ASEM Newsletter

December 2015

Comet C/2013 US10 Catalina
December 1st, 2015
image from Gregg Ruppel

December Calendar

Social

December 3 – 7-9pm Beginner Meeting @ Weldon Springs Interpretive Center, 7295 HWY 94 South, St. Charles, MO 63304

December 12 – Monthly Meeting. 5pm Open House, hors d'oeuvres @ Weldon Springs Interpretive Center, 7295 HWY 94 South, St. Charles, MO 63304. 6pm ham dinner provided by Marv and Barb Stewart followed by monthly meeting at 7pm. Complimentary dishes and desserts are welcome. Carla Kamp is turning over hospitality hosting duties with the January meeting.

December 22- 7pm DigitalSIG Astrophoto group meeting Weldon Spring, 7295 Highway 94 South, St. Charles, MO 63304. Note this is the ***FOURTH*** Tuesday for just this month. We'll go back to the 3rd Tuesday in January.

December 23- 7PM DIY-ATMSIG Weldon Spring, 7295 Highway 94 South, St. Charles, MO 63304

December 4, 11, 18, 25- 7 pm start times Broemmelsiek Park Public viewing, weather permitting.

ASTRONOMICAL DELIGHTS

If you're very careful, on December 7 a very old crescent moon will occult Venus in daylight, late morning. You'll need to look to the west of the sun-***don't catch the sun in your binoculars***- around 11:10 or so for the disappearance on the bright side of the moon. Start your search before 11am so you know where Venus and the moon are. Venus will be occulted for about 90 minutes.

There's a really good lunar libration on December 21 at the north Polar region. Good night to poke around the north polar landscape craters that are not normally discernible.

Iota Cassiopeia, a beautiful triple star is favorably placed high overhead in the evening.

For the real night owl or 4 am riser, Jupiter is now climbing pretty high in the east.

See Dave Mitsky's December Celestial Calendar at the end of the newsletter for more.

Contributors To The October Newsletter

Dan Crowson – Associate Editor
Carl Turek
Jim Twellman
Steve Boerner
Carla Kamp
Amy and Ed White
Chuck Simms
Gregg Ruppel
Rick Steiling
Bill Neubert
Grant Martin
Bill Sheehy

A newsletter is only as interesting as the material sent in by contributors.

Would you like earn the eternal gratitude of your fellow club members and intergalactic recognition in our newsletter? Send a note to your friendly editor on any astronomy related subject at **newsletter@asemonline.org** I'll get it posted in the monthly newsletter.

Your editor at large (not large editor),

Jim Curry

From Our Executive Director
Jim Twellman

Notes from the Executive Director

I hope we have a great attendance at our next meeting ("Christmas party"). Pending approval from Weldon Springs, we plan to open the doors at 5pm and snack and talk until the 6pm "dinner hour". A great time to talk about what's on your astronomical Christmas list, or to bring in a toy for show-and-tell (or fix), or share a great appetizer for all to enjoy.

The Library Telescope work is pretty much done for 2015. We just held the last "Star Party" in St Charles County, and we'll start up again next Spring. I'd like to thank Chuck Simms for all his efforts on this very successful program, and Don Ficken for all of the top-end coordinating that he is doing. I am sure that we will add to the Library Scope "inventory" with a build in the coming months. Sounds like we will add 4 scopes in a build, possibly in March.

I am already looking forward to our mission in 2016. We will no doubt spend quite a bit of time getting ready for the 2017 Total Solar Eclipse. I am hopeful that 2016 will finally be the year that we put the 32" back into action.

As far as November, I'm personally hoping to see comet US10 Catalina soon (if these clouds clear...). It will be near Venus in the morning sky on Dec 7. Later that day, Venus will undergo an occultation by the moon. Hopefully I can work from home that day and it will be clear!

We could not have accomplished all that we have done in 2015 without our volunteers. Whether hospitality, FNOH, scout or school camps, equipment builds and maintenance, Library Scopes, support of Beginners or budding Astrophotographers, or whatever, THANK YOU for your service. I hope that our newer members take notice, as we will be needing more help as we head into the future.

Clear Skies!

--
Jim Twellman
Executive Director
Alliance for Astronomy (dba Astronomical Society of Eastern MO)

Hospitality Members Found!!

Donna and Lisa Barnes will be joining the committee and beginning their hosting duties in January.

Thank you for stepping up to the tasks!!

Sent in by Carla Kamp

Broemmelsiek Report
By Amy White & "Not the Amy"

103 people participated at the mostly-cloudy Friday Night Open House on November 6 at Broemmelsiek Park. Most of the people were first-time visitors to a FNOH. The attendance last evening included a remarkable number of children under 10 years old.

Clouds came and went from all directions. Any sucker holes that appeared closed up within minutes. Since there was no Moon, and Saturn had set by 5:30pm, there were few objects to entertain first-time visitors to the Park. Our ASEM volunteers tried their best to show astronomical objects. Carl Turek had his 10" Dobsonian out, showing people double stars and clusters, when they were available. Steve Boerner had his big binocs on a parallelogram mount, giving brief views of deep sky objects as they became available. Ed White ran the C-14, and spent a lot of time on Albireo. Views of the Ring Nebula, M57, and other usual deep sky objects for this time of year, were not looking good even in the C-14. High wispy clouds ruined the views of DSO's. I had our Astroscan out, viewing the Pleiades, which were sometimes visible, sometimes not. Rodney Roederer welcomed people.

