

Sky WAA tch



Celebrating Halloween

Courtesy of Scott Nammacher is this ghostly image of IC63 in Cassiopeia. IC63 is an emission/reflection nebula associated with the 2nd magnitude star Gamma Cassiopeia. The nebula lies at a distance of about 600 light years.

Scott took this image with his 12.5" Planewave scope and a SBIG 10XME camera—160 min (10 minute subs) in each of Ha and OIII. He used MaximDL for capture and stacking and Photoshop to combine and finish. Scott did a 4-color version using Ha and OIII, but elected to convert the finished work to B&W for effect.

In This Issue . . .

- pg. 2 Events for November
- pg. 3 Almanac
- pg. 4 In Memoriam: Mario Palmieri
- pg. 5 WAA Goes to Astronomy Camp
- pg. 12 Is Proxima Centauri's 'Earth-like' Planet Actually like Earth at All?
- pg. 13 The Belt of Venus
- pg. 14 Active Regions 2599 and 2598

Events for November

WAA November Lecture

"Astrophotography Image Processing with PixInsight."

Friday November 4th, 7:30pm

**Leinhard Lecture Hall,
Pace University, Pleasantville, NY**

Astrophotographer and WAA-member, Olivier Prache, will briefly introduce the image processing software, PixInsight, and its purpose. He will go through a digital color image development process using PixInsight to highlight how the tools function and how to use them.

Olivier has been watching the sky since the mid-1970's and started imaging around 2003. In 2007 he built a roll-off roof observatory in his backyard mostly as a shield against car lights and to provide greater stability to the imaging train. He has been imaging out of that location since then and moved from a 4" apo refractor to his current 12.5" Hyperion astrograph. [Directions](#) and [Map](#)

Upcoming Lectures

Pace University, Pleasantville, NY

On December 2nd, our speaker will be Professor Reshmi Mukherjee of Barnard College and Nevis Laboratories. Professor Mukherjee is a high-energy astrophysicist.

Starway to Heaven

**Saturday November 19th, Dusk.
Ward Pound Ridge Reservation,
Cross River, NY**

This is our scheduled Starway to Heaven observing date for October, weather permitting. Free and open to the public. The rain/cloud date is November 26th. **Important Note:** By attending our star parties you are subject to our rules and expectations as described [here](#). [Directions](#) and [Map](#).

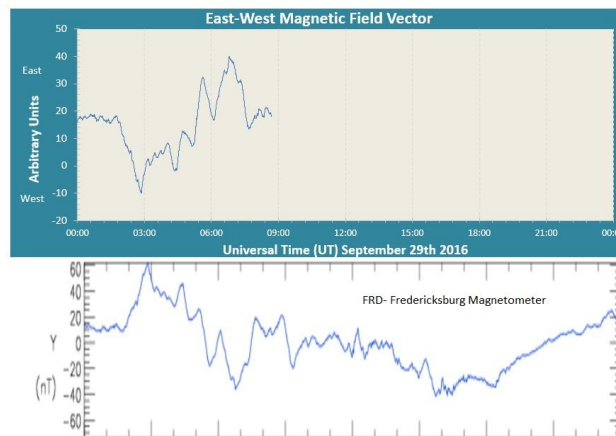
New Members. . .

Karen Killeen - Sleepy Hollow
Harrison Hurwitz - Scarsdale

Renewing Members. . .

Michael Lomsky - Wilton
Edgar S Edelmann - Tarrytown
Mauri Rosenthal - Scarsdale
Olivier Prache - Pleasantville
Kristina Newland - White Plains

Emmanouil Makrakis - Scarsdale
Claudia & Kevin Parrington Family - Harrison
Elaine Miller - Pound Ridge
Hans Minnich - Bronx
Bob Kelly - Ardsley
Kevin Mathisson - Millwood



Above is the output from John Paladini's homemade magnetometer. It records a coronal mass ejection on September 28-29th.

Wanted Assistant Editor

The WAA newsletter (the *SkyWaatch*) is seeking an Assistant Editor. If you can help, please let us know. Your participation in editing, compositing and proofreading tasks or submitting articles or images, will be much appreciated. Email Tom at waa-newsletter@westchesterastronomers.org

WAA Apparel

Charlie Gibson will be bringing WAA apparel for sale to WAA meetings. Items include:

- Hat (\$15)
- Polos (\$15)
- Tee shirts (\$12)

Call: 1-877-456-5778 (toll free) for announcements, weather cancellations, or questions. Also, don't forget to visit the [WAA website](#).

ALMANAC**For November 2016 by Bob Kelly**

Nov 7



Nov 14



Nov 21



Nov 29

The most super of Full Moons for 2016 (and beyond) arrives on the 14th, when the Full Moon is only three hours from Luna's closest approach for November. Be alert for higher than normal tides for the 14th and a few days afterward. Unless you enjoy watching beaches erode, hope against nor'easters or late season hurricanes (or hybrids) during that time. Enjoy this large Moon since, in 2017, the closest a Full Moon gets to a lunar perigee is 42 hours from perigee on November 5th, 2017.

Venus and Mars are silver and rose highlights in the southwestern sky after sunset. Mars continues to keep separation from the advancing Sun (as good wide receivers do in American football) and will do so for the rest of the football season. The time of Mars-set will stay the same through the rest of the year, but Mars will settle lower in the sky as seen from our latitude. Venus will blow people minds if they notice it blazing, low in the southwest. The always cloudy and highly reflective planet is brightening a touch to magnitude minus 4.1, the brightest since January 2016, on its way to an incredible minus 4.8 in February 2017. Venus follows Mars' path through Sagittarius, topping the teapot on the 16th. Watch for Venus' disk to become noticeably less full-phased in November. It becomes easier to detect the difference in a telescope as Venus grows more than 15 arc seconds wide. Venus' shape is best seen in bright twilight; or in daylight as it follows the Sun.

