Established in 1995 as a non-profit organization, the Northern Colorado Astronomical Society is dedicated to promoting the art and science of astronomy, and encouraging and coordinating activities of amateur astronomers. The society meets the first Thursday of each month to discuss interests and experiences in the universal world of astronomy. Monthly meetings are free, open to the public, and feature lectures from professionals in the field.

NCAS OFFICERS
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FEBRUARY NCAS MEETING
Date: Thursday, February 1, 2018
Time: 6:15 pm
Location: Otterbox Digital Dome Theater
Fort Collins Museum of Discovery
408 Mason Ct., Fort Collins
Speaker: Dr. John Williams
Topic: Electric Propulsion on Satellites and Spacecraft

Abbreviated Abstract: The use of electric propulsion (EP) on satellites and spacecraft has become commonplace over the past 20 years. The most efficient systems utilize ion and Hall thrusters that range in power from 200 W to 5 kW. This talk will discuss the physics and technology associated with ion and Hall thrusters and showcase some of the recent research being conducted at CSU. The presentation will include many beautiful photographs of the plasmas that are created during the operation of EP devices.
THE PRESIDENT’S SCOPE

A brief note from me, Ann Donoghue, your newly elected president. I’m a relative newbie to astronomy, and definitely an amateur. I joined the club in late 2009. I own a we telescope, a good pair of binoculars and a keen sense of curiosity and wonder. My background is in the biological sciences (ask me about parasitology!) - physics and calculus were simply a means to acceptance to veterinary college; astronomy was definitely not a course requirement. When I’ve been to our outreach events, I felt more like an attendee than a leader. I try to attend as many monthly meetings as possible; the speakers are always good, the science fascinating and I learn something every time! I guess what I’m saying is, this club has been an terrific way for me to explore astronomy with some really incredible astronomers, even though I’m but a curious observer with no formal astronomy training.

This club has grown exponentially since I joined, many new members are amateurs like me. Our club’s strength is its outreach - to the public and to each other. I’d like for us to get to know each other a bit better, and plan to encourage interaction before and during our business meetings. I hope newbies and experienced members will have more ways to explore the sky together.

As Jack Horkheimer said, at the close of his Star Gazers show each week, “Keep looking up”!

NEWS OF THE NORTHERN COLORADO ASTRONOMICAL SOCIETY

DUES ARE DUE

Time to pay the 2018 membership dues. The easiest way to pay is online at http://NoCoAstro.org/join. The dues are $20 for the year, prorated for those joining after March 31. As a reminder, membership automatically enrolls you in the Astronomical League (along with their quarterly publication, The Reflector). You receive discounts on Sky & Telescope and Astronomy magazines. You can borrow any of the NCAS telescopes and resources, and of course much, much more.

NCAS Loan Items

Items belonging to the club may be borrowed at no cost by NCAS members in good standing. New members (less than 6 months) need approval from a club officer to borrow some high-valued items. The list of items and loan process can be reviewed on the NCAS web site HERE.

JANUARY MEETING NOTES

Carla Johns

Trevor Moriairty began the meeting promptly at 6:15. He thanked NCAS for the opportunity to serve as President the past 2 years. There are currently 94 paid members (thru Jan’18 or Jan’19). New member(s) in the last month: Lauren daCunha and Joseph Doyle

Charlie Davis gave a Treasury update. NCAS has $3752.45 in our account to date. Annual membership dues are $20.00. We have 94 current members. Trevor Moriairty was excited about the possibility of reaching 100 members in 2018.

Greg Halac and Trevor Moriairty gave the December outreach report. NCAS had two events scheduled: Devil’s Backbone, 12/15, lasted 1.5 hours with 17 enthusiastic attendees despite winter temperatures; and Fossil Creek, 12/23, cancelled due to adverse snow and cold.

In regards to elections, there was a single nominee for each office and all were voted on and approved.

- President - Ann Donoghue
- Vice President - Greg Halac (will continue for another year)
- Treasurer - Charlie Davis (will continue for another year)
- Secretary - Carla Johns (will continue for another year)

Greg Halac and Trevor Moriairty were excited to announce the club has a newsletter editor, Patrick Fitzhorn. And, they asked that club members send him photos and articles. Greg Halac introduced a motion to donate $250.00 for 2018 to the Fort Collins Museum of Discovery. It was approved. Trevor Moriairty introduced our speaker for the evening, Andy Caldwell, professor at Front Range Community College. Andy gave a fun and comprehensive talk titled “Meteorites: Old Rocks, New Discoveries.” He passed around meteorites and had us take an online quiz at the end through Kahoot.

