune.htm> and also at https://www.skyandte...EB_UrNep18.pdf and on pages 48 and 49 of the September 2018 issue of Sky & Telescope.

See <http://www.curtrenz.com/uranep.html> for additional information on the two outer planets.

Click on <http://www.skyandtel...watching-tools/> for JavaScript utilities that will illustrate the positions of the five brightest satellites of Uranus and the position of Triton, Neptune's brightest satellite.

The dwarf planet **Pluto** is in conjunction with the Sun on January 11th.

For more on the planets and how to locate them, browse <http://www.nakedeyepplanets.com/>

A wealth of information on solar system celestial bodies is posted at <http://www.curtrenz.com/astronomy.html> and <http://nineplanets.org/>

Various events taking place within our solar system are discussed at <http://www.bluewater...ed-4/index.html>

Asteroids



Asteroid 433 Eros heads southeastward along the Perseus-Auriga border this month, eventually entering Taurus as January ends. It comes closest to the Earth on January 15th. On that date, 433 Eros will be approximately 19,000,000 miles from the Earth and will shine at ninth magnitude, the brightest it will be until 2056. 433 Eros will be moving almost one degree per day so a noticeable change in its position should be noticeable in 30 minutes time at a magnification of 100x. Asteroids brighter than magnitude +11.0 that reach opposition this month include 216 Kleopatra (magnitude +10.6) on January 10th, 704 Interamnia (magnitude +10.3) on January 15th, and 324 Bamberga (magnitude +10.4) on January 21st. See http://asteroidoccul.../2019_01_si.htm for information on asteroid occultation events taking place this month. Consult <http://www.curtrenz.com/asteroids.html> to learn more about a number of asteroids.

Carbon Star



Notable carbon star for January: WZ Cas (Cassiopeia) Right Ascension: 00^h 01^m 15.85670^s Declination: +60° 21' 19.0235"

Comets



Comet 46P/Wirtanen glides northeastward through Lynx and Ursa Major during January. On January 10th, the brightest periodic comet of last year passes one degree south of the third magnitude star Ursae Majoris. As the comet departs the inner solar system, its brightness may drop to ninth magnitude. The recently discovered Comet C/2018 Y1 (Iwamoto) will reach perihelion in Leo in early February and may brighten to seventh or eighth magnitude. During January, it travels northwestward through northeastern Hydra and southern Virgo. Browse <https://www.britastr...iles/2018y1.pdf> for a finder chart and <https://earthsky.org...to-jan-feb-2019> for an article on the comet. Visit <http://cometchasing.skyhound.com/> and <http://www.aerith.ne...t/future-n.html> for information on these and other comets visible this month.

Meteors



The Quadrantid meteor shower is predicted to peak around 9:00 p.m. EST on January 3rd. Unfortunately, the radiant, which lies at the junction of the constellations of Boötes, Hercules, and Draco, in what was once called Quadrans Muralis, will be below the horizon at that time. However, a waning crescent Moon will not compromise this year's Quadrantids. The Quadrantid shower can sometimes reach zenithal hourly rates of more than 100 meteors per hour for a relatively short period of time. The near-Earth asteroid 2003 EH1, which may be an extinct comet, is believed to be the source of these meteors. See pages 48 and 49 of the January 2019 issue of Sky & Telescope or browse <http://earthsky.org/?p=155137> and <https://amsmeteors.o...-meteor-shower/> for more on the Quadrantids.

The major meteor showers that will occur this year are discussed at <https://www.skyandte...howers-in-2019/>

Orbiting Earth



Information on Iridium flares and passes of the ISS, the Tiangong-2, the USAF's X-37B, the HST, and other satellites can be found at <http://www.heavens-above.com/>. Satellite information with ISS Live HD streaming <https://www.n2yo.com>

Information on the celestial events transpiring each week can be found at <http://astronomy.com/skythisweek> and <http://www.skyandtel...ky-at-a-glance/>

The Deep Sky



Seventy deep-sky objects for January: B26-28, B29, M36, M37, M38, NGC 1664, NGC 1778, NGC 1857, NGC 1893, NGC 1907, NGC 1931 (Auriga); IC 361, Kemble 1 (Kemble's Cascade asterism), NGC 1501, NGC 1502, NGC 1530, NGC 1569 (Camelopardalis); NGC 1507, NGC 1518, NGC 1531, NGC 1532, NGC 1535, NGC 1537, NGC 1600, NGC 1637, NGC 1659, NGC 1700 (Eridanus); IC 418, M79, NGC 1832, NGC 1888, NGC 1964 (Lepus); B33, Cr65, Cr69, Cr70, IC 434, M42, M43, M78, NGC 1662, NGC 1973-75-77, NGC 1981, NGC 1999, NGC 2022, NGC 2023, NGC 2024, NGC 2112 (Orion); Be11, NGC 1491, NGC 1496, NGC 1499, NGC 1513, NGC 1528, NGC 1545, NGC 1548, NGC 1579, NGC 1582, NGC 1605, NGC 1624 (Perseus); DoDz3, DoDz4, M1, M6, NGC 1514, NGC 1587, NGC 1647, NGC 1746, NGC 1807, NGC 1817 (Taurus)

Top ten binocular deep-sky objects for January: Cr65, Kemble 1, M36, M37, M38, M42, NGC 1528, NGC 1647, NGC 1746, NGC 1981

Top ten deep-sky objects for January: M1, M36, M37, M38, M42, M43, M78, M79, NGC 1501, NGC 2024

Challenge deep-sky object for January: IC 2118 (Eridanus)

The objects listed above are located between 4:00 and 6:00 hours of right ascension.