Really dark skies come earlier this month. The Seven Sisters and the horns of Taurus the Bull are well up in the east by 7pm, followed by Orion by 9pm; earlier as the month goes on. The Milky Way stretches from northeast to west-southwest after dusk. The summer triangle and its many sights linger into late autumn in the west. The Great Square of Pegasus stands high and drags the Andromeda Galaxy to overhead by late evening.

The Moon occults Neptune and Aldebaran on the other side of the world this month. Wait until December 6 and 13, respectively, for a chance to view the Moon overtaking these objects from our side of the planet.

Jupiter is visible again, surprising early-morning office workers with an east to southeast horizon as it rises well before sunrise this month.

Mercury slips out of the SOHO C3's solar corona viewer early in November on its way to an evening appearance, brightest about mid-month, dimming as the month goes on before leveling out at magnitude minus 0.5 for the last week of November. Mercury's greatest distance out from the Sun is December 11th, so we have a while to look for it. Altitude is the problem since by the end of the month, Mercury is as far south as it gets. To dig it out of twilight, look just as the sky starts to get dark, less than a fist high and to the left of where the sunset happened. You can fight the low altitude with a persistent attitude, particularly on the 30th, when the very thin Moon will keep company with Mercury low in the southwest.

Saturn is low in the southwestern evening sky on its way to conjunction with the Sun in December. By the time Mercury passes Saturn on the 23rd, much dimmer Saturn will be overwhelmed in bright twilight. Instead, try to catch Saturn making the scene with Venus and the Moon on the evening of the 2nd. After that, fans can track it with binoculars as it fades into the solar glare.

Uranus and Neptune are well up in the evening sky. Look up their locations, get your telescope and look at these distant ice giants. What color are they? Try to approach this with no preconceived notions as they are faint and their colors are subtle.

The once-in-a-while mighty Leonid meteor shower peaks on the 18th. A mostly full Moon in the morning sky washes out all but the brightest of the few flakes of comet Tempel-Tuttle expected this year.

On the morning of the 21st, the +4.4 magnitude star 31 Leo ducks behind the last quarter moon around 6:01:42 EST, reappearing soon after at 6:10:25. The edge of the occultation's visibility crosses northern New Jersey. There, a grazing occultation occurs, and if you travel to the right spot along a thin line, you may be able to see the star disappearing and reappearing behind lunar mountains. This will be an event for viewers with telescopes, better if it occurs on the dark part of the lunar limb. Technical details are at <http://iota.jhuapl.edu/rasc16gz.txt>.

The population of the International Space Station varies; with the base crew of three, recently augmented to

six. But three will depart by the time November comes. It's visible pre-dawn until the 22nd, and after evening twilight starting the 28th. You may be able to see the much fainter cargo ships and crew crafts in orbits close to the ISS as they depart the station for re-entry into the atmosphere.

If you are up for the ISS in the early morning, the U.S. Air Force's space plane, designated OTV-4 is up most mornings, but fainter at magnitude +1 to 2.

Two taikonauts are on a 30-day stay on China's new Tiangong 2. (Is there such a thing as 'new space station smell?') It's visible here in the evening sky until the 16th, looking like a +1 magnitude star moving across the sky on passes higher in our sky.

Daylight time ends early Sunday November 6th; clocks fall back making it brighter in the morning for a while.

In Memoriam: Mario Palmieri

[Editor's Note: Following is an excerpt of an email from WAA past-President, Charlie Gibson, on the recent passing of longtime WAA member Mario Palmieri].

I just received this photo from Mike Virsinger from his 2006 archives. It's a photo of our dear friend and longtime club member Mario Palmieri, 91, who passed from us on September 23rd, 2016. A native of Westchester County, Mario was born in Eastchester, New York on February 21st, 1925. He graduated from Eastchester High, in 1943, then immediately joined the Navy to fight in WWII. Mario saw combat in the Philippines and other parts of South Asia.

After being honorably discharged from service in 1945, Mario pursued and achieved his Bachelor of Arts degree from Columbia University. He stayed active with the Alumni Association for the rest of his life. Mario worked for Irving Trust and was editor of the Bank's magazine. Later, after retirement, Mario, who was an avid skier, became active with the over 80 Ski Club.

Of course, the WAA knew Mario as an avid amateur astronomer. He was at the beginning of a loosely formed group that met at the Hudson River Museum, called "The Westchester Observer's Group", formed in the mid-80's. It was at that group—along with Bob Davidson, Bill Newell, Doug Towers, Ed Orovack,

Martin Hoffman, John Radzilowicz, and Jon Elvert—that I initially met Mario. At that time, when the group was attached to the HRM, we had mid-week meetings in the evening. The planetarium operators, Ed and Martin ran the programs and Jon was the director. Later, pre-incorporation, Jon was the first President of the group.



Jon, took a job on the West Coast, at the University of Oregon, in Eugene, and in 1991, 25 years ago, we officially became a 501c3, non profit organization. Bob Davidson and Mario Palmieri became our first President and Vice President, respectively. Mario's Columbia connections, allowed our club to use the 24" Harri-

man scope next to Arden House, in Harriman, NY. In the early '90s, we shared use of this scope with The Rockland Astronomy Club, until the scope fell into disrepair and along with liability issues and the all-to-close construction of Woodbury Commons, in Central Valley, the scope was deemed unusable.

Bob and Mario's five years (1991-1996) as the club's leaders produced many star party events and the inclusion of our club into the Northeast Astronomy Forum, in the early 90's. Today's WAA recognizes Mario's service to the club and mourns his passing.

