IO - March 2016

Issue 2016-03
Eugene Astronomical Society

www.eugeneastro.org

Eugene Astronomical Society
Annual Club Dues $25
President: Diane Martin 541-554-8570
Secretary: Jerry Oltion 541-343-4758
Additional Board members:
Jacob Strandlien, John Loper, Mel Bartels.

PO Box 7264
Springfield, OR 97475
www.eugeneastro.org
EAS is a proud member of:

The Astronomical League
The World's Largest Federation of Amateur Astronomers

Next Meeting Thursday, March 17th

A Journey to the Outskirts of the Universe

by Larry Deckman

At our March 17th meeting Larry Deckman will present his beautiful and awe-inspiring slide show "A Journey to the Outskirts of the Universe." This program will take you beyond Earth's atmosphere until you're seeing our home planet from 150 miles up. Ascending higher, you'll reach the Moon and the planets of our solar system. Then it's off to the stars and clouds of the Milky Way galaxy, followed by the clusters of galaxies at the edge of the universe. Illustrated entirely with beautiful photographs from NASA and the world's great telescopes, this 60 minute journey to the outskirts of the universe is genuinely consciousness expanding.

Before Larry's program, the work crew who have been building the club's new telescope will give a progress report (with telescope on hand!) and Mel Bartels will show us his 25" mirror in progress.

At our meetings we also encourage people to bring any new gear or projects they would like to show the rest of the club. The meeting is at 7:00 on Thursday, March 17th at the Science Factory. Come a little early to visit and get a seat before the program starts.

Next First Quarter Friday: March 11th

Our February 12th First Quarter Friday Star Party was clouded out, at least at first. Rain cascaded down by the bucketful just after 6:00, but then after most everyone gave up and went home the sky cleared up and Bill and Mercedes and a few others were able to enjoy the view through Bill's binoculars. So it wasn't a wildly successful star party, but at least a few people didn't get skunked.

Saturday's backup star party was completely clouded out.

Our next First Quarter Friday is on March 11th. First Quarter Fridays are laid-back opportunities to do some observing and promote astronomy at the same time. Mark your calendar and bring your scope to the College Hill Reservoir (24th and Lawrence in Eugene) and share the view with whoever shows up. Here's the schedule through 2016. Star parties start at dusk or 6:00, whichever is later.

March 11th (12.8% lit)	April 15 (70% lit)	May 13 (54% lit)
June 10 (38% lit)	July 8 (23% lit)	August 12 (72% lit)
September 9 (56% lit)	October 7 (39% lit)	November 4 (24% lit)
December 9 (79% lit)		

February 18th Meeting Report

At our February 18th meeting Salem club member Mike Conley gave us a presentation about the CATE project to photograph the solar corona during the entire extent of totality during the 2017 solar eclipse. He needs volunteers to operate nine photographic stations across the state of Oregon to image the corona. Equipment will be supplied; he just needs someone who will observe from the right spot and contribute their video to help create a continuous movie of the solar corona for the hour and a half that the eclipse crosses North America. It's an ambitious project with the aim of doing some real citizen science. If you're interested in helping out, contact Mike at <astroconleyATcomcast.net>

After Mike's presentation, Jerry Oltion gave a quick report on the recent detection of gravitational waves at the LIGO observatories. See the article on p.4 for more about that.

After those two short presentations we were treated to a full-dome planetarium show called "Cosmic Castaways," which described what happens to individual stars and their solar systems during galactic collisions. That was a fascinating show, especially when they showed a simulated collision, then rotated it sideways and showed a real photograph that exactly matched the simulation. The take-away message was kind of melancholy: during galactic collisions some stars get tossed out into intergalactic space where they have almost no companions. From their skies, an observer would only see distant galaxies; almost no individual stars would be visible to the naked eye. So be thankful it'll be 5 billion years before that happens to us.

The planetarium show was given to us in thanks for our support of the planetarium in the past year, with the donation of a mount for their solar scope and various other hardware to get it up and running.

And after the planetarium show, we were invited to tour the exhibit space. The theme at the moment is "Moneyville," and is all about the various kinds of monetary systems in the world, how money is made and counterfeited, how it's used (and abused), etc.

Also on display in the exhibit hall are winning photos from the Nikon Small World photo contest, featuring different subjects imaged through microscopes.