Three telescope pads at Broemmelsiek Park were occupied by new folks. One fellow, accompanied by two family members, had a brand new Celestron 8" GOTO. They did not stay long. Another fellow had a 10" fast Dob on a pad. He had some skills finding objects, but the clouds were not cooperating. Another pad was used by a man with an 8" Orion Dob and his son running a camera on a tripod. A fellow with a short-tube refractor stayed set up by his truck in the parking lot. I hope these folks will return again when the sky is better.

The Girl Scout group that Stacey had mentioned showed up. Each of the girls was carrynig a red light, yay! They stayed for a long time. We had two different high school groups attend, and I think they will return on a better night. Many families attended, and everyone seemed to have a good time, despite the lousy sky conditions.

Amy W

At the Friday the 13th FNOH there were 68 people in attendance at a, wait for it ... **CLOUD FREE!** Friday Night Open House at Broemmelsiek Park. (Although I thought transparency left some to be desired.) A group of about a 13-14 folks were first-time visitors to a FNOH with a group of home schooled kids, about half of the group, mostly younger kids. They showed up even before Carl did and left early. It was low 40's and may have dipped below 40, but no wind made it pretty

easily bearable. Yes it is getting toward winter. Orion was on the eastern horizon creeping out of the lights of Chesterfield as we were finishing up.

Carl Turek had his 10" Dobsonian out, showing people double stars and clusters. Steve Boerner ran the C-14 showing a variety of DSO's. Jim Stenzel was there but I missed what scopes he had out. And a couple of non-members had scopes out and were also showing people things. One fellow, accompanied by two family members, had a brand new Celestron 8" GOTO and indicated he had tried to join last year. I explained that we were having tax free issues that are now resolved and we are definitely accepting new members.

I ran the clicker (finally some technology I can handle!) and generally tried to meet and greet while clicking as well as abuse a few students. A surprising number of people were heard to mutter, "Not the Amy." Oh well...

Ed White

EDITOR'S CHOICE AWARDS

Dan and I discussed some of the best of the best in the DIY and Photo category's and decided on two that are jaw droppers. Perhaps the winners can be talked into bringing their wares to the December meeting for all members to view.

In the DIY category there were several dozen entries worthy of consideration. From electronics to woodworking to bashing of existing equipment there was quite a selection to review from the past year. This year's DIY award goes to Carl Turek for his overhaul of a Celestron C-8 from a tube to a truss design. This was featured in the August Newsletter and I'll repeat Grant's report here:

Another View of Carl's C8
By Grant Martin

One of the benefits of going to the DIY (Do It Yourself) meetings is you get to see all sorts of creativity. Either it's some kind of cool gadget Steve Boerner or John Ducek whipped up out of wood and glass and electronics or it's something else another very talented member created from fertile mental territory. And you never would have expected to see it there either. And then you realize you've been looking for something like that for years and didn't even know it. It's always something at the DIY.

Then there's Carl. No, not the guy that "had that one job". We're talking Carl Turek. The thing about Carl is he'll ask you about something in that innocent way he has and then you won't hear anything about it until sometime later. And it's always at the DIY meeting. And it's always something right outa left field. Not that that's a bad thing. No, when it's a Carl thing, it's usually a really *unexpected* thing.

Take the July DIY fer instance. Back in June, he wrote me an email asking what I knew about dew prevention on SCT scopes. I gave him my thoughts and never heard back. A few weeks later I thought about the conversation and suddenly realized I should take a night off work and go to the July DIY meeting. This was probably going to be good.

Ya gotta understand something here: Carl is an SCT fanatic and he's been bedeviled by such things as Dew prevention, mirror cooling & etc. He's been incrementally solving these problems with very creative and solutions.

Lately he's been working on mirror cooling. His last big project was to take his classic C8 apart and then machine in holes and mounts for small DC fans behind the mirror to speed cooling. A terrific job and the results were apparently better than he expected.

Then he gets this deal on a fork mounted Celestron C8 Ultima. A really great scope. He never said nuttin about it though. And here's why: John Ducek is fond of saying "You can't have tube currents if you don't have a tube". Carl took his advice to heart and this is the result.

I walked in the door at the DIY and the first thing I saw were the members all admiring a truss tube C8. Yep, a truss tube C8. Had to be Carl. Carl had one ... project and it was a doozy.

Carl took the tube off and retrofitted truss tubes, bored holes in the back of the casting and installed cooling fans and then went so far as to glue small resistors to the inside of the corrector plate holder for Dew control.

EDITOR'S CHOICE AWARDS

In the Photography category there were also a lot of choices. Several of our members had images in Astronomy, Sky & Telescope and the Reflector. While there were a lot of good images, in the end, it came down to Rick Steiling's IC 342 (Caldwell 5). What makes his image remarkable is the color and detail he was able to achieve. IC 342 is viewed through the plane of the milky way so it is heavily obscured by the dust. Most images tend to be very soft and lack color. Rick's four nights at Whiteside during October and November, 2015 really paid off.

IC 342 – Rick Steiling

- Imaged on 10/12/15, 10/14/15, 11/08/15, and 11/09/15 from Whiteside, MO.

- Scope: Orion 8" f/3.9 Newtonian Astrograph (800mm focal length)

- Imager: SBIG STF-8300M with OAG-8300 guiding system and FW5-8300 filter wheel / QHY5L-II

- Mount: Celestron CGEM - Filters: Astronomik LRGB and 12nm Ha

- Luminance: 23 x 20' @ 1x1 – RGB: 12 x 10' @ 2x2 (each) - Hα: 11 x 20' @ 1x1 (probably not enough!)