WAA Goes to Astronomy Camp

Eric Baumgartner, Bob Kelly & Larry Faltz

WAA members Bob Kelly, Eric and Katherine Baumgartner and Elyse and Larry Faltz attended this year's Medomak Astronomy Retreat and Symposium (MARS2016) in Washington, Maine, which took place from Sunday, July 24 to Saturday, July 30. Medomak has two properties in a rural area: a "family camp" and a "retreat center," running week-long programs concurrently each summer.



Washington, Maine (in red) is about 6½ hours from Westchester, 3 hours north of Boston.

Eric Baumgartner writes:

MARS2016 was our third year under the dark skies of Midcoast Maine. Medomak Camp owners George and Holly Stone, along with their camp director Dave Brunner, have cultivated a star party unlike any other that we know of on the East Coast.

Stargazing and telescope observing had been an important part of the Medomak Family Camp experience for years. In 2014, with the help of Sky & Telescope senior contributing editor J. Kelly Beatty and Bruce Berger of the Amateur Telescope Makers of Boston, a program catering to beginning and advanced amateur

astronomers took shape. A booth at NEAF enticed about 15 amateurs that first year, and since then, the event has doubled in attendance through an annual presence at NEAF and through word of mouth.

In its 2016 edition, MARS migrated up the road from Family Camp to the Medomak Retreat Center, which hosts summer retreats geared to yoga and meditation, ecology, fiber arts workshops, and even classical music conductors. In the off season, the Stones reclaimed and improved the south portion of a cow pasture for telescopes, added a graded gravel observing pad, installed GFCI AC power, and even built a pavilion with screened porch and bathroom for the comfort of the observers. The field, at an elevation of 478 ft., has unobstructed 360-degree views. George Stone even cut down the odd tall tree at the far southern end of the field to keep the horizon as low as possible. The camp owners are supremely sensitive to the needs of their astronomical guests! They want this program to be a success.

The skies above are dark, really dark. The Retreat Center is only 14 miles north of U.S. Route 1, the busy coastal highway that is the route most vacationers take to their destinations. Waldoboro is the nearest coastal town, but with just 5,000 residents it doesn't reveal its presence with a light dome. In fact, there are no visible light domes around the horizon. (Long-exposure photos show a minor dome in the southeast, toward Rockland, a more built-up and semi-industrial city of 7,000.)

Low horizons and no light pollution allowed for telescopic observation of Messier and NGC objects in southern Scorpio, something we can never do from our usual spots in Connecticut and New York. We were able to view NGC 6302, the Bug Nebula, with our 7" APO refractor, even though it reached a mere 8 degrees altitude at culmination. We took advantage of this by touring globular and open clusters and planetary nebulas in this rich region of the sky on one of the four clear nights during the six-day retreat.

Larry Faltz writes:

Unlike the tent or RV accommodations needed at regular star parties, Medomak attendees stay in simple but well-constructed cabins scattered among the pine trees, with regular beds and bathrooms with showers.

Three excellent meals are served each day in a large dining room and meetings are held in an adjacent common room. Talks are given after lunch and before dinner, leaving the morning and mid-afternoon free. All of the family camp resources, including boating, swimming, archery and other activities, are available to retreat attendees. Washington is about half an hour from the picturesque Maine coast, particularly the towns of Camden and Rockland, and a similar distance from the state's capital, Augusta. There's plenty to do and see in the local area. The site is rural enough to be very dark, but not so far away as to be unreachable in a day's drive from our area.



One of the comfortable cabins

About 35 people attended MARS2016. It's been growing each year but will be capped at around 50, based on the number of cabins. Eric and Katherine have been to all three retreats; it was the first for Bob (a birthday present from his wife), Elyse and me. A number of the other guests were repeat attendees. Folks came from as far away as Maryland, New Jersey, Pennsylvania, and a recently retired couple from NASA's Johnson Space Flight Center flew up from Houston, Texas. A few people were relatively inexperienced telescope users eager to learn. The presence of some large, sophisticated instruments reflected a serious commitment of others to the hobby.

This year, the organizers arranged for two special participants: well-known amateur astronomy writer/educator/observer and S&T contributor Rod Molise, who came all the way from Mobile, Alabama, and National Geographic photographer Babak Tafreshi, who is also the principal organizer of [The World at Night](#), the international nightscape photography collaboration. Rod, Babak and Kelly each gave a couple of talks and Babak gave a half-day workshop on the techniques and equipment he uses for making

magnificent wide-angle images that combine earth and sky in a single shot without cutting and pasting.

During its first two iterations, the retreat took place near the end of August so as not to conflict with Stellafane, which is always scheduled for the new moon at the end of July or beginning of August, but this year the lunar calendar would put a late August date past the camp's usual closing. A decision was made to hold it the week prior to Stellafane and accept that the moon's position would not be optimal, as moonrise would bring an end to the deep-sky portion of the viewing sessions a bit earlier than one might prefer. Nevertheless the darkness and transparency made for superb observing.



Elyse and Larry, CPC800 and mosquito-fighting window fan.



Eric Baumgartner setting up his 7" AP refractor.

Elyse and I brought our Celestron CPC800 8" Schmidt Cassegrain and a pair of Nikon 10x50 binoculars on a parallelogram mount. The Baumgartners brought a fantastic 7" AstroPhysics refractor on an AP1100 observatory-quality mount. Bob Kelly

brought his 8" Orion Intelliscope dobsonian and an iOptron SkyTracker for DSLR photography. Other scopes on the observing field included several 80 mm refractors, a 5" AstroPhysics refractor, two more 8" SCT's, a 10" Meade SCT, a 10" truss-tube dobsonian and another fabulous 7" refractor, this one a TEC. Behavior on the observing field followed typical star-party rules: red lights only and computer screens covered with rubylith. Thoughtfully, the organizers provided sheets of red film just in case. Green lasers were used only briefly during Kelly Beatty's sky orientation for enthusiasts new to the hobby.