While some of us were touring the exhibit hall, several others were helping a young girl with a telescope she brought in for help in learning how to use. We had fun going through the steps for using an equatorial mount and a Newtonian scope, and hopefully didn't confuse her too badly.

We had many new visitors this time, nearly filling the planetarium. Some were undoubtedly there just for the free planetarium show, but some were genuinely interested in our club, too. We got two new memberships from guests who had attended previous meetings, plus another two new members signed up by mail before the meeting. We're growing by leaps and bounds — up to 59 members now with a lot of year left for that to increase even more. That's partly because we've been so active in our online outreach and partly because of the great meetings we've been having. Next month promises to be just as fun, so mark your calendars and join us again on March 17th.

Telescope Lending Library

The EAS has several telescopes available for members to borrow. Check out the telescope lending page on our website to see the many scopes in our lending program, and contact Frank Szczepansky, our lending coordinator, to arrange to check out one of these excellent scopes.

Frank can be reached via email at frszcz at gmail.com or by phone at 541-556-3427.

You can also contact Jerry Oltion at j.oltion at sff.net or 541-343-4758.

For ongoing discussion of astronomical topics and impromptu planning of telescope outings, join the EAS mail list at http://eugeneastro.org/mailman/listinfo/general_eugeneastro.org

Five-Planet Alignment

For the last month or so, early risers have been treated to a great display of planets strung along the ecliptic. Attempts to photograph them, however, have mostly resulted in a bunch of dots as stars complicate the scene, and when the Moon was out it blew away everything else. Our Hawaiian EAS member-in-spirit Cindy Krach captured the event beautifully in a sketch made from the summit of Haleakala, her favorite observing site at 10,000 feet elevation. Her sketch does what photos couldn't: emphasize the planets in the pre-dawn sky and capture the early morning landscape as well. That's Mauna Kea off in the distance.

Earth Hour Saturday, March 19, 8:30-9:30

Earth Hour is an annual worldwide movement designed to increase awareness of the many excesses we subject our poor planet to. One such excess is excess lighting. During Earth Hour, we encourage individuals, communities, households and businesses to turn off their non-essential lights for one hour as a symbol for their commitment to the planet. Earth Hour was started as a lights-off event in Sydney, Australia in 2007, and has since grown to become a worldwide phenomenon. Today, Earth Hour is just part of a massive mainstream effort to address a broad range of environmental issues.

Earth Hour 2016 will be on Saturday, March 19, from 8:30 p.m. to 9:30 p.m. local time wherever you are. Join millions of like-minded people in switching off excess lights, parking our gas-guzzlers, and reading books instead of watching TV.

Gravitational Waves Detected

For the first time since their prediction over 100 years ago, gravity waves have been directly measured. On February 11th, scientists at LIGO, the Laser Interferometer Gravitational-Wave Observatory, released the news that they have detected a pulse of gravitational waves from the merger of two black holes.

This is big news for astronomers. LIGO has brought online a completely new way of looking at the universe, using a completely new type of telescope. For the first time ever we have detected an astronomical event not by its electromagnetic emission but by its gravitational ripples. This achievement promises a new way to study the cosmos, and as with any new method of study, we can expect new discoveries to come of it.

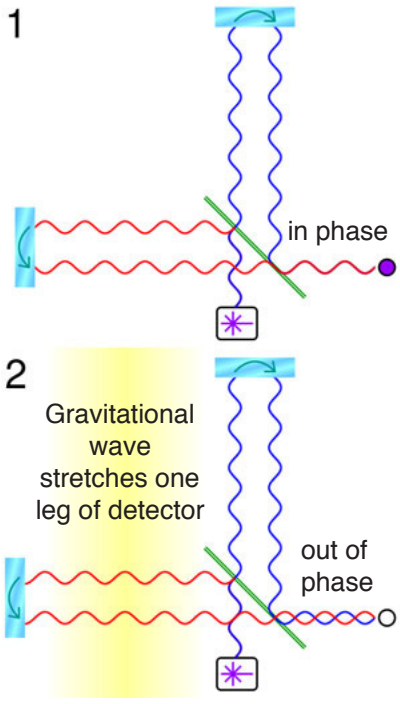


Image: Wikimedia Commons

LIGO is basically an interferometer. It's two interferometers, actually, one in Louisiana and one in Washington. Each one measures the distance down two 4-kilometer pathways set at right angles to each other. When a gravity wave ripples past, one path will stretch and compress slightly — about a thousandth of the width of a proton. That's not much, but it's enough to change the diffraction pattern created by two laser beams reflected off the ends of the pathways. When the detectors note a deviation in the path, they compare their results with the other facility and see if it detected an event, too. If so, and if the event is time-shifted by the few milliseconds that it would take for the gravity wave to pass from Louisiana to Washington (or vice versa), then the observers know the event is truly a gravitational wave and not a simple Earthbound seismic event.