- Total integration: 17 hrs 20 min

- Guiding with PHD2 / Acquisition with Sequence Generator Pro / Integration and processing with PixInsight 1.8

Whiteside Report
By
Jim Twellman

I did not make it out to Danville this past month, but I did manage two trips to Whiteside. The first outing was 'solo', on Saturday 11/7/15. Others had gone to Danville, but due to family reasons that was not possible for me. My main effort was to see some dim comets. I had maps for three, two of which were low in the West just after sunset. Despite a strong effort, I could not locate them thru the thick atmosphere so low in the dusk. I did manage to bag C/2014 S2 (PanSTARRS) in Ursa Minor, and show its' motion over a couple of hours by drawing the field of view (FOV).

The night looked good naked-eye, but the seeing and transparency were noticeably off in the telescope. That did not stop me from perusing over a dozen objects. Some of my most fun observations were NGC 7008 (Fetus nebula), 6888 (Crescent nebula), NGC 891, and the Eta Cass triplet. For fun, I tossed in a view of Uranus.

Two nights later (Monday 11/9/15) I managed to get permission to slip out again! This time I was joined at Whiteside by Jeff Heckencamp and Rick Steiling. I managed a better drawing of the same comet (attached), and another dozen DSO observations in between comet movements. Of those I'll note Mirach's Ghost (404), the Blue Snowball, and the Helix. The latter was visible in my 8x50 finder, so the transparency was a bit better than two days prior. The galaxies did not show much better, so things were still a bit off.

This time of year (September thru December) can provide some of the best nights of seeing and transparency. It didn't happen on these two nights, but you never know until you get out and try! Still, it was fun to be out and I'll take nights like these any day.

--
Jim Twellman

November Digital SIG Meeting Notes
By Dan Crowson

November's meeting was held on a terrible night. It was raining horses and cows (versus cats and dogs). There was a nice river and lake where the parking lot used to be. I really appreciate the handful of people that came out to hear Bill Neubert talk about the Baader filter system and imaging with a refractor.

The next Digital SIG meeting is Tuesday, December 22nd, 2015. This is the ***FOURTH*** Tuesday. Mike Chartand will be back in town for the holidays and will give a presentation on imaging from below the equator. Mike was deployed in Diego Garcia for a time and is now back in the states. Things we take for granted like using Polaris or using an equatorial mount out of a box go away when you attempt use it from 7° South.

(Images from Wikipedia - https://en.wikipedia.org/wiki/Diego_Garcia)

Rick Steiling will be giving a presentation on Sequence Generator Pro. This a really nice program for controlling sessions. Where Maxim DL is part of the old standard, SGP is part of the new breed of software. There's a free 45 day demo available. After the 45 days, the software reverts to a Lite version that can still be used or you can buy a full license is $99. That's even less than our, "Everything costs $100," reply.

Show up. Bring your images and questions. We can help.

Again, this meeting is on the ***FOURTH*** Tuesday – December 22nd. We'll go back to the 3rd Tuesday in January.

The latest Digital SIG news can always be found in the **ASEM Digital SIG Yahoo Group**.

ASEM Loaner Equipment
By Chuck Simms

Equipment	Description	Location
Big Binoculars	Chuck Simms (7/11/2015)	Check-Out
Canon T1i camera	Canon T1i camera	Dan Crowson (6/30/2015)
SBIG STL-1001 camera	SBIG STL-1001 camera	Jim Roe (12/8/2012)
Eye-piece/Filter kit	verious 1.25 inch eyepieces & filters (O III; H Beta; UHC)	Bill Sheehy (5/9/2015)
11.5 inch scope	Nolan's 12:	Chuck Simms (5/4/2015)
Coronado PST	Personal Solar Telescope	Chuck Simms (7/3/2015)
Meade ETX125 Telescope	125 mm (5 inch) Meade ETX telescope W/tripod	Richard Kamp (6/12/2015)
Starmaster 14.5 telescope"	Starmaster 14.4 inch telescope	Stacey Thater (1/12/2013)
Celestron CG5 mount	mount currently being used for Lunt	Tim Dunbar (11/14/2015)
Lunt - Stack Filter	Stack filter used on Lunt Solar telescope	Tim Dunbar (11/14/2015)
Lunt Solar Telescope	LS50FHa filter - 60mm	Tim Dunbar (11/14/2015)
Denkmeier Bino-Viewer	Denkmeier Bino-Viewer	Stacey Thater (6/20/2015)
Equatorial Platform	Grant Martin (9/14/2013)	Check-Out
Star Atlas	Herald-Bobroff Astroatlas	Bill Biermann (4/10/2015)

Astronomical League Update
By
Steve Boerner

The Astronomical League has announce a Sketching Award/Contest sponsored by Astronomics. The purpose of the award is to recognize the importance of sketching in appreciating astronomical objects and of the skill required in depicting celestial scenes. The work will be evaluated for accuracy, aesthetics, neatness, composition, and the visceral effect imparted on the viewer. The first place winner will receive $250 and a plaque recognizing the achievement. The second place finisher will receive $150 and the third place finisher will receive $75. The winners will be announced in August at the 2016 AlCON in Washington DC.

More information, rules, and dates can be found on the AL's web page at:
https://www.astroleague.org/awards/astronomics-sketching-award

THE NEXT TIME SOMEONE IN YOUR FAMILY SAYS YOU HAVE TOO MANY TELESCOPES SHOW THEM THIS PICTURE.
Sent in by Grant Martin

ASEM's Tinkerer's aka The DIY Crowd (Do-It-Yourself)

These guys will find solutions to problems you didn't know you had

Notes Prepared by Carl Turek

September 28, 2015 Meeting

Due to the date for the November ASEM ATM-DIY being Thanksgiving Eve, the November meeting was cancelled. However, there was an ATM project shown in the September meeting that was not included in the newsletter notes. The project was a bowling ball mount for visual observing.