Eric's b/w shot of the pavilion and the observing field.

We all arrived in time for lunch on Sunday, July 24, got an orientation, met the other attendees, moved into our cabins and then set up the telescopes on the observing field.

After dinner, we went up to the field. The viewing session was ushered in by lots of lovely fireflies dancing in the early evening. There were lots of mosquitos, typical for a Maine summer, but in addition to our own bug spray the camp kept a supply of window fans in the pavilion that can be set up near one's telescope to blow away the insects. We learned that mosquitos can't land on you if the breeze is above 8 mph. We got a few bites, but it could have been worse. During the orientation, we received strict instructions to avoid applying DEET-containing mosquito repellent anywhere near the telescopes, since the chemicals can be destructive to optics and plastic scope parts. We were even asked to make sure our hands and eyes were free of bug spray residue so that expensive eyepieces wouldn't be contaminated as we made observations.

We were able to observe on four of the six nights. We had a window of about 2 hours on Sunday before clouds came in. Tuesday and Wednesday were simply spectacular, a few clouds present at dusk dissipating

before astronomical twilight ended, resulting in dark, transparent skies. The sky quality meter reached 21.41, even better than Medomak's promised darkness of 21.3. For comparison, a very good night at Ward Pound gives a reading of 20.25. At WPR the Milky Way is just at the limit of perception on the very best of nights but at Medomak the galaxy stretched brightly across the sky from horizon to horizon. The North American Nebula in Cygnus was a naked eye object, as was M7 in Sagittarius. It was cloudy on Monday and thunderstorms came in on Thursday, but in spite of predictions of substantial cloud cover for Friday, the skies cleared nicely. There were quite a few meteors throughout each evening, and every night featured one or more ISS passes.

The lectures were very informative. Rod Mollise gave an interesting talk on observations of "Strange Things," covering unusual astronomic phenomena as well as faux observations like the "face" on Mars. His second talk was a thorough and detailed exposition of the evolution of amateur astronomy since the 1960's, lavishly illustrated with dozens of advertisements from the pages of *Sky & Telescope*. Names like Cave, Criterion and Jaegers brought back many memories. Rod is an interesting guy: he has the affectation of referring to himself in the third person in the persona of "the honey badger" (*Mellivora capensis*, an exotic and fierce animal that lives in Africa and southern Asia) and his relaxed manner and southern drawl are disarming, but his knowledge of astronomy, telescopes, observing, physics and science in general is quite astounding. He teaches college-level astronomy in addition to his prolific activities as an astronomy writer and blogger (I had him autograph my copy of his excellent book *The Urban Astronomer's Guide*.) Kelly Beatty gave a lucid presentation on the latest results from New Horizons mission to Pluto (his article on the same topic is in the October S&T). He also discussed the August 21, 2017 eclipse, including the science behind it and practical tips for making travel plans, at this now-late date, as well as describing the tours that *Sky & Telescope* will be sponsoring to several viewing sites. One afternoon, the attendees were invited to make brief presentations. I spoke about life in the solar system (I keep some astronomy PowerPoints on a thumb drive on my keychain). There was a report on aurora viewing from Churchill, Manitoba and a young fellow who does meteorite research at Goddard Space Flight Center in Maryland spoke about how Martian meteorites tell us about the geologic history of the red planet. In addition to his workshop,

Babak Tafreshi gave a general talk on nightscape photography and showed some spectacular images taken by him and his colleagues.

Thursday night's rain-out precluded viewing, and at Rod Mollise's suggestion, we all watched a DVD of *Pitch Black*, the first of the Riddick movies starring the semi-conscious Vin Diesel. Rod pitched it as something profound, but we thought it was basically a slasher movie set in outer space. *De gustibus non disputandum est*.

The food was delicious, diverse and plentiful. Every meal was different, with a range of salads, main courses, side dishes and desserts. The camp provided water, lemonade and iced tea, and we could drive two minutes to a nearby market for beer and wine. Friday night featured an epic lobster and mussel feast. The delicious soft-shell lobsters could easily be devoured without the need for lobster crackers. It turned out to be Rod's first lobster, although he is an experienced crawfish eater.



Our group on the observing field, by Babak Tafreshi

The accommodations at Medomak are far more civilized than at a regular star party, where you're on your own for accommodations (usually camping or an RV) and food (usually non-gourmet grub purchased at the site). Even though it's not "glamping," the cabins are solid, clean and comfortable, serious attention is paid to the food, the number of attendees is kept reasonable intimate and the staff support is first rate. The opportunity to interact with the faculty is vastly more personal than at a large star party. For this kind of program and environment, the camp charged \$1,040 per person for the 2016 event. It's not the *de minimus* cost of a regular star party, but it's a more comfortable and in a sense a more enlightened experience. It is, after all, a vacation as well.

We had ample opportunity to explore the local area. Although the meals at Medomak were really excellent, Eric and Katherine, who know the area well, convinced us to join them for two seaside lobster roll lunches. They also took us to the excellent Farnsworth Museum in Rockland, which specializes in Maine artists, particularly three generations of the Wyeth family. Eric and Anne are art dealers and know the curator, who gave us a tour. We also stopped at the Sweetgrass Winery and Distillery in the town of Union, quite close to Medomak. It's recognized as one of the top gin makers in the United States. We sampled a number of their unusual and flavorful concoctions. In the tiny hamlet of Liberty, just 7 miles north of Medomak, we visited the Liberty Tool Company, a charming antique store featuring more used, dull and broken drill bits and bizarre tools than you could ever imagine. Across the street was Liberty Graphics, selling a range of printed T-shirts. Elyse and I each bought astronomy-themed glow-in-the-dark shirts, which we hope to wear at a coming WAA star party.