Continued on Page 3
**Call for Volunteers**

Greg Halac  
Member volunteers are always appreciated at outreach events. (NCAS members are welcome to attend all outreach events, including “private” events.) Even if you don’t bring a telescope, you can really improve our public interactions by:  
- talking with people about astronomy  
- sharing views with binoculars  
- discussing the constellations (eg, mythology in your culture-of-choice)  
- answering questions about the club  

If you don’t feel “qualified” yet, just hang out with scope volunteers to learn by listening in and enjoying views thru the telescopes. (That’s how all the scope volunteers learned ...) We do maintain a separate email list for volunteers which covers event logistics details. Please send an email to outreach@NoCoAstro.org if you’d like to be added to that list.

**NOTE:** If you do join us at a stargazing event, dress VERY warmly. A “rule-of-thumb” is to dress like you’re going out in temperatures 20°F below the actual temperature.

**Contributions to the Newsletter**

Please send articles, information, reviews, news, astrophotos, etc. that are of interest to NCAS members. Desired contributions include, but are not limited to:

- Reports on NCAS outreach activities  
- Descriptions of upcoming NCAS events including calls for volunteers  
- Announcements of local and regional events of interest to members  
- Photos of members, events, outreach activities, astro-photos...  
- Descriptions of star parties, private or public viewing sessions, tours of observatories or planetariums and other activities of general interest.

Of special interest are photos taken at events so that all might share in these outreach activities. For photos, please include your name, telescope, mount, camera, and any special techniques or methods worthy of note. Please send all contributions to the Newsletter Editor.

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**Our Night Sky In February**

In this newsletter you’ll find times when one might see a bright spark moving in the northern Colorado night sky – the Sun’s reflection off either the International Space Station or an Iridium communications satellite (called an Iridium flare). I enjoy seeing these ethereal diamonds – in fact, they’re almost artistic. That got me wondering: is art already in space? Art has flown in space aboard satellites, the shuttles, and so on, but are there examples of art actually IN space? Well – yes.

Just this January, spaceflight startup Rocket Lab launched three commercial satellites into space. Hitching a ride on their Electron rocket was the “Humanity Star,” a 3’ wide carbon fiber geodesic polyhedron made up of 65 triangular reflective panels. Plus, it spins. Rocket Lab believes that the Sun’s reflections will make this the brightest object in the night sky. Their goal is to create: “a shared experience for all of humanity.” You can follow the track of the artificial star on their website HERE. They are quick to say that this is just orbital eye-candy with no scientific or engineering purpose.

Sometime mid-year, artist Trevor Paglen (in partnership with the Nevada Museum of Art and SpaceX) will launch a satellite that will place his sculpture – “Orbital Reflector” – a 100 foot long inflatable elongated diamond-shaped reflective balloon, into low Earth orbit. Paglen and the museum have raised over $70,000 in donations through Kickstarter – about 5% of the $1.3 million total project budget. The Nevada Museum of Art is guaranteeing the remainder.

In early 2019 a Japanese firm will launch a satellite specifically to release small pellets that, during reentry, will burn “so bright that anyone within a 100 kilometer radius of Hiroshima will be able to see them.” The company, ALE, will mix science and art to “get people interested in space exploration, as well as the STEM fields” so says Lena Okajima, founder and CEO of ALE. One might say that it will be a flash in the atmospheric pan.

Whether or not such are good, bad, or somewhere on the slippery slope, I doubt we’ll see many of these. Taking the “many” first, I suspect not many artists have a $1.3 million dollar bill ready to burn to create the thrust necessary to launch their art into space. Now, about the “see.”

To resolve a specific symbol (like a golden arch) makes recognizable art in space a tad impractical. The resolving angle of the human eye is about 0.02 degrees or so. I’ll ignore the low orbits (say 300 miles up) since after a couple of orbits it’ll burn up and be gone anyway. Let’s look at low Earth orbits (1,200 miles) and thus more permanence of display. To figure out how large something would be to resolve it at that orbital height requires a bit of trigonometry: \( \tan(\theta) = \frac{O}{L} \), where \( \theta \) is the eye’s resolving angle, \( O \) is the distance to orbit, and \( L \) is the minimum length the object must be to resolve it by eye. Solving, \( L \approx 2,200 \) ft.