Carl Turek noted that he had this project on his list for many years and finally got around to putting one together. Using a bowling ball for an omni-bearing has many advantages – smooth motions, very stable and best of all, very cheap!

The whole scope:

The support pads:


CELESTRON

Of course you can’t carry a bowling ball mount in anything but a retro bowling ball bag:
The bag carries not only the ball, but also the counterweights and counterweight shaft.

Mysterious Spots Spotted at Danville

By Bill Sheehy

It was a dark and cloudless night when I finally arrived at Danville the Saturday before the November new moon. In deference to others, I turned off my headlights and gingerly inched the car forward, hoping to avoid the shadowy outlines of vehicles just barely visible in the distance. The coyotes were eerily quiet, but I could hear muffled voices coming from the edges of the gravel parking area. As I hunched over the steering wheel, I eased into a dark opening that loomed up on the southern perimeter, shut off the engine, and stepped out. The enveloping blackness promised good observing. Anticipating a productive session, I assembled my Dob, inserted my laser collimator into the focuser, then peered down at the large primary mirror.

And that's when I saw them: two large white spots, each about the size of a quarter, on the mirror's surface! They looked like the spectral eyes of an alien intelligence studying me through the porthole of its spaceship. Or like two blobs of anemic bird poop, if you prefer more earthly metaphors. Such things, I surmised, are not supposed to grace your telescope mirror. So what were they, and how did they get there? It was a mystery.

Here, I need to backtrack, since one of the spots was, in fact, not new. I had first discovered it at home several months earlier. Because I keep the mirror in a covered wooden storage box, the origin and nature of the spot had stumped me. It was like a Sherlock Holmes storyline: a murder victim found in a windowless room, locked from the inside. In the absence of a rational solution, wild speculations had taken over. Had a wasp wriggled through the narrow gap between the lid and the box and dive-bombed his own reflection in the mirror? Had a muscular pigeon managed to lift the lid and leave me his calling card? I was bewildered, befuddled, addled, and bemused. Nevertheless, I had decided to leave the spot until it was time to clean the rest of the mirror, which was still in decent shape.

And now there were two spots! Two bodies in the locked, windowless room! Was the ghost of Professor Moriarty taunting me? Would the spots continue to multiply? This was a mystery I could no longer ignore.

Of one fact I was certain: The new spot had not been there the last time I had gone observing. Curiously, moreover, the new spot sported a long whitish drip trail. Aha, I thought, a clue! Both the drip trail and the timing of the second spot—appearing only after I had disassembled the scope the last time out—dramatically narrowed the possibilities. Wasps had long since departed for Florida, or wherever they own winter residences, and pigeons…well, I never really did suspect pigeons, even ones with well developed pectorals. As I pondered the possibilities, the elements of a theory began to accrete, like debris in a protoplanetary disk. Then the final telltale clue slipped into place. It was the temperature. Specifically, the effect of the temperature on my sinuses. You see, on cold nights outdoors I, like many people, often get a runny nose. Yes, you guessed it. The most likely scenario is that my watery nose dripped onto the mirror as I was putting it away for the night. And the drip trail? That would have resulted as I tilted the mirror while returning it to its storage box. So mystery solved. Take that, Moriarty! I spent the rest of the night observing DSO's, wondering how much this new form of "dew" was affecting what I saw.

Moral of the story: Always keep a hanky in your ditty bag. Or wear a nasal dew heater.

Buy/Sell - Swap/Trade - Wanted

Wanted:

Wanted: 2.5x and 5x Televue Powermate 1.25”

-Mike Pusatera

For Sale:
1070 Cave Astrola 12.5” f/6.7. Contact Tom Kelemen, St. Louis.
Kelemen56@gmail.com
For Sale:
Fiberglass tube for 10” reflector – x Cave f/5 $40, contact Jim Curry
jjc@structureguard.com

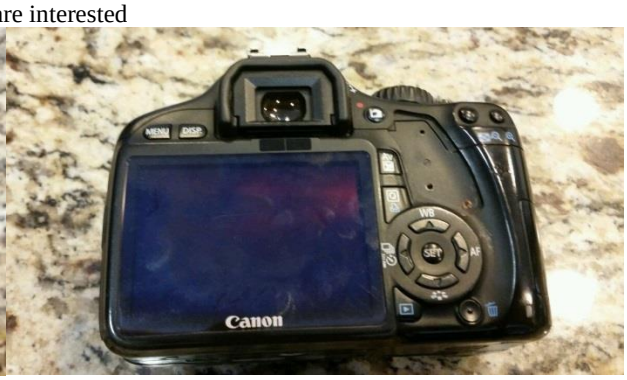
For Sale:

Mike Pusatera:

I'm upgrading to a mono CCD and no longer need my modified T2i. It's a good camera and comes with an AC adapter and T-Ring. The LPF2 filter has been removed. The LPF1 filter is still in place.

If you'd like to see some samples, check out my flickr page. Most of the DSO images were taken with the T2i. **https://www.flickr.com/photos/37401356@N05/**

The camera is in good shape. It is missing one small cosmetic rubber piece, but works well. Asking $375 (which is what I paid for everything). Let me know if you are interested



ASEM Members Photography

A section for ASEM members to distribute their photographs within the Society. Whether you're shooting digital, film or working in charcoal (hand sketching), this page(s) is for members to show us what you've seen and how you recorded it. Sunsets, supernovas, sundials, Stonehenge. Crepuscular rays, planetary alignments, or Markarian's Chain. If it's something we have to look up to see it will probably interest this crowd of inquisitive folks.