Event number GW150914 on September 14th, 2015, had all the characteristics we've been looking for. Careful analysis of the data shows that it has the signature of two black holes merging. We can even get a fair estimate of their relative masses (36 and 29 solar masses), their distance (1.3 billion light-years), and the amount of energy converted into gravitational waves when they merged (3 solar masses).Given the duration of the signal (1/5 of a second), that means they put out 50 times more energy than the entire rest of the universe during that brief moment. From the lag time between detectors (Louisiana saw it first) we also know that the signal came from the sky's southern hemisphere.

The LIGO experiment has been running since 2002, but in 2010 it shut down for upgrades that increased its sensitivity fourfold. The detection came almost immediately after restarting the more sensitive equipment, while still performing calibration runs. This signal is considered real to a 5-sigma deviation, which is about as certain as a signal can be. This result came so quickly that more seem sure to follow, especially since the data from the first official run have yet to be analyzed fully. Project scientists estimate that one or two more signals as striking as GW150914 may await within that data.

This is just the beginning for gravitational astronomy. LIGO will soon be joined by VIRGO, a gravitational-wave observatory in Italy. Another is under construction in Japan, and talks are under way to create a fourth in India. Plus an orbiting observatory, the Evolved Laser Interferometer Space Antenna, or e-LISA, is on the drawing board.

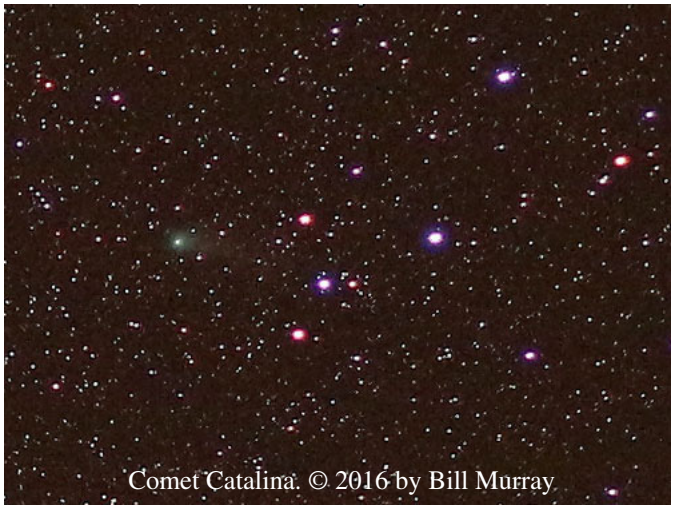
Einstein predicted gravitational waves a century ago, but only now have we been able to build detectors sensitive enough to study them directly. (We have had indirect evidence for years in the form of pulsar spin-down rates, but this is the first direct detection.) This marks the first time we've done so, but certainly not the last. We've just witnessed the birth of gravitational astronomy; there's plenty more to come.

A Good Night Out in February

Seems like we've been waiting months for a good clear night during the dark phase of the Moon. At last on Monday, February 8th, we got our wish. The forecast was good and the sky lived up to the forecast. Eleven of us went up to Eagle's Rest and had a great time. Others viewed from town, Cottage Grove, and even Crater Lake.