So to resolve a shape by eye at low Earth orbit, the length would need to be about

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*The Hubble Space Telescope drifts 353 miles (569 km) above the Earth's surface.*  
http://photojournal.jpl.nasa.gov/catalog/PIA18165
Our Night Sky in February

Continued from page 3

1½ mile – that’s 6 ISS’s linked end to end, or 8 football fields, or 2 Empire State buildings. The upshot? If I launch the entire Empire State building into low Earth orbit you won’t be able to recognize it as anything but a fuzzy spark, assuming you even see it.

Is it art if no one sees it? Or if it’s pin-prick reflection looks slightly brighter or dimmer than other moving pin-pricks of light? I’ll leave that to art philosophers. Having something else up there to look at along with the ISS and other satellites, iridium flares, meteors and what-not doesn’t seem too bad. Especially if Lena Okajima is right and it does get people interested in space and the STEM fields. If I’m wrong and this does become common though, I won’t have to worry about seeing a mile-high x 1½ mile-wide golden arch arcing high through the early morning sky reminding me to stop by for a celestial sausage, egg and cheese sandwich – I sleep in late.

• NCAS will host a total lunar eclipse event at Fossil Creek Reservoir starting at 04:45 am on January 31st.
• February is a “black moon” month since it will not have a full moon.
• Castor and Pollux of the constellation Gemini cross our local meridian at about 10pm Feb 14. Castor is actually 3 pairs of binary stars – with all six locked in a complex gravitational dance. There’s a good animation of this space-time entanglement HERE. Resolving Castor into Castor A (mag 1.9) and B (mag 3.0) – which are themselves binaries – is a good test of your optics and collimation - and a very pretty sight.
• The triple crown of open star clusters will make good viewing in February – M36 (the pinwheel cluster), M37 and M38 (the starfish cluster). All three sit in the constellation Auriga. M37 is the best of the lot in my opinion. In his book Burnham’s Celestial Handbook (vol 1, pg 293), Robert Burnham Jr. notes that Charles Messier himself was apparently the first to observe M37. He also writes that: “the great observer Smyth called it ‘a magnificent object, the whole field being strewed as it were with sparkling gold-dust; it resolves into infinitely minute points of lucid light.’” M37 contains over 500 named stars with 150 at or below mag 12.5. Given this attention, I’ve often wondered why M37 does not have a common name as do the other two clusters.
• If you’ve a mind to hunt, dwarf planet Ceres (mag 6.9) is a well-placed target in the late-Jan and Feb skies. You’ll need an ephemeris and some good tracking skills to find and stay on it since its RA and DEC are not fixed in the celestial sphere. Secondly, its albedo is only 0.09 (in comparison, Earth has an albedo of about 0.30) meaning just 9 percent of incident light is reradiated into space. Here is the position on Feb 1st: RA 09h 12m 31s; Dec 30° 11’ 21”
• We should see earthshine illuminating the shadowed side of the waxing Moon Feb 16-19. The moon will be in the west with best time to view around sunset or a bit after. For me, binoculars afford the best views. We should also see earthshine on the waning moon from Feb 8-10 or so.

Patrick Fitzhorn

Astronomy in Northern Colorado

Boulder Astronomy and Space Society

Meetings are hosted on the UC campus at the Fiske Planetarium. Open to students and the public.

Longmont Astronomical Society

Promotes amateur astronomy through monthly meetings, star parties and public observing sessions. Meetings are open to the public.

Denver Astronomical Society

Promotes understanding of astronomical phenomenon through monthly meetings, outreach and activities. Meetings are held at DU’s historic Chamberlin Observatory.

Chamberlin Observatory

DU’s historic Chamberlin Observatory features its prized 1894 Alvan Clark-Saegmuller 20-inch refracting telescope, the 35th largest refracting telescope in the world. The observatory is listed on the National Register of Historic Places and was renovated inside and out during 2008.

Little Thompson Observatory

This all-volunteer observatory, on the grounds of Berthoud High School, features the historic Mt. Wilson 24-inch f/16 Nasmyth-Cassegrain (reconfigured to an f/4 Newtonian) telescope. It also houses an 18” f/14 Tinsley classical Cassegrain with a focal length of 211’.