M45 the Pleiades from Council Bluff Lake - Bill Neubert

Total exposure of 30 minutes at ISO-800 through a Stellarview SV80 with 0.8X focal reducer and flattener, f=384 mm, F/4.8 system mounted on a Celestron Advanced VX system and Nikon D5300 at prime focus. Autoguided with a 50 mm F/3.3 guide scope and Orion SSAG camera using PHD2. Stack of 6 bright, 5 dark and 20 bias frames. Camera control using BackyardNIKON. Stacked in DeepSky Stacker and processed in Photoshop.

M1 the Crab Nebula from Danville Conservation Area – Bill Neubert

Imaged with a f=750 F/5 Newtonian with Coma Corrector and Baader UHC filter, using a Nikon D5200 full spectrum modified baffled camera at ISO-1600. Total exposure of 50 minutes in 10 sub-frames, 10 dark frames and 20 bias frames. Stacked in DeepSkyStacker and processed in Photoshop.

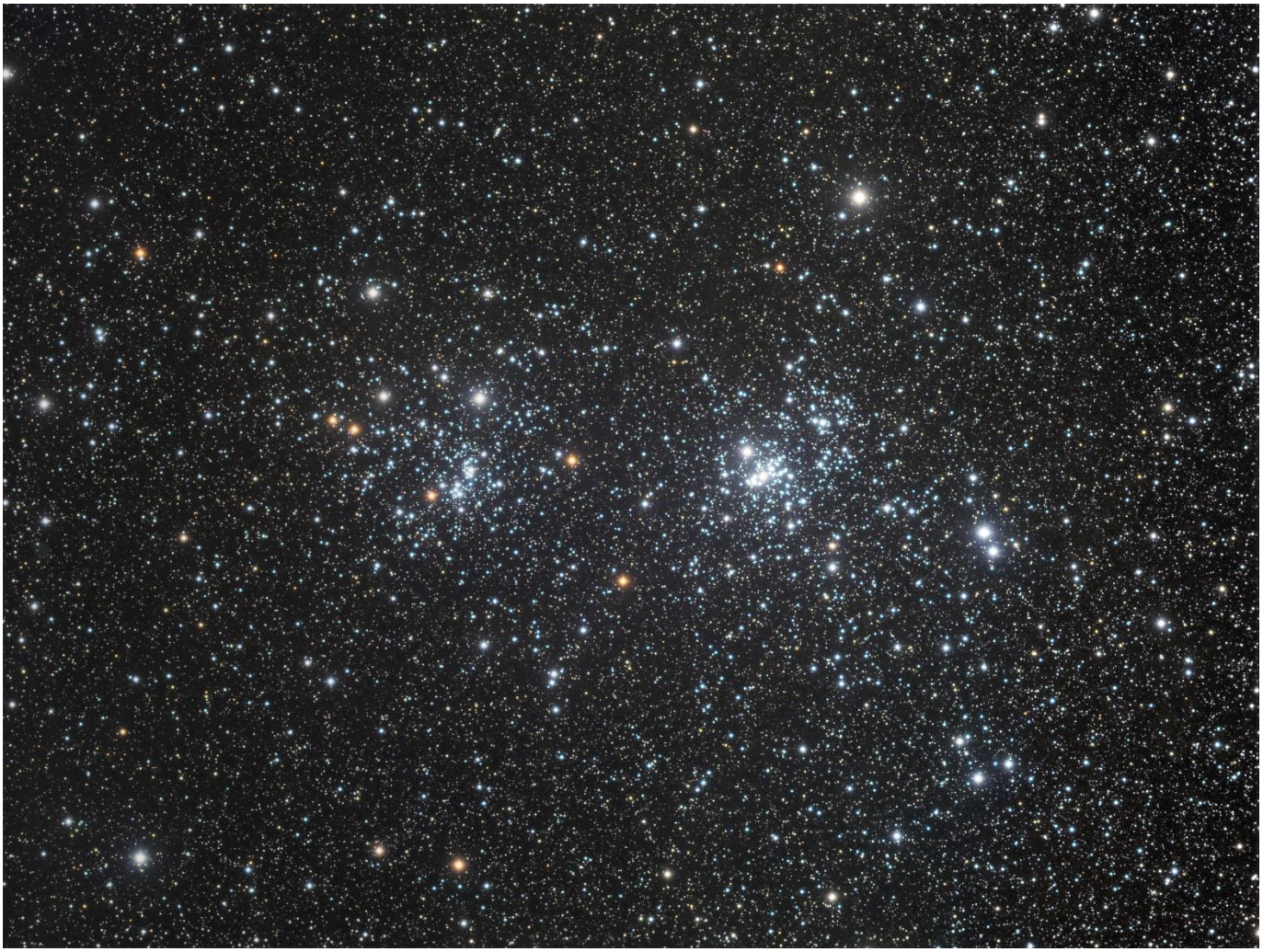
M33 – Gregg Ruppel

Lynds Dark Nebula 1251 – Dan Crowson

Barnard Dark Nebulae 11, 12 and 13 – Dan Crowson

Barnard Dark Nebulae 30, 31, 32 and 225 / CED 51
Dan Crowson

van den Bergh 31 + Barnard Dark Nebulae 26, 27 and 28
Dan Crowson



The Double Cluster – NGC 869 + 884
Dan Crowson

Club Contacts

Membership

Membership issues can be addressed through our executive director Jim Twellman at these addresses:

Email: jtwellman@asemonline.org.