Omicron2 (40) Eridani is a fourth-magnitude triple star system consisting of three dwarf stars: a type K1V yellow-orange dwarf (A) known as Keid, a type DA4 white dwarf (B), and a type M4.5e red dwarf ©. Omicron is located about 16 light years from the Earth at 4h15m16.32s, -7°39'10.34". Ninth-magnitude Omicron B is the most easily visible white dwarf star and can be seen with an aperture of six inches.

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in magnitude from 2.1 to 3.4, on January 3rd, 6th, 9th, 12th, 15th, 17th, 20th, 23rd, 26th, and 29th. The Demon Star is at minimum brightness for approximately two hours and is well-placed for observers in North America on the night of January 11th/12th, centered at 1:21 a.m. EST. Minima can also be observed on the night of January 14th/15th, centered at 10:10 p.m. EST, and on the evening of January 17th, centered at 6:59 p.m. EST. Consult page 50 of the January 2019 issue of Sky & Telescope for the times of the minima. For more on Algol, see <http://stars.astro.i.../sow/Algol.html> and <http://www.solstatio...rs2/algol3.htm>

Data on current supernovae can be found at <http://www.rochester...y.org/snimages/>

Free star maps for January can be downloaded at <http://www.skymaps.com/downloads.html> and <http://www.telescope...thly-Star-Chart>

Data on current supernovae can be found at <http://www.rochester...y.org/snimages/>

Finder charts for the Messier objects and other deep-sky objects are posted at <https://freestarcharts.com/messier> and <https://freestarcharts.com/ngc-ic> and <http://www.cambridge...y-september.htm>

Telrad finder charts for the Messier Catalog and the SAC's 110 Best of the NGC are posted at <http://www.astro-tom...charts/map1.pdf> and <http://sao64.free.fr...ataloguesac.pdf> respectively.

Information pertaining to observing some of the more prominent Messier galaxies can be found at <http://www.cloudynig...ur-astronomers/>

Author Phil Harrington offers an excellent freeware planetarium program for binocular observers known as TUBA (Touring the Universe through Binoculars Atlas), which also includes information on purchasing binoculars, at <http://www.philharrington.net/tuba.htm>

Stellarium and Cartes du Ciel are useful freeware planetarium programs that are available at <http://stellarium.org/> and <https://www.ap-i.net/skychart/en/start>

Deep-sky object list generators can be found at <http://www.virtualcolony.com/sac/> and <http://tonightssky.com/MainPage.php> and <https://dso-browser.com/>

Freeware sky atlases can be downloaded at <http://www.deepskywa...-atlas-full.pdf> and <http://astro.mxd120...ee-star-atlases>.

Information on observing some of the more prominent Messier galaxies is available at <http://www.cloudynig...ur-astronomers/>

Finder charts for the Messier objects and other deep-sky objects are posted at <https://freestarcharts.com/messier> and <https://freestarcharts.com/ngc-ic> and https://www.cambridg...s_january-march

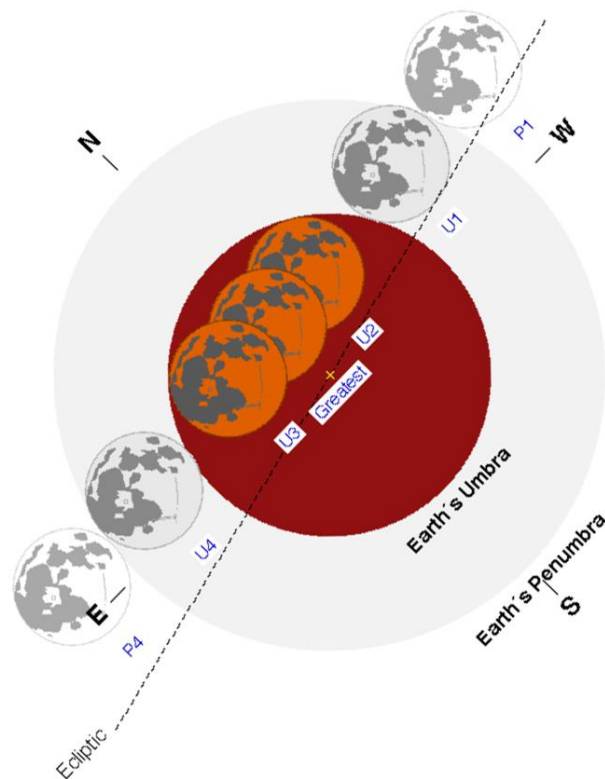
Telrad finder charts for the Messier Catalog and the SAC's 110 Best of the NGC are posted at http://www.astro-tom...essier_maps.htm and <http://sao64.free.fr...ataloguesac.pdf>

Deep-sky object list generators can be found at <https://dso-browser.com/> and <http://www.virtualcolony.com/sac/> and <http://tonightssky.com/MainPage.php>

Free sky atlases can be downloaded at <http://www.deepskywa...-atlas-full.pdf> and <https://www.cloudyni...ar-charts-r1021> and <https://allans-stuff.com/triatlas/>

Lunar Eclipse

The Total Lunar Eclipse of Sunday, January 20th, 2019
This will be the last total lunar eclipse visible in its entirety in Idaho until November, 2022.



Adapted from a [diagram by NASA](#). Note that, although the moon's orbital motion will cause it to move to the left (east) relative to Earth's shadow, it (and the shadow) will be moving to the upper *right* (away from the eastern horizon) due to Earth's rotation. Thus, for observers in Idaho, the moon will be moving higher in the sky relative to the local horizon throughout the eclipse.

