Spring 2014
Issue 105

Battle Point Astronomical Association BPAA Quarterly

www.bpastro.org Bainbridge Island, WA

Planetarium Shows

(unless otherwise noted, shows are open to the public, and held at Ritchie Observatory, Battle Point Park. All shows include stargazing, when weather permits.)

April 12 @ 7:30 p.m.
May 10 @ 8:00 p.m.
June 14 @ 8:30 p.m.
July 12 @ 8:30 p.m.
August 9 @ 8:00 p.m.
September 13 @ 7:30 p.m.

Astronomy Classes

7:30 – 9:30 Thursday nights at the Observatory. Sign up through Bainbridge Island Parks and Rec, www.biparks.org: page 35 of Parks programs pdf.

Introduction to Amateur Astronomy
April 10 – May 15 $59 #131860-01

Advanced Astronomy & Observation
May 22 – June 12 $39 #131861-01

Celestial Calendar

APRIL

8 Mars at opposition
12 Yuri's Night (world's first spaceman)
13 Vesta at opposition
14 Mars closest approach, Ceres at opposition
14–15 ○ Full Moon, Lunar Eclipse
22 Lyrids meteor shower peak
28 ● New Moon, Annular Solar Eclipse (Antartica)

MAY

10 Saturn at opposition
14 ○ Full moon (12:16 p.m.)
24 Camelopardalis meteor shower peak
25 Mercury greatest elongation east
28 ● New moon

JUNE

12 ○ Full moon (9:11 p.m.)
21 Summer Solstice (3:51 a.m.)
27 ● New moon

Homesteading Virgo

Mars concept vehicles and habitat for NASA Design Reference Mission Architecture 5.0 (2009)

CALENDAR NOTES: More than two hundred thousand people have already signed up for a one-way trip to Mars. Not me. Not that I wouldn't like an extra 37 minutes every day. Not that I wouldn't like to really get away from it all. Once upon a time I signed up for something similar as a member of the L-5 Society, dedicated to human habitation at one of the stationary Lagrangian points near Earth's Moon. Now, I'm content to contemplate. As Mars glares red-eyed this spring, I'll think fondly of those colonists, thrilled to know that space still excites. Mars, in particular, always does — maybe because it's not always there. We only get a brief, almost acceptable view every other year. April 2014 brings such a moment. For a couple months centered around April's opposition, Mars should command the attention of even the most casual observer. Amateur telescopes may reveal shrinking ice caps or planet-wide dust storms. Because Mars' day is only slightly longer than our own, observations on successive days show almost the same face of Mars, simplifying remote weather pattern data collection, if you want to be really geeky. Mention "face" and less formal conversation inevitably turns to Cydonia's famous mesa, the Face on Mars. Sure, it is probably nothing more than pareidolia, the human tendency to find patterns amidst noise. But it is further proof that Mars fascinates.

It might be easier to live on an asteroid. Since there is less gravity, it takes less fuel to get on and off (should commuting prove desirable). With binoculars, and maybe even the unaided eye, you can evaluate your own possible asteroidal homesites this spring. The two brightest asteroids, Ceres and Vesta, reach opposition a few days after Mars. Since all three bodies achieve opposition at nearly the same time, they appear quite close to each other in the night sky. All are in the constellation farthest from April's sun, Virgo. A sense of the actual distance between the two asteroids is conveniently offered by the flight schedule of the ion-thruster powered NASA spacecraft, Dawn, currently en route from Vesta to Ceres.

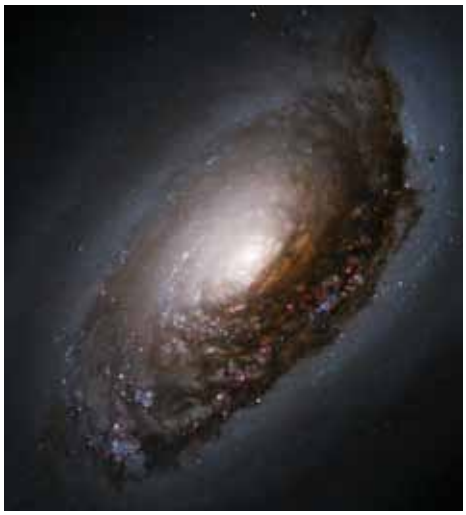
Vesta, courtesy NASA

Dawn left Vesta in September, 2012. She'll arrive at Ceres thirty months later, in the spring of 2015.