Katherine Baumgartner contemplating at the Sweetgrass Distillery.

With the solar eclipse occurring at new moon in August 2017, the Medomak Astronomy Retreat and Symposium will undoubtedly be scheduled for next July. You would do well to consider making the investment for a very civilized and enjoyable way to do deep sky observing and to meet and mingle with a diverse group of friendly astronomy enthusiasts in a comfortable setting. The likelihood of getting more than one clear night is high, and during the inevitable cloudy nights there's plenty to do.

Bob Kelly writes:

I have limited experience with observing in very dark skies. But the ease with which we could see the Milky Way after twilight ended was even better than the Rockland Astronomy Club's Summer Star Party in the Berkshires. Being further north, twilight ended later and I thought we'd lose some of the southern stars below the horizon and be more likely to be in the jet stream with the turbulence and storms that it brings. Not to worry – the Milky Way and the tail of the Scorpion were clearly visible down to the southern horizon – more southern stars than we can see at our Westchester dark sky site as we deal with a hill and light pollution to our south.



Bob Kelly's image of Sagittarius with a Canon XTi on an iOptron SkyTracker, 66-seconds

I'm a bright object guy. The first night, I would listen as someone found a fainter object, then walk over to see. Everyone was happy to let me look and tell me how they got to the cluster, nebula or galaxy. Then I'd go back to my 8" dob and find for myself. Everyone was very helpful and it was very rewarding.

The observing site had an enclosed pavilion with electricity and a bathroom. Snack food included bite-sized wraps, not just the typical munchies. The wi-fi at the observing site allowed full use of my wi-fi-only mini-tablet. I was surprised at how dark-adapted my

eyes could get – working with the telescope without a light was easier than usual, even though I'm not very good at seeing in the dark.

Each night I worked on something new – setting up my iOptron tracking mount for my camera, adding a unit finder on my scope, and other mini-projects with help from my fellow campers.

After Tuesday night's viewing, I finally went 'home' about 3:15am. These are the darkest skies I've ever seen, excepting when Carol and I watched the sky one night on a mountain in North Carolina. The sky is so dark I saw more of the Milky Way than ever before.

On Wednesday night, before sunset, I assembled my iOptron tracker for my first use. I used the compass to polar align the tracker, since I wanted it to be ready while it was still light out. But even exposures out to two minutes were well tracked, with some minor trailing of the stars (as you can see – try counting those stars!)

The mosquitoes were out each night, except when the wind kept them away. I spent a lot of time wearing my jacket and hood. But I had few if any bite marks, so the 25% DEET must have helped.

Larry Faltz' observing report

Not to let the details of the experience become emulsified in my memory with the passage of time, I kept a log and sometimes brief notes on each object that I viewed. I concentrated on the fainter objects that can't be made out from Ward Pound without video. It's great to get those photons directly onto your retina! Once the scope was aligned, it was simply a matter of pressing buttons and picking the right eyepiece (and sometimes a filter). I had both Cartes due Ciel (planetary program) and Deepsky Astronomy (old but capable planning software) on my red-shielded laptop to help decide on which objects to go for.

Jupiter, Mars and Saturn were the early targets for everyone each night before it got really dark. In Eric's large refractor, the image of Saturn was exceptional, the Cassini division very sharp and black in spite of the planet's low altitude. Mars, a respectable 13.6" disc, showed some surface features, particularly in the fine refractors with top-quality eyepieces. The image in my 8" SCT was good, helped by an orange filter and carefully collimated optics, but definitely not as good as in a 7" triplet APO refractor.

Rod Mollise, who probably knows more about SCTs than anyone in the world, came over to my set-up and

gave me some advice on backlash settings on the CPC mount (set them to zero and when aligning always approach objects with the up and right keys on the hand control). That definitely made a difference. I felt a tinge of pride when he praised the cleanliness of the optics in my 11 year-old scope.



Using Babak Tafreshi's techniques, Larry Faltz took this photo of Elyse just after astronomical twilight ended. The thin clouds dispersed shortly thereafter.

On Sunday's observing session, I made the rounds of the brighter Messier nebulas and galaxies. The Ring, Dumbbell, Lagoon and Omega nebulas, with and without Lumicon Deepsky, Orion Ultrablock and Lumicon Oxygen III filters, were bright with dramatic detail. Galaxies M81, M82, M51, M101, M63 and M64 were easy. Structure could be glimpsed in the spiral arms of M81 and the dust lane of M82 was easily resolved. M51 showed some structure as well, with the bridge between the two nuclei quite evident. M101, which is invisible from Ward Pound with the 8" due to its low surface brightness, was an impressively large, distinct fuzzball.

Among the fainter planetary nebulas, M76 in Perseus was just visible. The Owl Nebula, M97 in Ursa Major,

was large and brighter than I expected. It was even more dramatic through a Lumicon Deep Sky filter. Its structure was even more detailed with the OIII filter and averted vision, although so much light is lost with an OIII that the view is not as pleasing than with the less severe Lumicon. OIII filters probably need at least 10" of aperture even for the brighter planetaries.

When the 3rd quarter moon came up (later and later as the week went on, of course), the view along the terminator through Eric's refractor was dramatic, although moonrise pretty much marked the end of deep sky viewing each night and the field slowly emptied.