Eclipse timeline (all times listed are in Mountain Standard Time (UT-7 hrs.), and rise/set/twilight times are given for Twin Falls, Idaho, USA):

- 7:13 PM — **End of astronomical twilight.** The last trace of the sun's glow disappears in the west.
- 7:30 PM — **Centennial Observatory opens** for public telescope viewing, weather permitting. Please dress warmly!
- 7:36 PM — **First penumbral contact (P1).** The lower edge of the moon begins to enter Earth's penumbral (partial) shadow. The subtle decrease in illumination of the moon will not be noticeable to the eye.
- 8:34 PM — **First umbral contact (U1).** The moon begins to enter Earth's umbral (full) shadow. A small, dark "bite" begins to grow ever larger from the moon's lower edge.
- 9:41 PM — **Total phase begins (U2)** (second umbral contact). The moon is completely immersed in Earth's umbra, appearing dark red-orange, orange-brown, or darker depending on global atmospheric conditions.
- 10:12 PM — **Greatest eclipse.** The moon reaches its maximum excursion into the umbral shadow, appearing at its darkest for this eclipse. For this particular eclipse, the moon passes well north of the center of Earth's full (umbral) shadow, so it will probably not get extremely dark, with the upper left edge noticeably less dark than the lower right, which is deepest into the shadow.
- 10:43 PM — **Total phase ends (U3)** (third umbral contact). The moon begins to emerge from Earth's umbra, with a growing, bright sliver appearing at left edge of the lunar disk.
- 11:51 PM — **Last umbral contact (U4).** The shrinking dark bite disappears from the moon's upper right edge. The moon is still in the partial (penumbral) shadow, with subtle darkening that lessens toward the lower left.
- 12:30 AM — **Observatory closes.** With the moon mostly out of the penumbral shadow, it will appear completely normal to all but the most discerning eye.
- 12:48 AM — **Last penumbral contact (P4).** The moon has completely exited Earth's shadow, although the subtlety of the shading will render it normal to the eye well before this point.

NASA's New Horizons Mission Reveals Entirely New Kind of World - Images of the Kuiper Belt object Ultima Thule unveil the very first stages of solar system's history.

First Results

Alan Stern
New Horizons Principal Investigator
Southwest Research Institute

A Contact Binary: Unlike Asteroids and Comets



Thule

Ultima



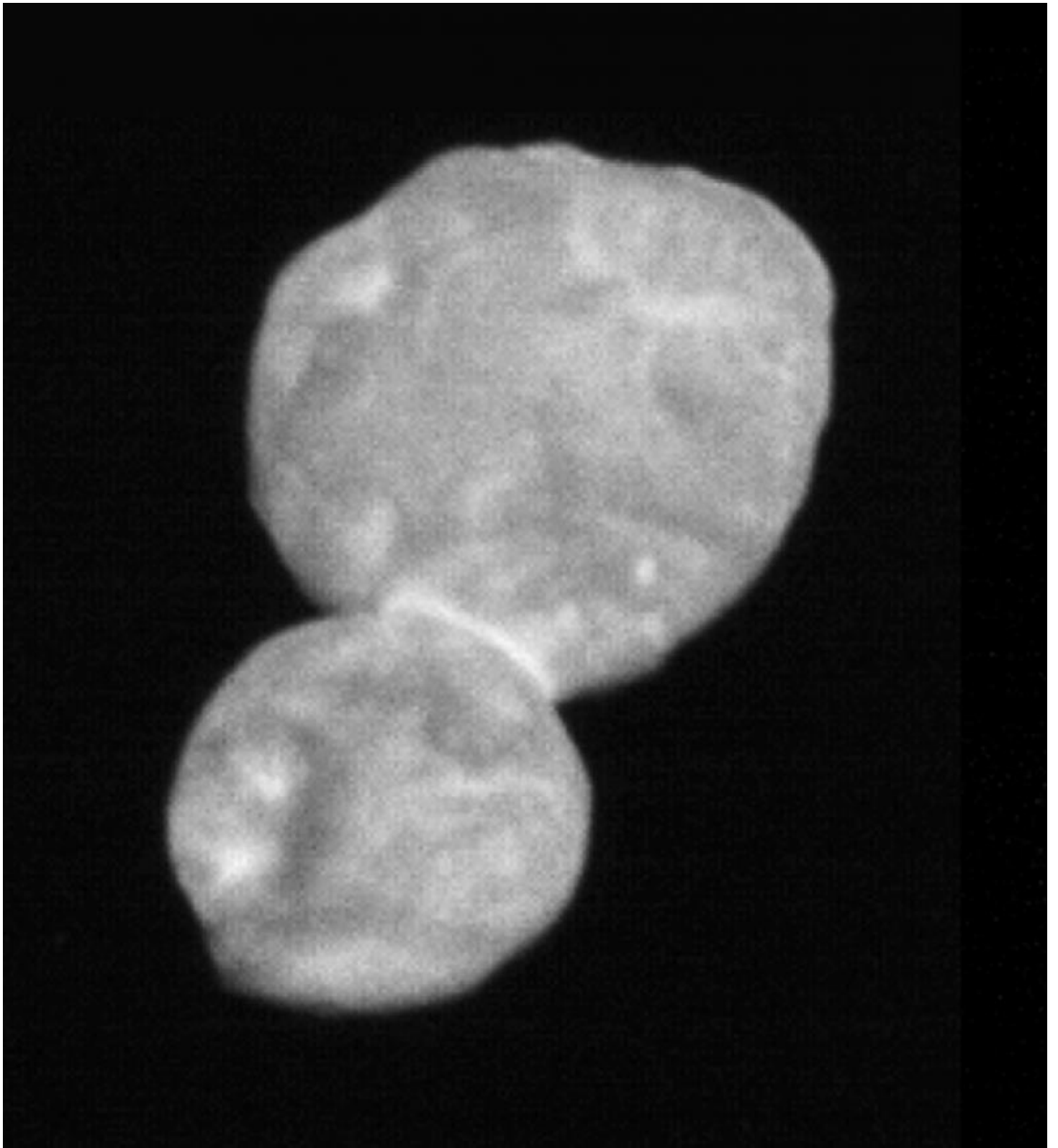
21 miles
(33 km)