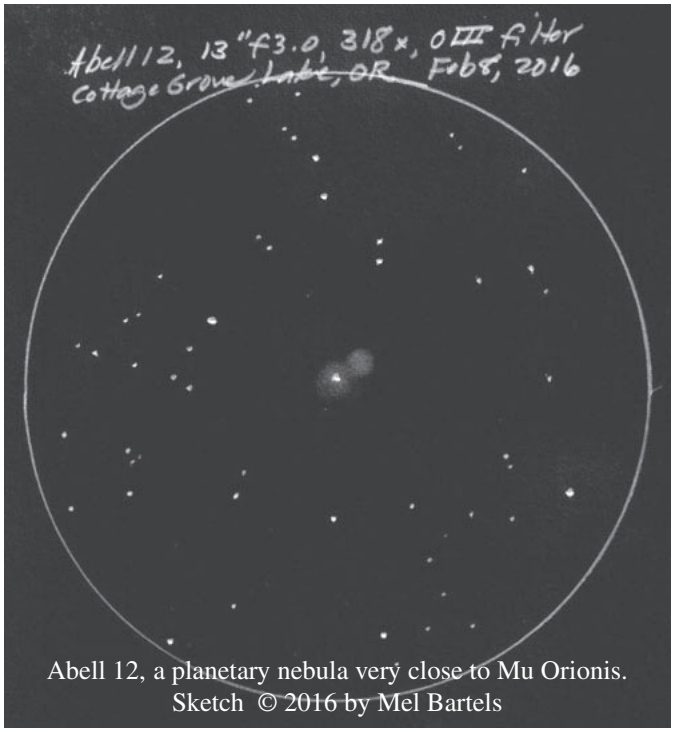
The seeing was a bit soft due to the wind, but the transparency was excellent. The Orion Nebula showed incredible texture, and we were able to see the Horsehead nebula with direct vision. Several people took photos and Mel made a sketch of one of his targets. It was a great night out for everyone!

Bill Basham went on up to Eagle's Ridge to do



Comet Catalina. © 2016 by Bill Murray

The Pleiades with nebula from Eugene..
© 2016 by Alan Gillespie



Abell 12, a planetary nebula very close to Mu Orionis.
Sketch © 2016 by Mel Bartels

Dave Horton captured star trails from Crater Lake.
© 2016 by Dave Horton

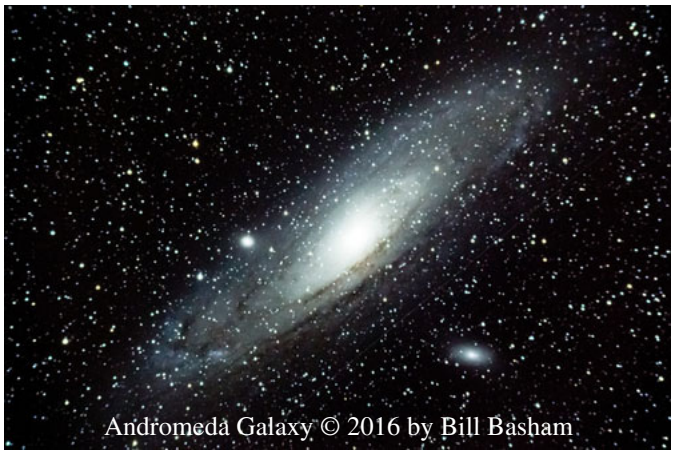
some photography. He wrote a great account of his experience, which we reproduce here to illustrate what dedicated astrophotographers will endure to get that perfect shot:

"It was a little windy when I got there, but the clear sky forecast was for light wind, so I ignored it. I took my new Explore Scientific apochromatic 80mm x 480mm (F6) refractor along with the Celestron autoguider and scope. I got it set up on the Celestron AVX mount fairly easily (only 2 hours :)

"Next I did the polar alignment, which aligns the axis of the mount to the North Celestial Pole (NCP). It's about 0.8 degrees away from Polaris (the North Star) in the direction of Kochab (the brightest star in the Little Dipper). Kochab was almost directly below Polaris, so I knew that Polaris was above the NCP. I had the GoTo computer mount (Celestron AVX) move the scope to point at Polaris, and then adjusted the Polar Alignment so Polaris was centered. I then aligned the mount using 3 stars and checked the accuracy of the Polar Alignment. It was very close.

"The auto-guider lets you get away without perfectly polar aligning. First I pointed at the Andromeda Galaxy, which was still well above the city lights to the West. I found a guide star using an eyepiece in the guide scope, and then replaced the eyepiece with the auto-guider camera. I was then able to lock onto the star I found and start auto-guiding. The auto-guider sends small corrections to the mount to keep the star stationary in the camera. That way, you can do long exposures and the stars will stay round and sharp.

"Unfortunately, the wind didn't obey the forecast and it started gusting pretty strong, around 20 mph or so. Andromeda Galaxy was downwind of me, so at least the wind wasn't blowing into the scope. I started a 10 minute exposure and held my jacket out to shield the scope from the wind a little. After a few tries, I got a pretty decent photo with almost round stars.