The association of Mars with war is too well known. (Well, at least war is too well known.) So it is nice to report that the namesake gods for these two asteroids give us the far more wholesome concepts of bread and hearth. Ceres, the largest asteroid and first discovered, is etymologically related to our word "cereal." In particular, spelt, an ancient (and delicious) grain was considered a gift of Ceres, the goddess of agriculture. Vesta, the brightest asteroid (if one is watching from Earth) is, as goddess, especially remembered for her priestesses. The Vestal Virgins tended Rome's sacred fire, giving us the concept of keeping the home fires burning. So enjoy the bread and fireplaces.

The Sombrero Galaxy courtesy NASA/ESA and The Hubble Heritage Team (STScI/AURA)

A few hours after Ceres arrives at opposition, our Moon goes blood red. The first bite out of the moon occurs just before 11 p.m. Monday, April 14th. Totality begins six minutes into tax day and lasts well over an hour. During totality Earth's shadow totally blocks sunlight from reaching the moon. If we had no atmosphere, lunar eclipses would be so dark they might only be detectable by the missing stars. Fortunately we have air to breathe, and this air bends some sunlight, which hits the Moon and bounces back to our retinas. Red is often the color, because what meager light reaches our totaled Moon first passes through Earth's ever-traveling ring of sunsets and sunrises. The actual color and intensity is a good measure of Earth's atmospheric health; volcanic ash, storms, and pollution can turn totality even darker. So we can't quite predict yet whether the Moon will get as red as Mars. But both will be staring down from Virgo, inviting comparison.



The Black Eye Galaxy courtesy NASA and The Hubble Heritage Team (AURA, STScI)

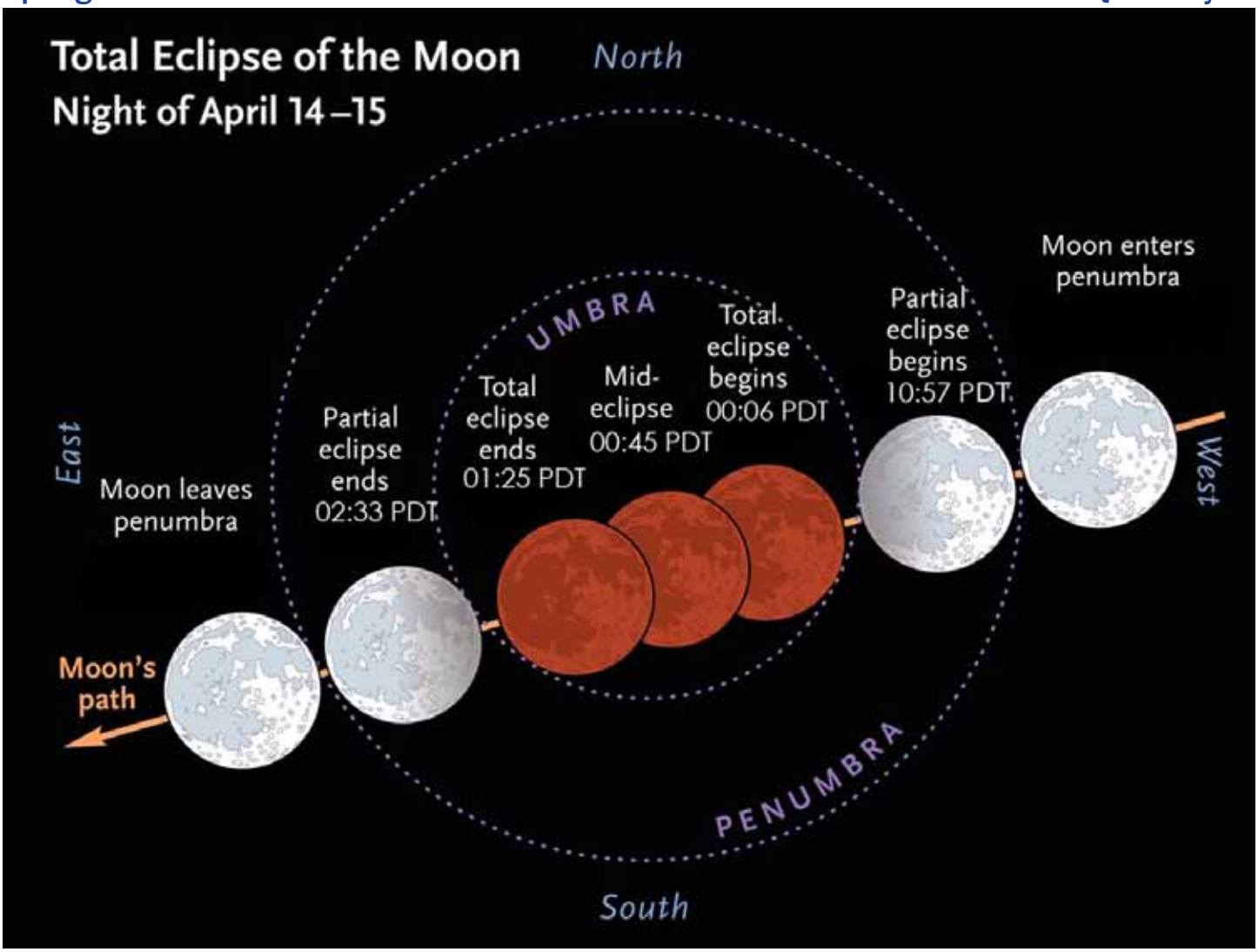
If local solar system destinations still seem a bit too close to home, you might consider the Virgo-Coma galaxy cluster. Every spring the constellations of the thirteenth hour of right ascension, Coma Berenices and Virgo, climb high, inviting exploration of their thousand-plus galaxies. Charles Messier listed at least fourteen, dozens are visible in amateur telescopes, and several are even bright enough for binoculars. Establishing a new home that far off might not be easy; but it's a good bet those galaxies host lots of suns, planets, and, maybe, a few sentient beings filled with similar spring fever wanderlust.