January 2, 2018

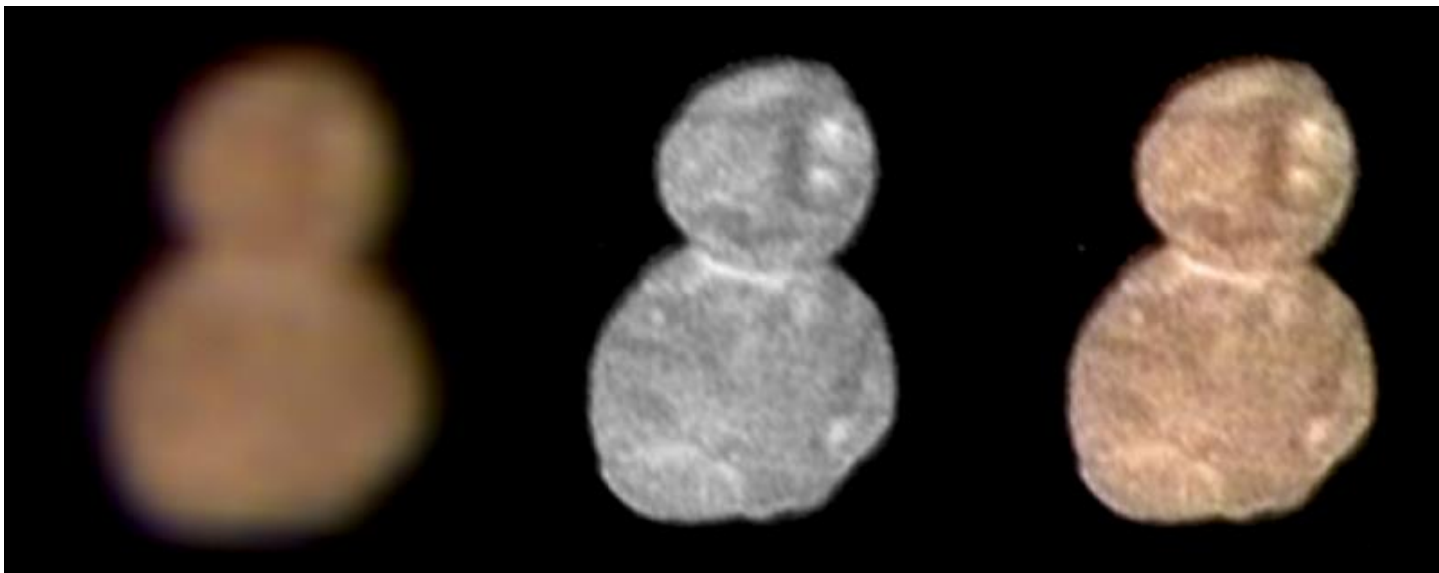
Press Conference



The first clear image of the object nicknamed Ultima Thule, beamed back after the New Horizons spacecraft's flyby on Jan. 1. Credit / NASA



This image taken by the Long-Range Reconnaissance Imager (LORRI) is the most detailed of Ultima Thule returned so far by the New Horizons spacecraft. It was taken at 5:01 Universal Time on January 1, 2019, just 30 minutes before closest approach from a range of 18,000 miles (28,000 kilometers), with an original scale of 459 feet (140 meters) per pixel. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



The first color image of Ultima Thule, taken at a distance of 85,000 miles (137,000 kilometers) at 4:08 Universal Time on January 1, 2019, highlights its reddish surface. At left is an enhanced color image taken by the Multispectral Visible Imaging Camera (MVIC), produced by combining the near infrared, red and blue channels. The center image taken by the Long-Range Reconnaissance Imager (LORRI) has a higher spatial resolution than MVIC by approximately a factor of five. At right, the color has been overlaid onto the LORRI image to show the color uniformity of the Ultima and Thule lobes. Note the reduced red coloring at the neck of the object. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute Scientists from NASA's New Horizons mission released the first detailed images of the most distant object ever explored — the Kuiper Belt object nicknamed Ultima Thule. Its remarkable appearance, unlike anything we've seen before, illuminates the processes that built the planets four and a half billion years ago. "This flyby is a historic achievement," said New Horizons Principal Investigator Alan Stern of the Southwest Research Institute in Boulder, Colorado. "Never before has any spacecraft team tracked down such a small body at such high speed so far away in the abyss of space. New Horizons has set a new bar for state-of-the-art spacecraft navigation." The new images — taken from as close as 17,000 miles (27,000 kilometers) on approach — revealed Ultima Thule as a "contact binary," consisting of two connected spheres. End to end, the world measures 19 miles (31 kilometers) in length. The team has dubbed the larger sphere "Ultima" (12 miles/19 kilometers across) and the smaller sphere "Thule" (9 miles/14 kilometers across).

The team says that the two spheres likely joined as early as 99 percent of the way back to the formation of the solar system, colliding no faster than two cars in a fender-bender.

"New Horizons is like a time machine, taking us back to the birth of the solar system. We are seeing a physical representation of the beginning of planetary formation, frozen in time," said Jeff Moore, New Horizons Geology and Geophysics team lead. "Studying Ultima Thule is helping us understand how planets form — both those in our own solar system and those orbiting other stars in our galaxy."

Data from the New Year's Day flyby will continue to arrive over the next weeks and months, with much higher resolution images yet to come.

"In the coming months, New Horizons will transmit dozens of data sets to Earth, and we'll write new chapters in the story of Ultima Thule — and the solar system," said Helene Winters, New Horizons Project Manager.