Snail mail:

Alliance for Astronomy (ASEM)
Rudder Court
Lake St. Louis, MO 63367

Committees

Comments, questions, suggestions and money (just kidding) may be sent to the following addresses:

program@asemonline.org

Use this address to communicate with the program committee. If you have something to present at a meeting or wish to contribute and let someone else perform, send it here. Questions and/or suggestions about programming etc. Remember, they are here to help you. This is a user friendly society and we like to see members get up and share.

equipment@asemonline.org

This address is used to find out about ASEM loaner equipment. If you find something amiss at BPark by all means report it here. If you are curious about borrowing an item, put in a request via this address.

hospitality@asemonline.org

Got a main dish you'd like to bring to the potluck? We sure could use it AND you will be reimbursed for your expenses.

newsletter@asemonline.org

Primary contact for the newsletter. Got an article or notice you'd like to see published? Send it here and be famous!

Outreach@asemonline.org

Special requests for groups at Broemmelsiek Park including:

- Notice of large party (more than groups of twenty)
- Request for specific requirements needed (school assignment, merit badge requirements, etc.)
- Requests for Star Party / Telescope event at another location

webmaster@asemonline.org

Kirk Steinbruegge is now our webmaster. Shoot him anything you want posted on our Web page

Entertainment

Late breaking news and member adventures (or shenanigans as the case may be) can usually be found at STLAstronomy in yahoo groups. If you aren't a member, you should join. Go to **http://tech.groups.yahoo.com/group/STLAstronomy/** and click "Join"

December 2015 Celestial Calendar

By: **Dave Mitsky**, Nov 29 2015 04:42 PM—reprinted here with permission
url: http://www.cloudynights.com/topic/519994-december-2015-celestial-calendar/

All times, unless otherwise noted, are UT (subtract SIX hours and, when appropriate, one calendar day for CST)

12/3	Last Quarter Moon occurs at 7:40
12/4	Jupiter is 1.8 degrees north of the Moon at 6:00; the Curtiss Cross, an X-shaped clair-obscure illumination effect located between the craters Parry and Gambart, is predicted to occur at 19:08
12/5	The Moon is at apogee, subtending 29'46" from a distance of 404,800 kilometers (251,531 miles), at 14:57
12/6	Mars is 0.1 degree north of the Moon, with an occultation visible from Australia, Indonesia, far southern India, the southern Arabian peninsula, and central and eastern Africa, at 3:00
12/7	Venus is 0.7 degree south of the Moon, with an occultation visible from the Caribbean, Central America, and North America, at 17:00
12/8	The earliest sunset of the year at 40 degrees north latitude occurs today
12/9	Asteroid 16 Psyche (magnitude +9.4) is at opposition at 14:28
12/10	New Moon (lunation 1150) occurs at 10:29
12/14	The peak of the Geminid meteor shower (100 to 120 per hour) occurs at 18:00
12/15	Mercury is at its greatest heliocentric latitude south today
12/17	Neptune is 3 degrees south of the Moon at 8:00
12/18	The Lunar X (the Purbach or Werner Cross), an X-shaped clair-obscure illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to occur at 8:14; First Quarter Moon occurs at 15:14
12/20	Venus is at its greatest heliocentric latitude north today; Uranus is 1.2 degrees north of the Moon, with an occultation visible from the Falkland Islands, the southern tip of South America, and the Antarctic Peninsula, at 1:00
12/21	The Moon is at perigee, subtending 32'18" from a distance of 368,417 kilometers (228,924 miles), at 8:54
12/22	The shortest day of the year at 40 degrees north latitude occurs today; winter solstice in the northern hemisphere occurs at 4:48
12/23	The peak of the Ursid meteor shower (10 per hour) occurs at 2:00; the Moon is 0.6 degree north of the first-magnitude star Aldebaran (Alpha Tauri), with an occultation visible from northern Asia, Russia, Europe, northwestern Africa, and the eastern coast of Canada, at 20:00
12/25	Asteroid 27 Euterpe (magnitude +8.4) is at opposition at 5:36; Full Moon (known as the Before Yule, Cold, Long Nights, and Oak Moon) occurs at 11:11
12/26	Uranus is stationary at 11:00
12/29	Mercury is at greatest eastern elongation (20 degrees) at 3:00
12/31	Jupiter is 1.5 degrees north of the Moon at 18:00

Interesting Facts:
Tycho Brahe, Johannes Kepler, Isaac Newton, and Arthur Eddington were born in December.

Giovanni Cassini discovered the Saturnian satellite Rhea on December 23, 1672.

Meteor Showers:
December 14th's Geminid meteor shower is not affected by moonlight this year. The Geminids, which are associated with the Palladian asteroid, or possible cometary nucleus, 3200 Phaethon, have become the most reliable meteor shower of the year. Geminid meteors appear to originate from a radiant that's just northwest of Castor (Alpha Geminorum). That radiant lies almost at the zenith at 2:00 a.m. local time. An article on the 2015 Geminids appears on page 44 of the December issue of Sky & Telescope. The Ursids, a normally minor meteor shower, peak on the evening of December 22nd DST. Moonlight from a waxing gibbous Moon will interfere with observing the shower. The radiant is located close to Kochab (Beta Ursa Minoris), some 15 degrees from the north celestial pole. See **https://in-the-sky.o...20151214_11_100** and **http://www.imo.net/calendar/2015#gem** for additional information on the Geminids and **https://in-the-sky.o...20151222_11_100** and **http://www.imo.net/calendar/2015#urs** for more on the Ursids.