The Needle Galaxy courtesy ESO

Galaxies from the Virgo-Coma Galaxy Cluster

Fortunately not everything happens in or happens best in April. Make special note to stay up late Friday night, May 23rd. The beginning midnight hour of Saturday, May 24th, is the predicted peak of a potentially spectacular and brand-new meteor shower. Dust from periodic comet 209P/LINEAR is responsible. Early predictions suggested a meteor storm (a very loose term meaning nearly too many to count) might ensue; recent calculations suggest a more modest zenithal hourly rate of 100. This is one shower no one has seen before, so no one really knows what might happen. But even if we only get the lower number, this could still be the best meteor display of 2014.

Whether or not the weather cooperates, we encourage you to join us for our monthly Planetarium-Show-and-Stargazing presentations. We'll tell you lots more about these and other heavenly delights, answer your questions, and do our best to keep you informed and entertained. Maybe we can even introduce a few of you to your future celestial home. — *Cheth Rowe*



Steve Ruhl
President's Message

Normally, not many people look forward to April 15th. This year we have an exception. For several years, we have not seen lunar eclipses. That ends on the night of April 14 – 15. And this full lunar eclipse is extremely well positioned for us. The entire eclipse will be visible from our location. This eclipse could only be better if it occurred during a weekend. I hope the weather will cooperate.

Above, a graphical rendition of the eclipse from *Sky and Telescope*, adapted for our time zone. Note that the eclipse begins to the right, at 10:57 p.m. PDT April 14, and continues to the left, ending at 2:33 a.m. PDT.

BPAA Events and Changes

Our downstairs meeting room has a fresh coat of paint and looks much better. Many thanks to Nels for organizing the work party and to Eben Calhoun, Paul Hoy and Glen Wyatt for submitting to Nels' "On the Job Training for Painting" and learning how to "Paint like a Pro."

Eben Calhoun, New BPAA Chief Astronomer

Eben has also taken up the board position of Chief Astronomer. He has been with us for a number of years and has poured his energies into the Association. I look forward to his future contributions.

Dave and I will be teaching "Intro to Astronomy" and "Advanced Astronomy" this spring. These classes are fun and designed for amateurs. Sign up is through the BI parks website, www.biparks.org/, details in the Newsletter Calendar, page 1. If you have questions, please email me, president@bpastro.org. We have learned that astronomers are procrastinators. In the past, six or seven people try to sign up on the last day only to find out that we had to cancel the class due to lack of interest. Please sign up early.

Sundial Project Update

The Battle Point Sundial Project is moving forward. We've produced preliminary drawings and a structural engineer has reviewed the sundial concept and determined that it is structurally sound. We've met with the fabricator to explore fabrication and construction details. These reviews have resulted in improvements to the design: for example, we've simplified the way we plan to attach the sundial to its concrete base.

The next major step is to meet with the fabricator again, this time to finalize details, schedule and cost. With a firm price in hand, the Board will take a vote to approve construction. In the last newsletter we were hopeful of completing installation this spring. We are now cautiously optimistic that a dedication ceremony can take place on or around the summer solstice, but of course a project like this is subject to unforeseen delays. We'll keep you posted!

Last time we reported that we reached our funding goal through an Indiegogo campaign. We have been busy sending perks to our generous donors. We've delivered 54 Analemma Patches, 64 Sundial T-shirts, 8 Sundial Models, and 5 pairs of beautiful Sundial Earrings handmade by our talented sundial sculptor Bill Baran-Mickle.