Andromeda Galaxy © 2016 by Bill Basham

"The wind kept getting worse, so I packed up and started down the hill at about 10. I stopped at the Eagles Rest clearing and joined the rest of the group, where the wind was much calmer. I thought about setting up the scope again, but Andromeda was already too low to photograph, and it's only possible to go through that 2 hour setup process once a night without destroying brain cells. Fortunately, Jerry had his little 20 inch scope handy. I was especially impressed with M51, the Whirlpool Galaxy through Jerry's scope in the highly transparent skies."

"Then I shifted over to the Orion Nebula almost due south, in the direction of the wind. The wind kept getting stronger, and this time there was nothing I could do to keep the scope from blowing around. The wind turned the telescope into a bottle flute. It was a pretty sound, but not what I had in mind.

"I did get an interesting 10 minute photo of the Orion Nebula. The stars have little spikes on the top and bottom from the wind overpowering the auto-guider, but the Nebula itself is still very beautiful. I'm looking forward to trying again in a few months, the next time the sky clears up.

Orion Nebula © 2016 by Bill Basham

We were all glad that Bill joined us, and happy to share such a great night out under the stars. Thanks, Bill, and everyone else, for sharing your great photos and sketches.

Here's hoping for more clear nights and good company in the next dark phase.

EAS Members Building 14.7" Telescope

Mike Curtin running the drill press

For the past several weekends, various EAS members have been meeting in Jerry Oltion's shop to build a telescope to house the 14.7" mirror that Sam Pitts ground and Jim Jackson bought and donated to the club. They started with the mirror box on January 31st and got it nearly finished in one four-hour session. On February 6th they built the secondary cage. On February 14th they installed the focuser and Telrad and built the spider. On February 21st they installed the spider, built the secondary mirror mount, and glued the secondary mirror to that mount. On February 28th they installed the trusses and got first light through the scope! Everyone is having a blast. Here are some photos of the process.


Jerry Oltion & Colin Miller routing a circle

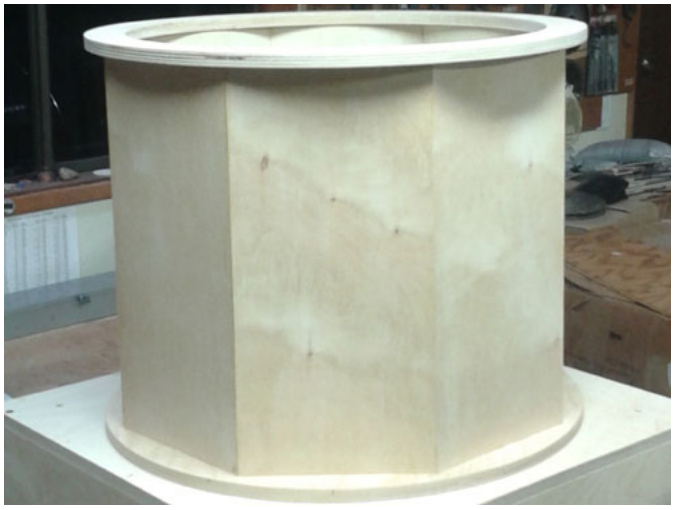

Pam Houston hammering in T-nuts


The finished mirror box


Randy Biederwell and Tim Lanz cutting doorskin panels

Mike Curtin built the truss clamps, and would like to thank Jan Vandertuin of the Center for Appropriate Transportation for the use of his machine shop facilities and Mac Maclean for his assistance in welding. The rest of us would like to thank Mike for doing all that precision machining!

Gluing the doorskin panels together



The finished secondary cage

Everyone watching as Jerry cuts the focuser hole

Tim Lanz's mentoring student Ben Weber pop-riveting

Focuser & finder installed, spider assembly ready to go in

Bob Andersen hacksawing the secondary mount bolt

Andy Edelen, Mike Curtin, and Randy Biederwell installing truss clamps

Putting the primary mirror in place

Proud telescope builders!