The Johns Hopkins Applied Physics Laboratory in Laurel, Maryland, designed, built and operates the New Horizons spacecraft, and manages the mission for NASA's Science Mission Directorate. The Southwest Research Institute, based in San Antonio, leads the science team, payload operations and encounter science planning. New Horizons is part of the New Frontiers Program managed by NASA's Marshall Space Flight Center in Huntsville, Alabama.

Follow the New Horizons mission on [Twitter](#) and use the hashtags #UltimaThule, #UltimaFlyby and #askNewHorizons to join the conversation. Live updates and links to mission information are also available on <http://pluto.jhuapl.edu> and www.nasa.gov.

Phil Harrington's Cosmic Challenge

Cosmic Challenge: Jonckheere 320

January 2019

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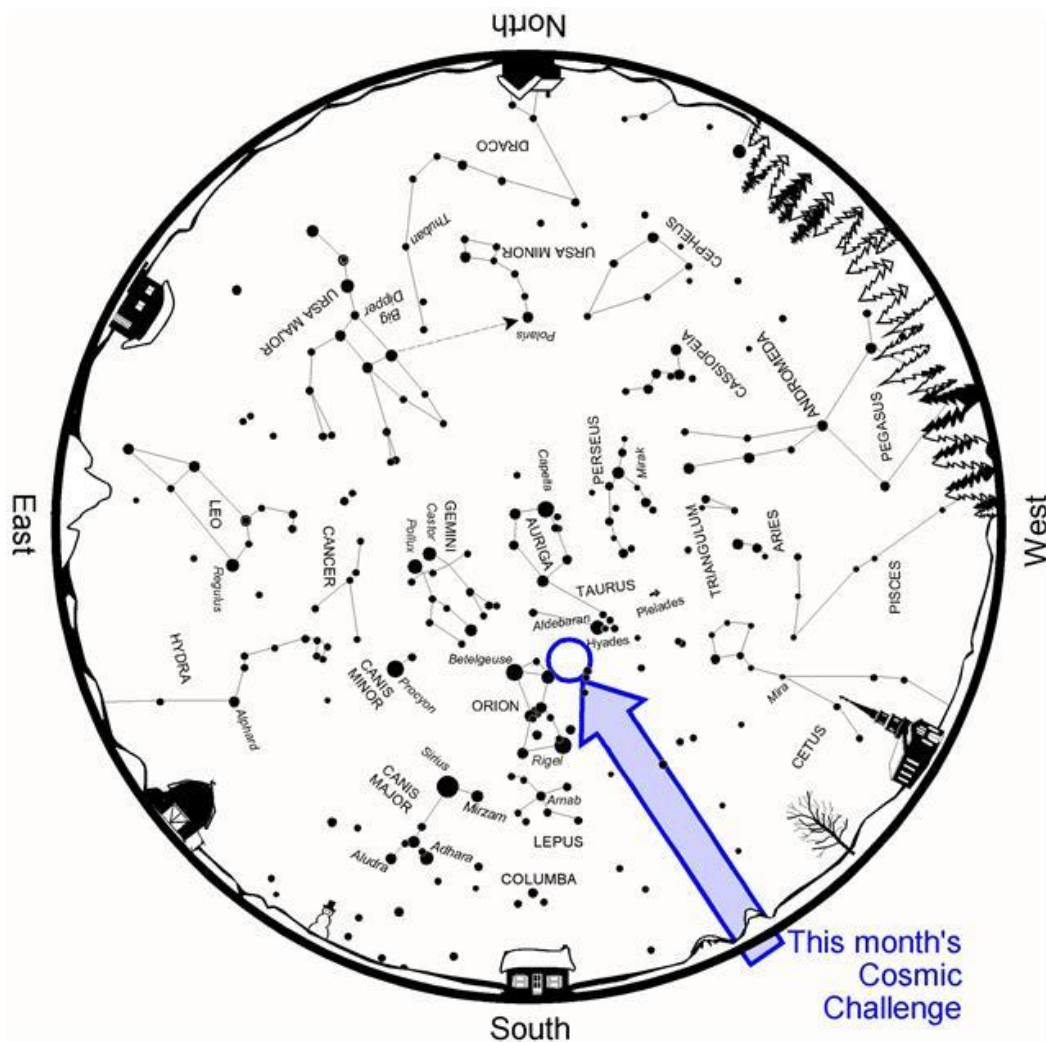
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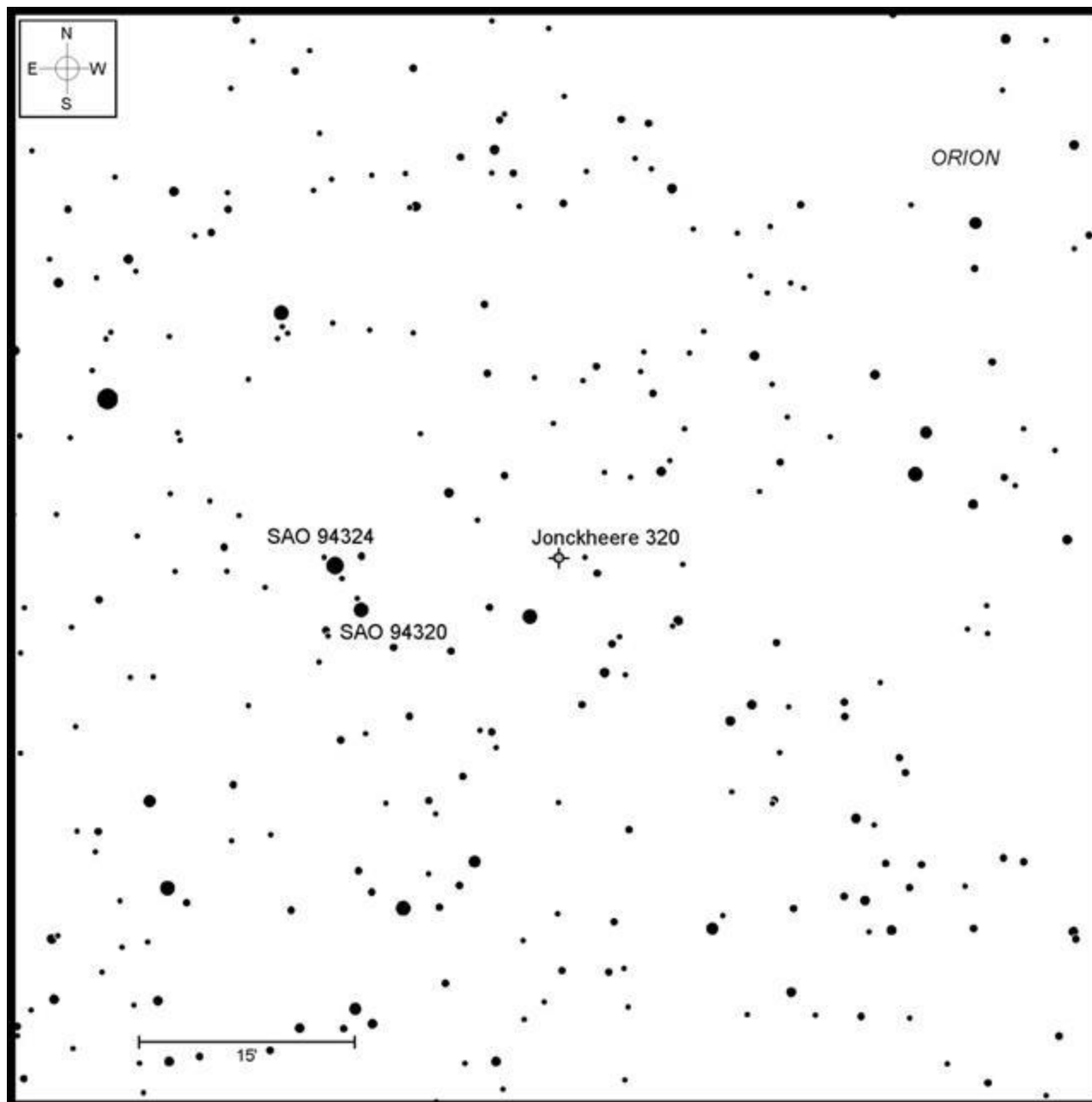
This month's suggested aperture range: 6- to 9.25-inch (15-23cm) telescopes.