Eric Baumgartner's wide-angle view, again using techniques taught by Babak Tafreshi

On Tuesday and Wednesday, we were out until well after the moon rose, getting to bed after 2:30 am on Wednesday. Sky conditions were optimal, with the SQM reading again reaching 21.41 on Tuesday and 21.39 on Wednesday, only falling when the moon rose (but still quite a bit better than WPR's darkest readings). The number and range of objects that Elyse and I looked at was staggering. At the start of each night we returned to the brighter, more famous Messier objects because they were so fabulous, but then we went

to fainter targets. I viewed more galaxies than I ever had before: M94 and M106 in Canes Venatici and M108 and M109 in Ursa Major were nicely resolved. NGC4214 in Canes Venatici was fainter but still quite visible, as were NGC4449 and NGC5005 in the same constellation. The large face-on spiral NGC6946 in Cepheus showed hints of detail.

Later, Andromeda and Pegasus rose in the east, bringing with them the close galaxies of the Local Group. I could place the core of M31 and its two companions M32 and M110 in the same wide-angle field. A special treat was M33, the great spiral galaxy in Triangulum. Its low surface brightness makes it impossible to see at Ward Pound without video (and then just barely). It's over a degree in diameter and completely filled the wide-field eyepiece. It was very easy to spot with 10x50 binoculars even when low in the sky.

I challenged myself to find the Ghost of Mirach, NGC404, a 10th magnitude galaxy only 7 minutes of arc away from 2nd magnitude Mirach (β Andromedae), whose glare overwhelms it. By putting the star just outside the eyepiece field stop, the faint galaxy could be seen. This is the first time I've glimpsed it without the MallinCam. NGC7331, the main galaxy of the Deer Lick Group in Pegasus, was easily visible.

I observed well over a dozen globular clusters, among them the familiar Hercules clusters M13 and M92, M4 and fainter NGC 6144 in Scorpius, the grand M22 in Sagittarius, M5 in Serpens, a gaggle of globs in Ophiuchus (M10, M12, M62, NGC6235, M107), M71 in Sagitta and M56 in Lyra. There was lots of discussion among the refractor set about which eyepieces brought out the best views of globular clusters. Seeing a glob in a 7" triplet APO ED AstroPhysics refractor with a Televue Ethos eyepiece is a special experience. Diamonds on velvet. My log entry for M13 has multiple exclamation points after it.

In addition to re-observing planetary nebulas M57, M27, M76 and M97, we observed NGC6826, the so-called "Blinking Planetary". The central star was invisible when I looked directly at it, but popped into view with averted vision, giving it a blinking quality indeed. The Cat's Eye, NGC6543, was bright and structured in the SCT and an object of intense study in Eric's large refractor. The 8th magnitude "Emerald Nebula" NGC6572 in Ophiuchus was a bright blue-green smudge, 11' in diameter. NGC7662, the "Blue Snowball" in Andromeda, lived up to its moniker.

I picked a few double stars from the CPC's "tour" list: Achird (Eta Cassiopeia), Marfak (Kappa Hercules), Psi and Zeta Pisces, the Epsilon Lyrae double-double and of course Albireo (Beta Cygni). I spent a half hour looking at open clusters in Cassiopeia. Because of the relatively small field of the SCT, they are not as dramatic as might be seen in a wider-field telescope and at times barely distinguished themselves from background star fields. M11, the "Wild Duck" cluster in Scutum, was another matter altogether, its myriad stars filling the eyepiece. Once the moon rose we examined Uranus and Neptune, their bluish disks clearly resolved. The moon itself was bright and the craters along the terminator were dramatically lit. I mounted my Denkmeier II binoviewer on the scope for lunar observing at the end of each of the two sessions.

On Wednesday night, some of the retreat staff came up to the viewing area for a look. Bob Kelly, who is WAA's premier astro-educator, took them under his wing to explain the night sky and describe how the telescopes worked. He's an eloquent and patient explainer of all things astronomic.

Friday evening, for which significant cloud cover had been predicted, turned out to have perfectly clear skies. Since some of us had packed our scopes away for an early Saturday getaway, there was more communal stargazing and gear chit-chat at the half-dozen scopes that were out, a nice way to end the week. The hit of the evening was the Veil Nebula through a 5" AstroPhysics refractor with a Televue eyepiece and a Lumicon deep sky filter. It appeared almost fluorescent as it snaked its way across the field.

You can find out more by going to the Medomak Retreat Center [web site](#), or talking to George Stone and David Brunner at next year's NEAF. ■



Camden harbor

Is Proxima Centauri's 'Earth-like' Planet Actually like Earth at All?

Ethan Siegel

Just 25 years ago, scientists didn't know if any stars—other than our own sun, of course—had planets orbiting around them. Yet they knew with certainty that gravity from massive planets caused the sun to move around our solar system's center of mass. Therefore, they reasoned that other stars would have periodic changes to their motions if they, too, had planets.

This change in motion first led to the detection of planets around pulsars in 1991, thanks to the change in pulsar timing it caused. Then, finally, in 1995 the first exoplanet around a normal star, 51 Pegasi b, was discovered via the “stellar wobble” of its parent star. Since that time, over 3000 exoplanets have been confirmed, most of which were first discovered by NASA's Kepler mission using the transit method. These transits only work if a solar system is fortuitously aligned to our perspective; nevertheless, we now know that planets—even rocky planets at the right distance for liquid water on their surface—are quite common in the Milky Way.