Setting the secondary cage on the trusses

First light: looking at a treetop

Observing Highlight: Thor's Helmet

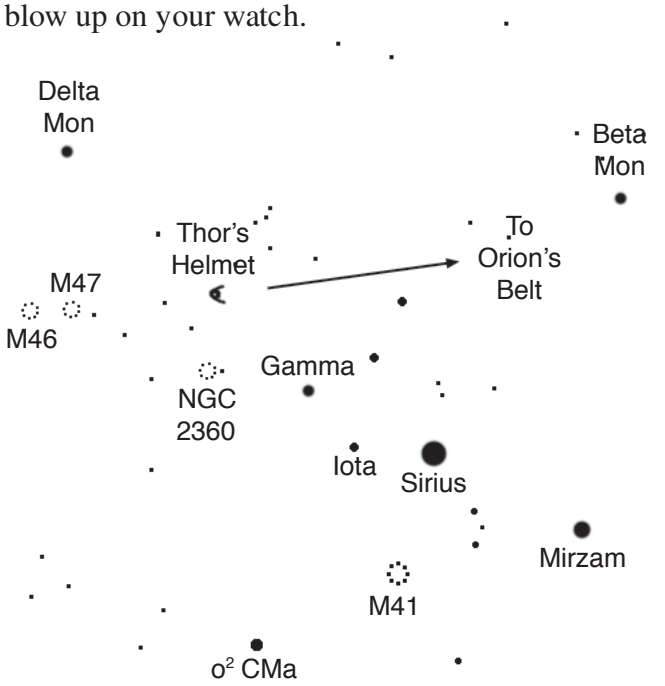
To the southeast of Orion and east of Sirius lie several great sights. Most familiar, probably, are M46 and M47, two bright open clusters that you can spot by naked eye under dark skies. To the northwest of those, however, lies a little-known emission nebula that is well worth tracking down: Thor's Helmet.

Also known as NGC 2359 and the Duck Nebula, Thor's Helmet is a huge bubble of expanding gas from a Wolf-Rayet star, flanked by two shock waves created as the star and its bubble move through a molecular cloud. The nebula is 12-15,000 light years away and 30 light-years across. It contains several hundred solar masses of ionized material, plus several thousand more of unionized gas. It glows at 11.5 magnitude, so it's not overly bright, but it shows up nicely even in an 8" scope if you use a narrowband or OIII filter. It's fairly large in the eyepiece (6-8 arc-minutes) so it shows up easily even at low power.

The Wolf-Rayet star at its center is thought to be nearing the supernova stage, so the Helmet's days are numbered. Better have a look at it while you can!

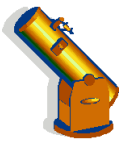
Here's how to find it: From Sirius, scan about 13° to the left (and upward if it's later in the evening) until you find M46 and M47. They're the biggest, brightest open clusters out there; they'll show up beautifully in binoculars or a finder scope. M46 is the one on the left and M47 is the coarser one to its right. Draw a line from M46 through M47 and keep going 4.5° straight toward the belt of Orion. A line drawn from Iota through Gamma Canis Majoris will also point right at it. Hunt around the intersection of those two lines at low power with an OIII filter and you'll nab Thor's Helmet fairly quickly. Once you've found it, go to about 100-150x for a good look at the bubble and the wings. This one repays extended study with fully dark-adapted eyes, so once you've found it give your eyes time to recover from your flashlight and star chart. Then admire this beautiful emission nebula and ponder its central star's mortality. Maybe it'll blow up on your watch.

Thor's Helmet courtesy ESO/Wikimedia Commons



Thank You Storage Junction

Storage Junction has donated the use of a storage unit for us to hold our loaner telescopes when they're not in use. EAS would like to thank Storage Junction for their generosity and support for our group. Please give them a call if you need a storage space, and tell your friends. Storage Junction is located at 93257 Prairie Road (at the intersection of Hwy 99 and Hwy 36, 3 miles south of Junction City) Phone: 541-998-5177



Observing in March

Last Q | New | 1st Q | Full

Mar 1, 3:11 PM	Mar 8, 5:54 PM	Mar 15, 10:03 AM	Mar 23, 5:01 AM
Mercury Rise: 6:19 AM	Mercury Rise: 6:20 AM	Mercury lost in Sun	Mercury lost in Sun
Venus Rise: 5:53 AM	Venus Rise: 5:49 AM	Venus Rise: 6:44 AM	Venus Rise: 6:35 AM
Mars Rise: 12:31 AM	Mars Rise: 12:17 AM	Mars Rise: 1:02 AM	Mars Rise: 12:42 AM
Jupiter Rise: 6:28 PM	Jupiter Set: 6:51 AM	Jupiter Set: 7:22 AM	Jupiter Set: 6:48 AM
Saturn Rise: 1:57 AM	Saturn Rise: 1:31 AM	Saturn Rise: 2:04 AM	Saturn Rise: 1:33 AM
Uranus Set: 9:08 PM	Uranus Set: 8:43 PM	Uranus Set: 9:17 PM	Uranus Set: 8:48 PM
Neptune lost in Sun	Neptune lost in Sun	Neptune lost in Sun	Neptune Rise: 6:25 AM
Pluto Rise: 4:09 AM	Pluto Rise: 3:42 AM	Pluto Rise: 4:15 AM	Pluto Rise: 3:44 AM