Major Satellites:
Information on Iridium flares and passes of the ISS, the Tiangong-1, the X-37B, the HST, and other satellites can be found at **http://www.heavens-above.com/**

The Moon:
The Moon is 19.3 days old, is illuminated 72.1%, and is located in Cancer on December 1st at 0:00 UT. Due to the position of the ecliptic, the Moon reaches its highest point in the sky for the year in December. It attains its greatest northern declination (+18.4 degrees) for the month on December 25th and its greatest southern declinations (-18.4 degrees) on December 12th. Longitudinal libration is at a maximum of +5.5 degrees on December 27th and a minimum of -4.8 degrees on December 12th. Latitudinal libration is at a maximum of +6.5 degrees on December 24th and a minimum of -6.6 degrees on December 12th. The 13%-illuminated Moon occults Venus, which will be 17 arc seconds in angular size and illuminated 69%, on the afternoon of December 7th. For further information on this daytime event, see **http://www.lunar-occ...s/1207venus.htm** and pages 46 and 47 of the December issue of Sky & Telescope. Visit **http://saberdoesthes...does-the-stars/** for tips on spotting extreme crescent Moons and **http://www.curtrenz.com/moon.html** for Full Moon data. Times and dates for the lunar light rays predicted to occur this month are available at **http://www.lunar-occ...o/rays/rays.htm**

The Sun:
The Sun is located in Ophiuchus, a non-traditional constellation of the zodiac, on December 1st. Winter solstice for the northern hemisphere occurs when the Sun is farthest south for the year on December 22nd UT.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on December 1st: Mercury (magnitude -0.8, 4.7", 98% illuminated, 1.42 a.u., Ophiuchus), Venus (magnitude -4.2, 17.4", 67% illuminated, 0.96 a.u., Virgo), Mars (magnitude +1.5, 4.8", 93% illuminated, 1.97 a.u., Virgo), Jupiter (magnitude -2.0, 35.6", 99% illuminated, 5.54 a.u., Leo), Saturn (magnitude +0.4, 15.1", 100% illuminated, 10.99 a.u., Ophiuchus), Uranus (magnitude +5.8, 3.6", 100% illuminated, 19.57 a.u. on December 16th,

Pisces), Neptune (magnitude +7.9, 2.3", 100% illuminated, 30.22 a.u. on December 16th, Aquarius), and Pluto (magnitude +14.2, 0.1", 100% illuminated, 33.92 a.u. on December 16th, Sagittarius).

Planets:
During the evening, Mercury can be found in the southwest, Uranus in the southeast, and Neptune in the south. Jupiter is the east and Uranus is in the west at midnight. In the morning, Venus, Mars, and Saturn are located in the southeast and Jupiter is located in the south.

At midmonth, Mercury is visible during evening twilight, Venus rises at 4:00 a.m. local time, Mars rises at 2:00 a.m. local time, Jupiter rises at midnight and transits at 6:00 a.m. local time, and Saturn is visible during morning twilight for observers at latitude 40 degrees north.

Mercury is visible low in the southwestern evening sky from December 7th through December 31st. It's at its greatest heliocentric latitude south on December 15th. Greatest eastern elongation takes place on December 29th UT. Mercury sets about an hour after the Sun on that date.

Venus is occulted by the waning gibbous Moon during daylight on the afternoon of December 7th. The brightest planet crosses into Libra on December 11th. Venus is at its greatest heliocentric latitude north on December 15th. It lies two degrees north of the third-magnitude star Zubenelgenubi (Alpha Librae) on December 17th.

Mars is occulted by the Moon on December 6th. The Red Planet is four degrees north of the first-magnitude star Spica on December 21st.

In early December, **Jupiter** rises at approximately 12:30 a.m. local time. The gas giant is 1.8 degrees north of the Moon on December 4th. By the end of the month, Jupiter rises around 11:30 p.m. local time. It shines at magnitude -2.2 and spans nearly 39 arc seconds at that time. Click on **http://www.skyandtel...watching-tools/** or consult page 52 of the December issue of Sky & Telescope to determine transit times of the central meridian by the Great Red Spot. Data on Galilean satellite events is available at **http://www.skyandtel...watching-tools/** and on page 47 of the December issue of Sky & Telescope.

Saturn reappears low in the morning sky in mid-December. The Ringed Planet is situated a bit more than six degrees to the north of the first-magnitude star Antares on December 21st. For information on Saturn's bright satellites, browse **http://www.skyandtel...watching-tools/**

Uranus is located two degrees due south of the fourth-magnitude star Epsilon Piscium for the entire month. It is occulted by the Moon on December 20th. Uranus is stationary and then resumes direct or prograde (eastern) motion on December 26th.

Neptune lies 1.5 degrees northeast of the fifth-magnitude star Sigma Aquarii on December 1st and 2.0 degrees northeast of that star on December 31st. The eighth planet sets before 9:00 p.m. local time by the end of the month.

See **http://www.curtrenz.com/uranep.html** for additional information on Uranus and Neptune.

Finder charts for Uranus and Neptune can be found on page 49 of the September issue of Sky & Telescope and online at **http://www.nakedeyep....com/uranus.htm** and **http://www.nakedeyep...com/neptune.htm** and at **http://www.skyandtel...Nep_Finders.pdf**

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** will not be visible again until next year.

For more on the planets and how to locate them, see **http://www.nakedeyeplanets.com/**

Comets:

Comet C/2013 US10 (Catalina) may shine at fourth magnitude in early December as it travels northward through Virgo and eventually through Bootes. A finder chart appears on page 45 of the December issue of Sky & Telescope. Comet Catalina lies just south of Arcturus on the morning of December 31st. Visit **http://cometchasing.skyhound.com/** and **http://www.aerith.ne...t/future-n.html** for additional information on comets that are visible this month.