On August 24, 2016, scientists announced that the stellar wobble of Proxima Centauri, the closest star to our sun, indicated the existence of an exoplanet. At just 4.24 light years away, this planet orbits its red dwarf star in just 11 days, with a lower limit to its mass of just 1.3 Earths. If verified, this would bring the number of Earth-like planets found in their star's habitable zones up to 22, with 'Proxima b' being the closest one. Just based on what we've seen so far, if this planet is real and has 130 percent the mass of Earth, we can already infer the following:

- It receives 70 percent of the sunlight incident on Earth, giving it the right temperature for liquid water on its surface, assuming an Earth-like atmosphere.
- It should have a radius approximately 10 percent larger than our own planet's, assuming it is made of similar elements.
- It is plausible that the planet would be tidally locked to its star, implying a permanent 'light side' and a permanent 'dark side'.
- And if so, then seasons on this world are determined by the orbit's ellipticity, not by axial tilt.

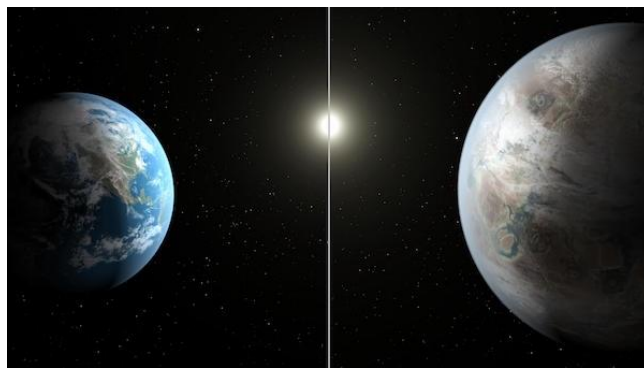
Yet the unknowns are tremendous. Proxima Centauri

emits considerably less ultraviolet light than a star like the sun; can life begin without that? Solar flares and winds are much greater around this world; have they stripped away the atmosphere entirely? Is the far side permanently frozen, or do winds allow possible life there? Is the near side baked and barren, leaving only the 'ring' at the edge potentially habitable?

Proxima b is a vastly different world from Earth, and could range anywhere from actually inhabited to completely unsuitable for any form of life. As 30m-class telescopes and the next generation of space observatories come online, we just may find out!

Looking to teach kids about exoplanet discovery? NASA Space Place explains stellar wobble and how this phenomenon can help scientists find exoplanets: <http://spaceplace.nasa.gov/barycenter/en/>

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov/ to explore space and Earth science!

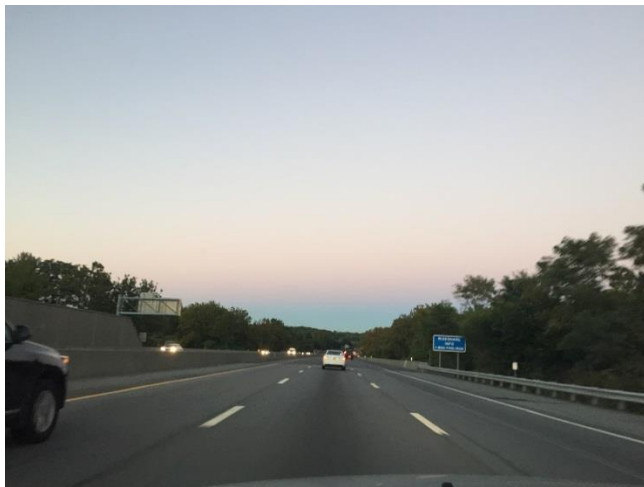


An artist's conception of the exoplanet Kepler-452b (R), a possible candidate for Earth 2.0, as compared with Earth (L). Image credit: NASA/Ames/JPL-Caltech/T. Pyle.



The Belt of Venus

Larry Faltz



On a clear day, when the sun is just below the horizon prior to sunrise or after sunset, an atmospheric phenomenon called the “Belt of Venus” graces the anti-solar sky. It’s a pink band arcing across the sky, below which the sky is dark blue down to the horizon. From a high vantage point, such as a mountaintop, you would see that the Belt is a gigantic arch, highest at the exact anti-sun point and curving gently to the north and south horizons.

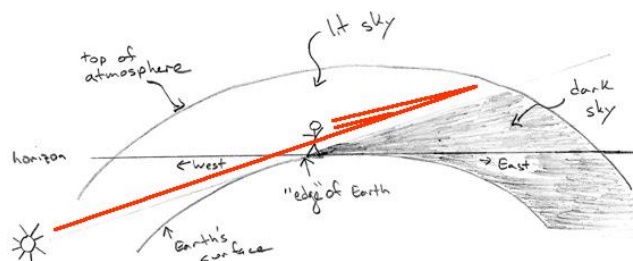
The Belt of Venus is usually seen 10-15 degrees above the horizon. It is most intense between 10 and 20 minutes before (morning) or after (evening) the terminator passes over your position.

The iPhone 6 picture above was taken on the Cross Westchester Expressway on October 11, 2016 at 6:52 a.m., 11 minutes before sunrise. The camera’s wide-angle lens makes the Belt look lower than it actually was (about 12°), but the colors are accurate.

The Belt of Venus is caused by back-scattering of sunlight by fine dust particles in the atmosphere. The light travels on a long path in the atmosphere. Rayleigh scattering, in which the blue wavelengths are preferentially dispersed by atmospheric molecules, leaves the red wavelengths to be reflected off the dust particles. The dark area below the Belt of Venus is the shadow of the Earth.

The arch structure of the Belt is one of the two direct pieces of evidence (without taking a trip in space) that the Earth is round, the other being our planet’s shadow on the Moon during a lunar eclipse.

Here’s a drawing of the phenomenon by Phil Plait, the impresario of the delightful astronomy blog Bad Astronomy. I added some red light rays coming from the sun and bouncing off the atmosphere above the Earth’s shadow.