All times Pacific Standard Time (November 1, 2015 – March 12, 2016 = UT -8 hours) or Pacific Daylight Time (March 13 – Nov. 5, 2016 = UT -7 hours)

Daylight savings time begins March 13

Date	Moonrise	Moonset	Twilight Begin	Sunrise	Sunset	Twilight End
3/1/2016	00:53	10:59	05:12	06:48	18:02	19:38
3/2/2016	01:49	11:43	05:11	06:47	18:03	19:39
3/3/2016	02:42	12:33	05:09	06:45	18:04	19:40
3/4/2016	03:33	13:30	05:07	06:43	18:05	19:41
3/5/2016	04:20	14:32	05:06	06:41	18:07	19:43
3/6/2016	05:04	15:40	05:04	06:40	18:08	19:44
3/7/2016	05:44	16:52	05:02	06:38	18:09	19:45
3/8/2016	06:22	18:06	05:00	06:36	18:11	19:47
3/9/2016	06:59	19:21	04:58	06:34	18:12	19:48
3/10/2016	07:35	20:36	04:57	06:33	18:13	19:49
3/11/2016	08:12	21:51	04:55	06:31	18:14	19:51
3/12/2016	08:51	23:02	04:53	06:29	18:16	19:52
3/13/2016	10:33	00:02	05:51	07:27	19:17	20:53
3/14/2016	11:20	01:10	05:49	07:25	19:18	20:55
3/15/2016	12:11	02:13	05:47	07:24	19:19	20:56
3/16/2016	13:05	03:10	05:45	07:22	19:21	20:58
3/17/2016	14:03	03:59	05:43	07:20	19:22	20:59
3/18/2016	15:02	04:43	05:41	07:18	19:23	21:00
3/19/2016	16:02	05:21	05:39	07:16	19:24	21:02
3/20/2016	17:01	05:54	05:37	07:14	19:26	21:03
3/21/2016	18:00	06:25	05:35	07:13	19:27	21:04
3/22/2016	18:59	06:54	05:33	07:11	19:28	21:06
3/23/2016	19:57	07:21	05:31	07:09	19:29	21:07
3/24/2016	20:55	07:49	05:29	07:07	19:30	21:09
3/25/2016	21:52	08:17	05:27	07:05	19:32	21:10
3/26/2016	22:49	08:48	05:25	07:04	19:33	21:12
3/27/2016	23:46	09:20	05:23	07:02	19:34	21:13
3/28/2016		09:57	05:21	07:00	19:35	21:15
3/29/2016	00:41	10:38	05:19	06:58	19:37	21:16
3/30/2016	01:34	11:25	05:17	06:56	19:38	21:18
3/31/2016	02:25	12:17	05:15	06:54	19:39	21:19:

All times are for Eugene, Oregon Latitude 44º 3' Longitude 123º 06'

Items of Interest This Month

3/1 Ganymede and Io pass one another 8:00 – 8:45 PM.
3/5 Io shadow transit 9:59 – 12:15. Io is only 2 minutes behind its shadow.
3/7 Io and Europa side-by-side all night.
3/8 Jupiter at opposition.
3/9 Jupiter's Moons form two pairs all night.
3/10 Io and Europa pass one another 8:00 – 9:00 PM.
3/11 First Quarter Friday Star Party.
3/13 Daylight savings time starts 2:00 AM.
3/14 Double shadow transit (Io & Europa) 7:22 – 9:33 PM.
3/19 Spring begins 9:30 PM.
3/20 Europa passes Ganymede 8:00 – 10:00 PM.
3/21 Double shadow transit (Io & Europa) 9:23 – 11:31 PM.
3/25 Io and Europa pass one another 8:00 – 9:00 PM
3/28 Io and Europa close all night. Double shadow transit 11:59 PM – 1:25 AM
3/30 Io shadow transit in progress at sunset. Ganymede transit 6:38 – 9:52, G's shadow transits 8:45 – 12:02.
3/31 Extra last quarter Moon 8:17 AM.