Minor Planets and Astroids:

During December, asteroid 29 Laetitia glides northwestward through Cetus. The tenth-magnitude minor planet lies very close to the spiral galaxy M77 on the nights of December 9th and December 10th. On the night of December 16th, it passes between the spiral galaxy NGC 1055 and the fourth-magnitude star Delta Cygni. The following asteroids brighter than magnitude +11.0 reach opposition this month: 16 Psyche (magnitude +9.6) on December 9th and 27 Euterpe (magnitude +8.4) in on December 25th. For information on this year's bright asteroids and upcoming asteroid occultation events, consult **http://www.curtrenz.com/asteroids.html** and **http://asteroidoccultation.com/** respectively.

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

Free Sky Maps:

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

Deep Sky Objects: (The objects listed below are located between 2:00 and 4:00 hours of right ascension.)

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in magnitude from +2.1 to +3.4, on December 3rd, 6th, 9th, 12th, 15th, 18th, 21st, 23rd, 26th, and 29th. On December 17th (December 18th UT), Algol is at minimum brightness and is well-placed early in the night. Consult page 47 of the December issue of *Sky & Telescope* for the times of the eclipses. For more on Algol, see **http://stars.astro.i.../sow/Algol.html** and **http://www.solstatio...ars2/algol3.htm**

Information on observing some of the more prominent Messier galaxies can be found at **http://www.cloudynig...ur-astronomers/**

Deep-sky object list generators can be found at **http://www.virtualcolony.com/sac/** and **http://tonightssky.com/MainPage.php**

One hundred and five binary and multiple stars for December:

Gamma Andromedae, 59 Andromedae, Struve 245 (Andromeda); Struve 362, Struve 374, Struve 384, Struve 390, Struve 396, Struve 400, Struve 419, Otto Struve 67 (Camelopardalis); Struve 191, Struve Iota Cassiopeiae, Struve 263, Otto Struve 50, Struve 283, Struve 284 (Cassiopeia); 61 Ceti, Struve 218, Omicron Ceti, Struve 274, Nu Ceti, h3511, 84 Ceti, h3524, Lambda Ceti, Struve 330 (Cetus); h3527, h3533, Theta Eridani, Rho Eridani, Struve 341, h3548, h3565, Tau-4 Eridani, Struve 408, Struve 411, h3589, h3601, 30 Eridani, 32 Eridani (Eridanus); h3478, h3504, Omega Fornacis, Eta-2 Fornacis, Alpha Fornacis, See 25, Xi-3 Fornacis, h3596 (Fornax); Struve 268, Struve 270, h1123, Otto Struve 44, h2155, Nu Persei, Struve 297, Struve 301, Struve 304, Eta Persei, Struve 314, Otto Struve 48, Tau Persei, Struve 331, Struve 336, Es588, Struve 352, Struve 360, Struve 369, Struve 382, Struve 388, Struve 392, Struve 410, Struve 413, Struve 425, Otto Struve 59, Struve 426, 40 Persei, Struve 434, Struve 448, Es277, Zeta Persei, Struve 469, Epsilon Persei, Es878 (Perseus); Struve 399, Struve 406, Struve 401, Struve 422, Struve 430, Struve 427, Struve 435, 30 Tauri (Taurus); Epsilon Trianguli, Struve 219, Iota Trianguli, Struve 232, Struve 239, Struve 246, 10 Trianguli, Struve 269, h653, 15 Trianguli, Struve 285, Struve 286, Struve 310 (Triangulum)

Notable carbon star for December:

U Camelopardalis

One hundred deep-sky objects for December:

NGC 891 (Andromeda); IC 342, K6, St23, Tom 5 (Camelopardalis); Be65, IC 1848, K4, Mel15, NGC 896, NGC 1027, St2, Tr3 (Cassiopeia); M77, NGC 788, NGC 835, NGC 864, NGC 908, NGC 936, NGC 955, NGC 958, NGC 1015, NGC 1016, NGC 1022, NGC 1042, NGC 1052, NGC 1055, NGC 1087, NGC 1094 (Cetus); IC 2006, NGC 1084, NGC 1140, NGC 1187, NGC 1199, NGC 1209, NGC 1232, NGC 1291, NGC 1300, NGC 1309, NGC 1332, NGC 1337, NGC 1353, NGC 1357, NGC 1395, NGC 1400, NGC 1407, NGC 1421, NGC 1426, NGC 1440, NGC 1452, NGC 1453, NGC 1461 (Eridanus); NGC 1079, NGC 1097, NGC 1201, NGC 1292, NGC 1316 (Fornax I Galaxy Cluster), NGC 1317, NGC 1326, NGC 1344, NGC 1350, NGC 1360, NGC 1365, NGC 1371, NGC 1374, NGC 1379, NGC 1380, NGC 1381, NGC 1387, NGC 1398, NGC 1404, NGC 1406, NGC 1425 (Fornax); Bas10, Cz8, IC 351, IC 2003, K5, Mel 20, M34, NGC 869, NGC 884, NGC 957, NGC 1023, NGC 1058, NGC 1161, NGC 1245, NGC 1275 (Perseus I Galaxy Cluster), NGC 1333, NGC 1342, NGC 1444, Tr2 (Perseus); M45 (Taurus); NGC 777, NGC 784, NGC 890, NGC 925, NGC 949, NGC 959, NGC 978A/B (Triangulum)

Top ten binocular deep-sky objects for December:

M34, M45, Mel15, Mel20, NGC 869, NGC 884, NGC 1027, NGC 1232, St2, St23

Top ten deep-sky objects for December: |

M34, M45, M77, NGC 869, NGC 884, NGC 891, NGC 1023, NGC 1232, NGC 1332, NGC 1360

Challenge deep-sky object for December:

vdB14 (Camelopardalis)