The Belt of Venus can’t be associated with the planet Venus, since that body could only be viewed opposite the Sun if you were on the dark side of Mercury. The appellation comes from the *cestus* of Aphrodite (the Roman name of Venus, goddess of love, beauty and pleasure), a sash or belt that was decorated with objects that aroused amorousness. In the Trojan War, Aphrodite supported the Trojans and Hera was on the side of the Greeks. Zeus was somewhat neutral, favoring individual Trojans in battle but already having decreed the eventual destruction of Troy. In the *Iliad*, Book 14, Hera borrows Aphrodite’s *cestus* (after telling her a lie) to enhance her attractiveness to Zeus in order to seduce him; Hera has arranged for the Greek fighters to gain an advantage during their dalliance.

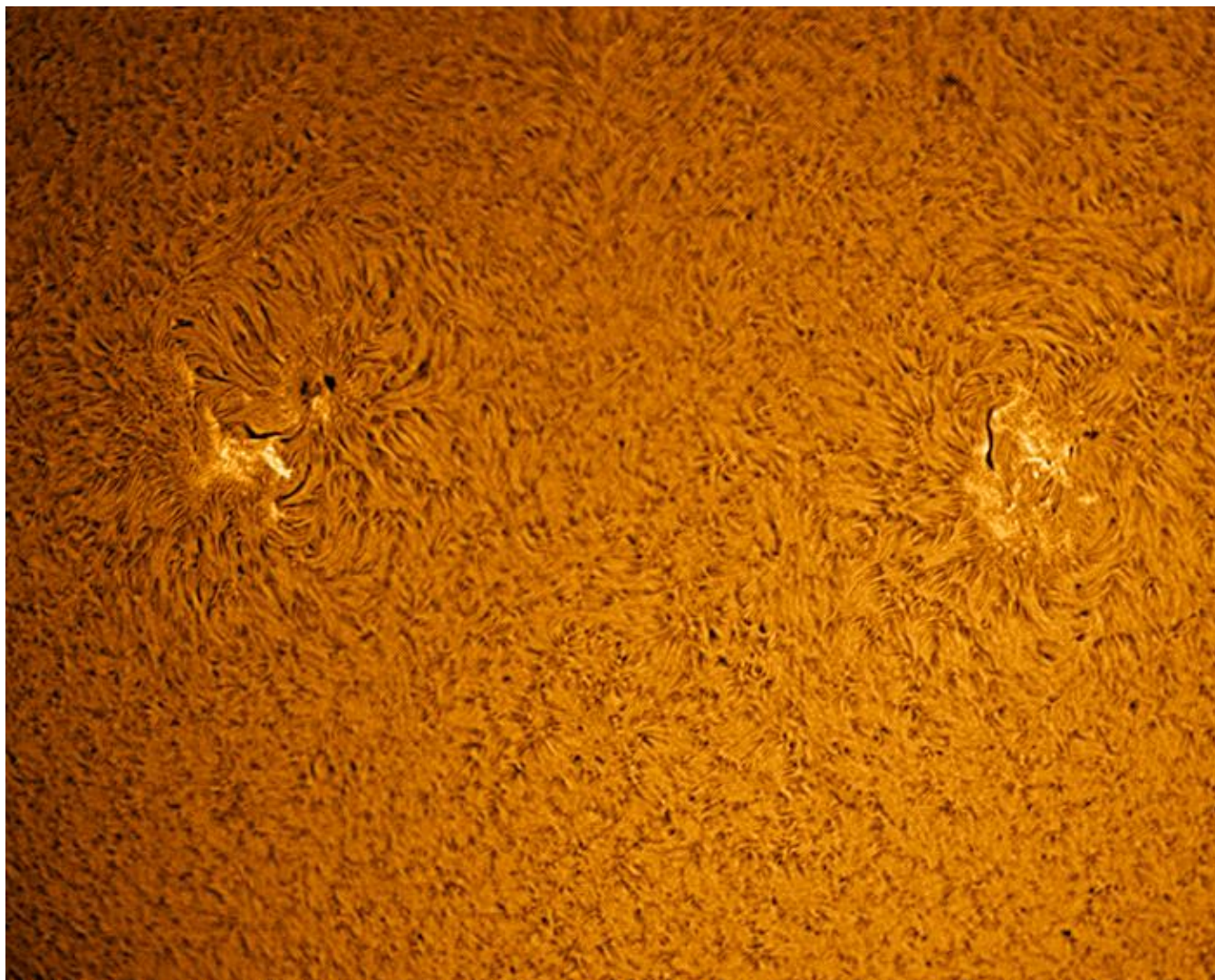
She [Aphrodite] spoke, and from her breasts unbound the elaborate, pattern-pierced zone [sash], and on it are figured all beguilements, and loveliness is figured upon it, and passion of sex is there, and the whispered endearment that steals the heart away even from the thoughtful. She put this in Hera’s hands, and called her by name and spoke to her: “Take this zone, and hide it away in the fold of your bosom. It is elaborate, all things are figured therein. And I think whatever is your heart’s desire shall not go unaccomplished.” (Translation by Richmond Lattimore)

The belt is mentioned in Harriet Beecher Stowe’s 1852 anti-slavery novel *Uncle Tom’s Cabin*:

Bards have written of the cestus of Venus, that turned the heads of all the world in successive generations.

A plain version of the *cestus* was a common element of Greek women’s garb in the classical era. ■

Active Regions 2599 and 2598



Active regions 2599 (L) and 2598 (R) as imaged with a Lunt 60 mm f/10 hydrogen-alpha telescope, double-stacked to give 0.5 Å resolution. October 7, 2016, seeing 7/10, best 750 of 3,000 frames, stacked with Auto-stakkert!2 and wavelet processed with Registax 6.1. Final processing with Photoshop Elements.

--Larry Faltz