Continued on page 5
Astronomy in Northern Colorado

Continued from page 4

Madison-Macdonald Observatory

Tucked between the old University Greenhouses and the Insectary at 1251 East Drive, this CSU observatory first opened in the 1960s. The main instrument is a 16” Schmidt-Cassegrain catadioptric telescope.

Estes Park Memorial Observatory

A community resource dedicated to fostering scientific education of children in Estes Park, and serving as an educational venue for the community and visitors. The observatory features a 16” Ritchey-Chretien reflector on a Paramount ME II mount.

The Stargazer Observatory

Front Range Community College operates this observatory in a partnership with Observatory Village homes. It has a 14” Celestron C14 Schmidt-Cassegrain catadioptric telescope on a Paramount ME mount.

Summers-Bausch Observatory

Operated by the Department of Astrophysical and Planetary Sciences at CU Boulder. Housing multiple telescopes, their primary instrument is a 24” Boller & Chivens f/8 Cassegrain installed in 1973.

Astronomy News

The Rocky Mountain Star Stare is scheduled for June 13-17. It’s sponsored by the Colorado Springs Astronomical Society and will be held at their 35 acre preserve “Starry Meadows” at Gardner, CO. There is a registration fee.

The Astronomical League ALCON 2018 convention is scheduled for July 11-14 at the Hilton Hotel and Convention Center near the Minneapolis-St. Paul airport. The Eagle Lake Observatory will be showcased.

The 232nd meeting of the American Astronomical Society will be held in Denver, CO June 3-7, 2018 at the Sheraton Denver Downtown on the 16th Street Mall. The 231st meeting of the AAS was held January 7-12, 2018 in Washington, DC and had an attendance of about 2,500 astronomers and other space scientists.

Astronomers at the National Radio Astronomy Observatory recently confirmed the presence of an aromatic organic molecule – benzotriole (C₉H₈CN). Aromatic molecules contain a complex hexagonal ring of carbon atoms. It was first detected at the NSF’s Green Bank Telescope in an interstellar gas cloud in the Taurus molecular cloud (TCM-1). Although astronomers have long known that aromatic molecules exist in space, this is the first time a specific aromatic molecule has been identified.

In January, a group of NASA scientists showed that autonomous spacecraft would not need Earth contact to find their way through the stars. An X-ray guidance system using pulsars, timed to the millisecond, was successfully tested. Jason Mitchell at NASA’s Goddard Space Flight Center said: “This demonstration is a breakthrough for future deep space exploration.”

Dan Garisto, publishing in Science News in January, described worriesome increases in the triad of pollutants negatively effecting Earth-based astronomy, (1) space debris, (2) radio interference and (3) light pollution. The latter, light pollution, is especially troubling with the rapid growth in installation of broad-spectrum LED lights. The blue-rich emission scatters more easily, thus worsening sky-glow. He describes some technology solutions to these technology-created problems, but is not optimistic.

NASA’s $10b James Webb space telescope recently passed a crucial milestone by completing vacuum chamber testing at the Johnston Space Center. It is still on target for a launch in 2019. Interestingly, the Webb will NOT orbit the Earth. It will be inserted into the Sun-Earth L2 Lagrange point 1.5 million km from Earth. It’s 6.5m ~ f/20 primary mirror will provide 5½ times the reflecting area of the 2.4m f/24 mirror of the Hubble. The Webb is the first of four telescopes planned for L2 insertion between 2019 and 2028.

NASA recently combined infrared data from the Spitzer space telescope with visual data from the Hubble to create an astounding and hauntingly beautiful three-dimensional fly-through movie of M42 – the Orion Nebula. You can view the video HERE.

Dark matter and dark energy, mathematically elegant solutions to very difficult astrophysics problems borne of astronomical observations, still defy attempts at physical characterization by the world’s astrophysicists. Since these two concepts comprise a whopping 95% of the universe, they loom large as current-day scientific enigmas. One suspects there is a Nobel prize or two waiting for the person or group that lifts the dark veil! NASA has a good website HERE that explains what we know now in layman’s terms.