Target	Type	RA	DEC	Const.	Mag	Size
Jonckheere 320	Planetary nebula	05h 05.6m	+10° 42.4'	Orion	12.9p	26"x14"

On January 22, 1916, while revisiting some of the stars in his [Catalog and Measures of Double Stars discovered visually from 1905 to 1916 within 105° of the North Pole and under 5" Separation](#), French astronomer Robert Jonckheere returned to a vague double in Orion, which he had previously designated as entry number 320. Jonckheere was later to [write](#) of this encounter through the 28-inch refractor at the Royal Greenwich Observatory, "I noticed that the object I have catalogued as J 320 is not a double star, but, like J 475, it appears with the larger instrument to be an extremely small bright elongated nebula. As is the case with J 900, this object also appears to be new as a nebula." (Sidebar: Jonckheere 900 was the featured *Cosmic Challenge* in [March 2017](#). And what of Jonckheere 475? You probably know it better as planetary nebula NGC 6741 in Aquila.)



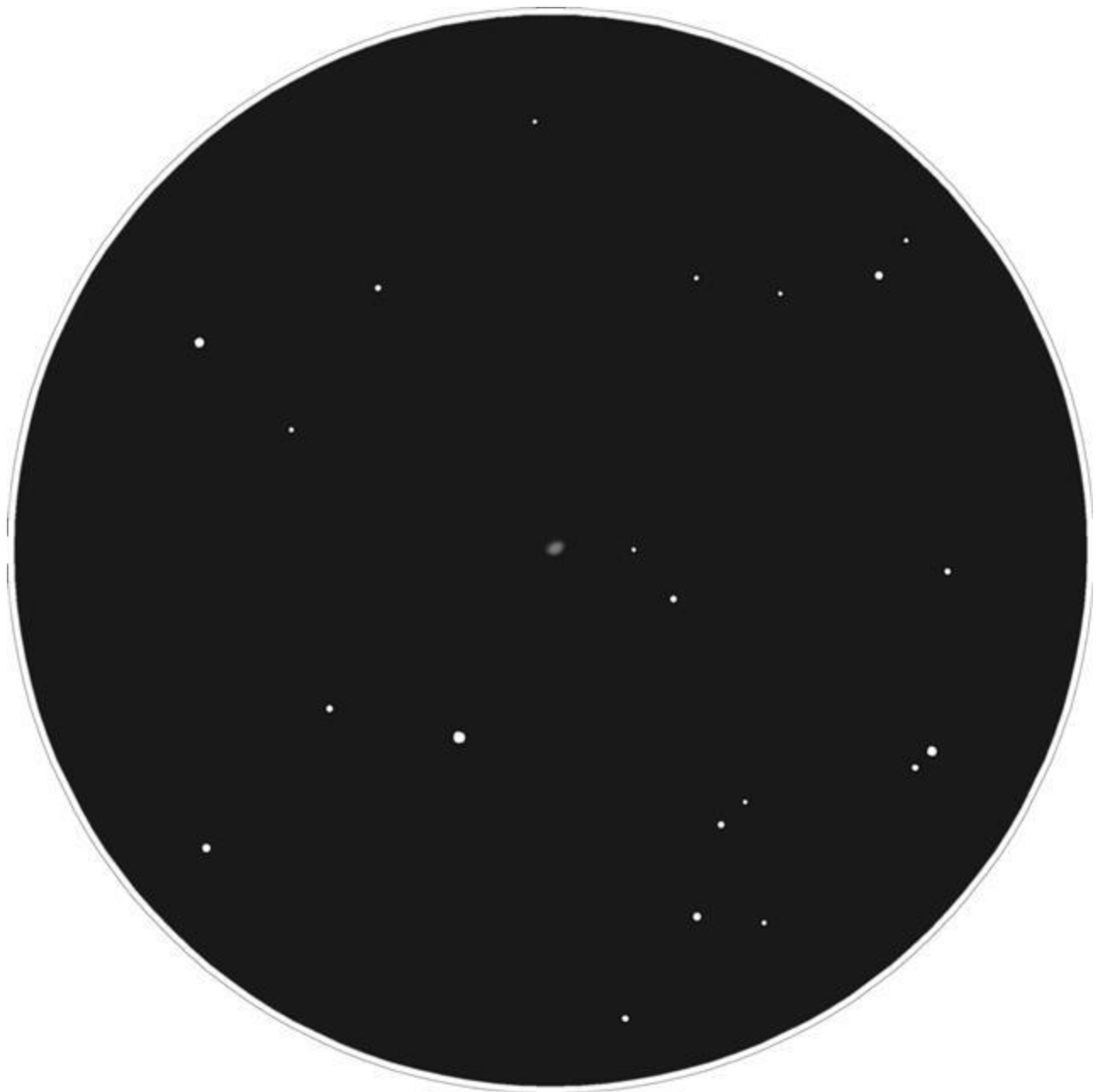
Above: Winter star map. Credit: Map adapted from [Star Watch](#) by Phil Harrington