The Chinese Tiangong 1 (Heavenly Palace) manned space station is scheduled to reenter the Earth’s atmosphere in a blaze of glory sometime middle to late March. It’s large – 18,000 lbs and 34’ x 11’. The space station was abandoned June 2013 and this is a planned, but uncontrolled, reentry. It’s theorized that some of the station, for example the engines, might not burn up completely on reentry. Exact time and location of reentry cannot be predicted with accuracy due to atmospheric density variation and a host of other variables. The Aerospace Corporation hosts a website HERE with info on the reentry.

Pluto and Charon

Reprint from the March 2001 NCAS Newsletter. Recall that during this time Pluto was still considered a planet, before the IAU demoted it to minor-planet status in August 2006.

In 1905, Percival Lowell launched the search program which finally culminated in Pluto's discovery. The planets Uranus and Neptune appeared to stray from their predicted courses, and an unknown planet was presumed to be responsible. The successful search for Neptune was born of such an analysis, conducted independently by Leverrier and Adams, and executed by Galle at Berlin on his first night to search. Lowell had national notoriety for his high profile studies of Mars. He had established a private observatory in Flagstaff, Arizona, to pursue the idea that Mars was crisscrossed with canals, constructed by a Martian civilization. The reality of the canals was challenged in Lowell's time, but remained on official US maps of Mars until spacecraft retired them in the 1960's. Lowell Observatory was known for its Mars observations, and the prospect of discovering a planet was irresistible. Lowell and William Pickering conducted 8 searches from 1905 to 1919, and accumulated over 1000 photographic plates. Their tedious search produced no new planet. Lowell was
discouraged, and in 1919 died of a stroke. His widow brought a suit to collect from his estate, and legal wrangling drained the family fortune. The observatory managed to install a new 13" refractor camera. Vesto Slipher became the new director, and noticed letters and drawings sent by a Kansas farm boy. Clyde Tombaugh started observing in 1909 when his uncle loaned him a 3 inch telescope. His family moved to Burnett, Kansas in 1922. He enjoyed football, track and field, and studied Latin and Astronomy. He could not afford college, and had not been away from home. Tombaugh was invited to Arizona for the planet search. The camera was not ready when he arrived, so he was assigned more tedious chores as a tour guide and shoveling the abundant snow in Flagstaff. In April 1929 the camera was ready, though Slipher was reluctant to turn Tombaugh loose with it. Their search routine was guided by a realization that their target would be moving quite slowly against the starry background. This would allow them to discard asteroids and comets in their search. At the predicted distance, the object’s apparent motion would be dominated by the effect of Earth’s orbital motion. The planet would appear to move most rapidly when opposite the Sun, and its direction of motion would be retrograde, from East to West. At best, they estimated the planet would be 1/15 as bright as Neptune. Exposures were over an hour. Each field was photographed a few nights apart. Tombaugh quickly grasped Slipher’s technique. A binocular machine was used to view the plates, alternately blinking one or the other, while the observer looked among 50 to 90,000 images on the plate for a dot jumping by a few mm. He churned through the tedious cycle of photographing at night, processing plates, viewing plates, and a little sleep before the next round. The plates revealed 29,000 galaxies, 1800 variable stars, 2 comets. Asteroids were quickly eliminated, as they jumped 10x too much. There were frustrating plate defects. On February 18, 1930, Tombaugh saw a pinprick jump, about 3-4 mm. A third plate was checked and confirmed an object. Tombaugh took 45 minutes to be sure, then found Slipher. “I have found your Planet X.” There were immediate concerns. No planetary disk was visible. The object was 1/250 fainter than Neptune, over tenfold dimmer than predicted. Additional confirmation images were sought, based on predictions from plates taken on January 21-29. On February 18, clouds prevented imaging. On February 19, plates were shot, and processed on the 20th, confirming motion as predicted. Lowell astronomers held their news until March 13, 1930, the 75th anniversary of Percival Lowell’s birth. The planet was dubbed Pluto for the god of the Underworld. The orbit is unusual, with 25% eccentricity and rather high inclination. Pluto is carried inside Neptune’s orbit between 1979-99, but they never approach each other due to a 2:3 orbital resonance. Pluto remained mysterious for years, but the ceiling on its mass shrank as it was observed. The ominous trend was humorously projected to total disappearance at a future date. Photometry revealed a 6.39 day periodicity in brightness variations. The magnitude was too much for surface markings. Precise repetition implied little or no atmosphere. The answer came in 1978, when Jim Christie was given 18 Pluto photographs to measure. It was casually mentioned that some plates appeared defective, with Pluto out-of-round. He realized that Pluto was the only asymmetrical object on the plate, and that the asymmetry occurred periodically. Review of plates in 1970 confirmed the evidence that Pluto had a companion, to be dubbed Charon, which was about half its size. Leif Andersson, a Ph.D. candidate at the University of Indiana, determined that Charon was about to begin a series of eclipses with Pluto, an opportunity which only comes twice in Pluto’s 248 year solar orbit. Timing of photometry during the eclipses allowed much more precise determination of the pair’s characteristics. Charon is estimated to be about 1/10 Pluto’s mass, by far the largest proportionally in the Solar System. The barycenter of the pair lies between Pluto and Charon. Their rotation is tidally locked, so an observer on Pluto would always see the same face of Charon. See Alan Stern’s 1998 book, Pluto and Charon, for more details.
Iridium Flare Schedule for Northern Colorado