Above: Finder chart for this month's *Cosmic Challenge*. Credit: Chart adapted from [Cosmic Challenge](#) by Phil Harrington
Click on the chart to open a printable PDF version in a new window

Cross-listed as PK 190-17.1 in Perek and Kohoutek's comprehensive [catalog of planetary nebulae](#), J 320 is in northern Orion, 7° northwest of Bellatrix [Gamma (γ) Orionis], the Hunter's western shoulder. To get there, first hop 6° due west from Bellatrix to 5th-magnitude 16 Orionis, and then continue another 2° further northwest to a pair of 8th-magnitude stars, SAO 94320 and 94324. You'll find the nebula lying just 15' to their west and just 5' northwest of a 9th-magnitude field star.

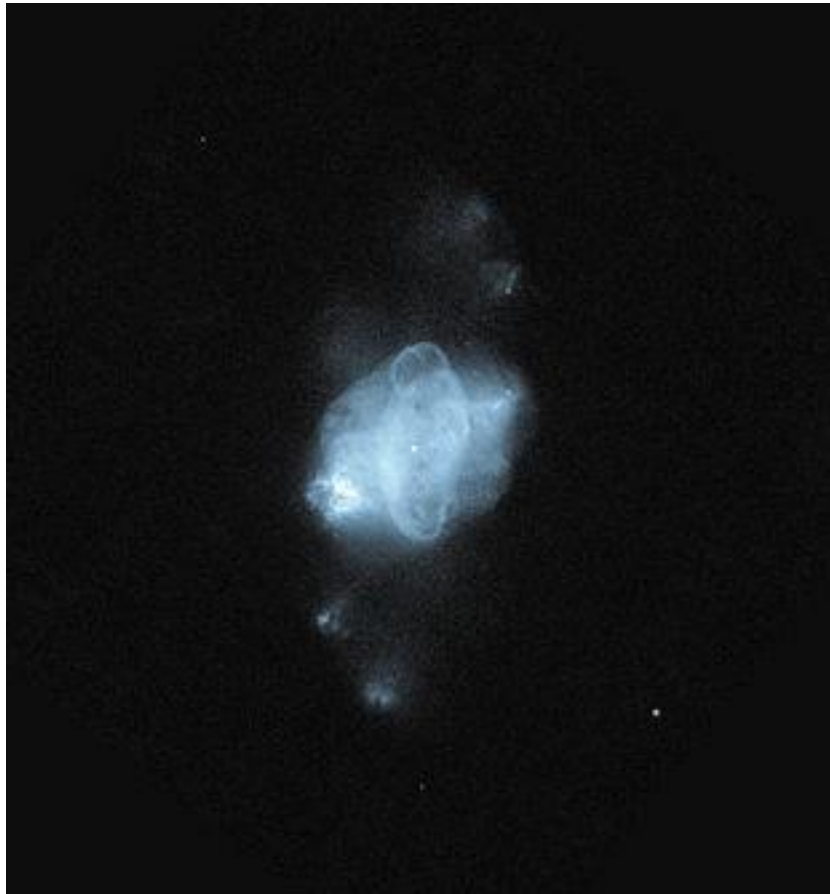
That is, you *should* see it there. That's the rub. J 320 shines at about 12th magnitude, which is bright enough to be seen in an 8-inch telescope trapped under the veil of suburban light pollution. But there are so many stars in the same field that picking out which one is the planetary is a tough job. J 320 only measure 26"x14" across, and indeed is easy to confuse for a close-set double star if viewed at low power, as Jonckheere likely did during his initial discovery. Again, you may need to flash the planetary, if you'll pardon the phrase, by holding a narrowband filter between your eye and eyepiece. Doing so will suppress the field stars, but not the planetary. The culprit will have no choice but to surrender.



Above: J 320 as seen through the author's 8-inch (20cm) reflector.

My notes made through my 8-inch reflector at 56x recall a small, extended object that indeed looked like a pair of close-set stars on the brink of resolution. Switching to 203x, however, quickly dispelled that notion. The planetary's disk, though still fuzzy, was easy to tell apart from a double star. Its central star shines at magnitude 14.4, but evades detection even through my 18-inch, perhaps masked by the nebula's high surface brightness.

Photographs reveal that J 320's ellipticity reflects its lobed structure, which resembles a butterfly in flight. A [study](#) conducted with the Hubble Space Telescope's Wide Field Planetary Camera (WFPC2) in 2003 revealed a more complex internal structure than the typical bipolar planetary. Two pairs of bipolar lobes are clearly visible extending from the nebula's core. One is approximately aligned north-south and the other southeast-northwest. In addition, the Hubble images uncover two pairs of faint knots just outside the center of the nebula. As a result of this complex morphology, J 320 has been classified as not just a bipolar planetary, but rather as an example of a much less common breed known as a polypolar planetary. Try to say that three times fast!

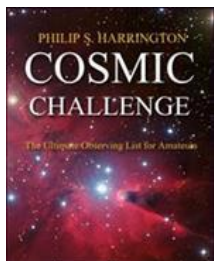


Above: Image of J 320 taken with the Hubble Space Telescope

Finally, be sure to visit the forum thread [The joy of Jonckheere 320, a poly-polar planetary nebula](#) created in November 2015 by CN'er [iainp](#). Viewing J 320 through a 20-inch (51cm) reflector at 546x, his sketch bears an impressive resemblance to the Hubble image.

Have a favorite challenge object of your own? I'd love to hear about it, as well as how you did with this month's test. Contact me through my [web site](#) or post to this month's discussion forum.

Until next month, remember that half of the fun is the thrill of the chase. Game on!



About the Author:

Phil Harrington writes the monthly [Binocular Universe](#) column in [Astronomy](#) magazine and is the author of 9 books on astronomy. Visit his web site at www.philharrington.net to learn more.

Observatories and Planetarium

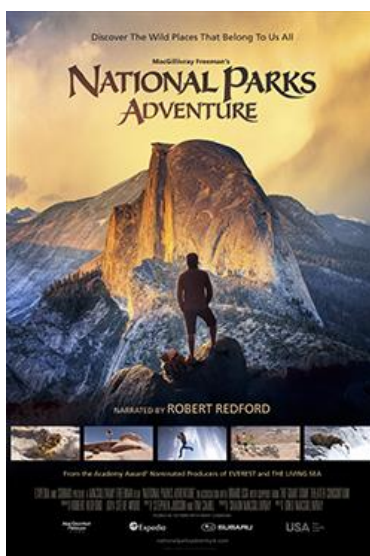


CSI Centennial Observatory / Faulkner Planetarium Herrett Center

Event	Place	Date	Time	Admission
Twin Falls Parks & Recreation "Cabin Fever Day" Solar Viewing	Centennial Observatory	Saturday, January 5 th , 2019	11:00 AM to 2:00 PM	FREE
Telescope Tuesday	Centennial Observatory	Tuesday, January 8 th , 2019	6:30 to 9:00 PM	\$1.50 or free with Faulkner Planetarium admission
Monthly Free Star Party	Centennial Observatory	Saturday, January 12 th , 2019	6:30 PM to midnight	FREE
Total Lunar Eclipse	Centennial Observatory	Sunday, January 20 th , 2019	7:30 PM to 12:30 AM	FREE
Telescope Tuesday	Centennial Observatory	Tuesday, January 22 nd , 2019	6:30 to 9:00 PM	\$1.50 or free with Faulkner Planetarium admission

College of Southern Idaho Campus Twin Falls, ID Faulkner Planetarium / Show Times

<http://herrett.csi.edu/astronomy/planetarium/showtimes.asp>



[Now Showing](#)

About the Magic Valley Astronomical Society

Magic Valley Astronomical Society
550 Sparks St.
Twin Falls, ID

The Magic Valley Astronomical Society (MVAS) 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.

In partnership with the Centennial Observatory, Herrett Center, College of Southern Idaho - Twin Falls; we hold regularly scheduled monthly meetings and observation sessions, at which we share information on current astronomical events, tools and techniques for observation, astrophotography, astronomical computer software, and other topics concerning general astronomy. Members enthusiastically share their telescopes and knowledge of the night sky with all who are interested. In addition to our monthly public star parties we hold members only star parties at various locations throughout the Magic Valley.

MVAS promotes the education of astronomy and the exploration of the night sky along with safe solar observing through our public outreach programs. We provide two types of outreach; public star parties and events open to anyone interested in astronomy, and outreach programs for individual groups and organizations (e.g. schools, churches, scout troops, company events, etc.), setting up at your location. All of our outreach programs are provided by MVAS volunteers at no cost. However, MVAS will gladly accept donations. Donations enable us to continue and improve our public outreach programs.

Membership is not just about personal benefits. Your membership dues support the work that the Magic Valley Astronomical Society does in the community to promote the enjoyment and science of astronomy. Speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs just to name a few of the programs that your membership dues support.

Annual Membership dues will be:

\$20.00 for individuals, families, and \$10.00 for students.

Contact Treasurer Jim Tubbs for dues information via e-mail: jtubbs015@msn.com

Donations to our club are always welcome and are even tax deductible. Please contact a board member for details.

Membership Benefits:

Lending Telescopes: The society currently has three telescopes for loan and would gladly accept others please contact President Robert Mayer, for more information on these and other benefits.



Telescopes are an individual thing and not practical for public use. However, everyone should have the experience of a good look at the moon for at least 5 minutes in their life time. It is a dimension and feeling that is unexplainable. Pictures or TV can't give this feeling, awareness, or experience of true dimension. A person will not forget seeing our closest neighbor, the moon. Norman Herrett in a letter to Dr. J. L. Taylor, president of the College of Southern Idaho, Twin Falls, ID, USA.