<table>
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<tr>
<th>Date</th>
<th>Brightness</th>
<th>Alt</th>
<th>Az</th>
<th>Satellite</th>
<th>Distance to flare centre</th>
<th>Brightness at flare centre</th>
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<td>Feb 20, 18:11:47</td>
<td>0.3</td>
<td>46°</td>
<td>179° (S)</td>
<td>Iridium 54</td>
<td>37 km (E)</td>
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</tr>
<tr>
<td>Feb 21, 06:30:49</td>
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<td>59°</td>
<td>6° (N)</td>
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<tr>
<td>Feb 23, 06:18:50</td>
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<td>55°</td>
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</tr>
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<td>53°</td>
<td>9° (N)</td>
<td>Iridium 50</td>
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<td>41°</td>
<td>135° (SE)</td>
<td>Iridium 80</td>
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</tr>
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<td>44°</td>
<td>138° (SE)</td>
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<tr>
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<td>51°</td>
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<td>48°</td>
<td>8° (N)</td>
<td>Iridium 83</td>
<td>25 km (E)</td>
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<tr>
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<td>143° (S)</td>
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<td>145° (SE)</td>
<td>Iridium 41</td>
<td>13 km (E)</td>
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Predictions can be obtained from [http://www.heavens-above.com/](http://www.heavens-above.com/)

**Warning:** Prediction accuracy degrades towards the end of the month.
What’s Out Tonight?
February 2018 Sky Chart

Instructions
Face North, South, East or West, then rotate the chart so your direction is at the bottom. Match the biggest stars on the chart to the brightest stars in the sky. The center of the chart is the top of the sky.

Planets
The position of any visible, naked-eye planet is indicated for the 15th of the month with a size matching its magnitude. If the planet moves significantly during a month, other positions will be noted with dates. The ECLIPTIC is the path of the Sun through the sky but the planets and Moon move along it, too. It passes through the constellations of the zodiac.

February 2018 Planet Notes
Venus, at magnitude -3.6, sets in the west about 45 minutes after the Sun. Mars, at magnitude +1.0, in Ophiuchus, rises in the east 30 minutes after Jupiter. Jupiter, at magnitude -2.1, in Libra, rises in the east around 1 AM. Saturn, at magnitude +0.6, in Sagittarius, rises in the east about 3 hours before the Sun.

Distances planets are from Earth the 15th of this month:
Venus: 157,000,000 miles, Mars: 143,000,000 miles
Jupiter: 490,000,000 miles, Saturn: 992,000,000 miles.
## FEBRUARY 2018

<table>
<thead>
<tr>
<th>SUNDAY</th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
<th>SATURDAY</th>
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<tr>
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<td>30</td>
<td>31</td>
<td>1</td>
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</table>

- **Dwarf planet Ceres is at opposition @ 23:21 & well placed for observation**

<table>
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<tr>
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</table>

- **Asteroid 2002 AJ129 (0.7m wide) passes Earth at a distance of 2.6m miles**
- **Globe at Night**

<table>
<thead>
<tr>
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<th>16</th>
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<table>
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<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
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</thead>
</table>

- **Dark Sky Weekend**
- **DAS**
- **Kline Dark Site**
- **Deer Trail, CO**
- **All day event**

<table>
<thead>
<tr>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>1 Mar</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
</table>

- **The Crow Moon**
- Winter’s last full moon

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**please send upcoming astronomy events/items/activities to:** objview@NoCoAstro.org