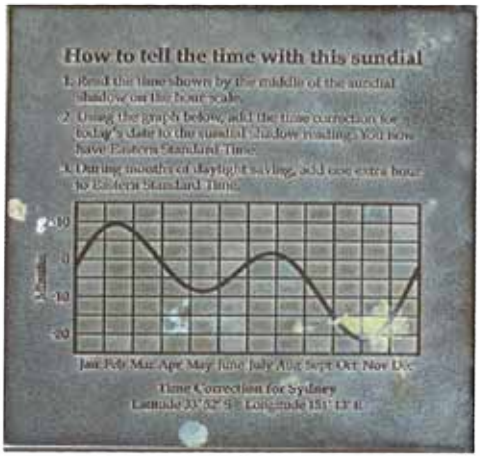
There are still T-shirts, patches, and a few models available for purchase. If you'd like to support the Sundial and have a cool memento to proudly display, please contact Steve Ruhl at president@bpastro.org, Frank Petrie at bpaasundial@gmail.com, or make a purchase at one of our Planetarium shows.

— Frank Petrie, Sundial Committee Member

And an Aussie Sundial

An armillary sphere sundial in the Royal Botanic Gardens Herb Garden, Sydney.

South-pointing Gnomon



Frank modelling a Sundial T-shirt, taking a well-deserved break down under, where the sun is in the north and moves from right to left.

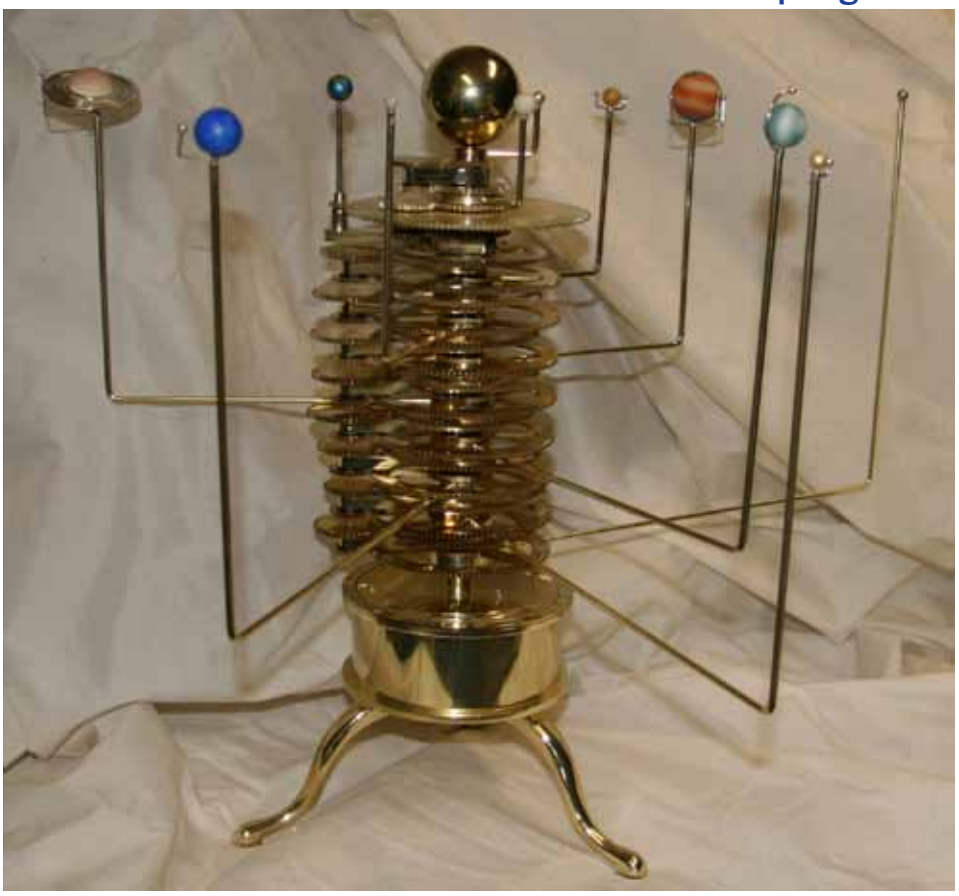
We Want ... AN ORRERY!!![1]

Last November, Russ Heglund and Dave Fong manned a table at the Bainbridge Public Library's celebration of the 50th anniversary of Dr. Who. At the end of that table stood a leggy brass structure with a central orb. That structure was an orrery[2] and the board collectively thought it was a cool gizmo that could be useful for teaching planetary science.

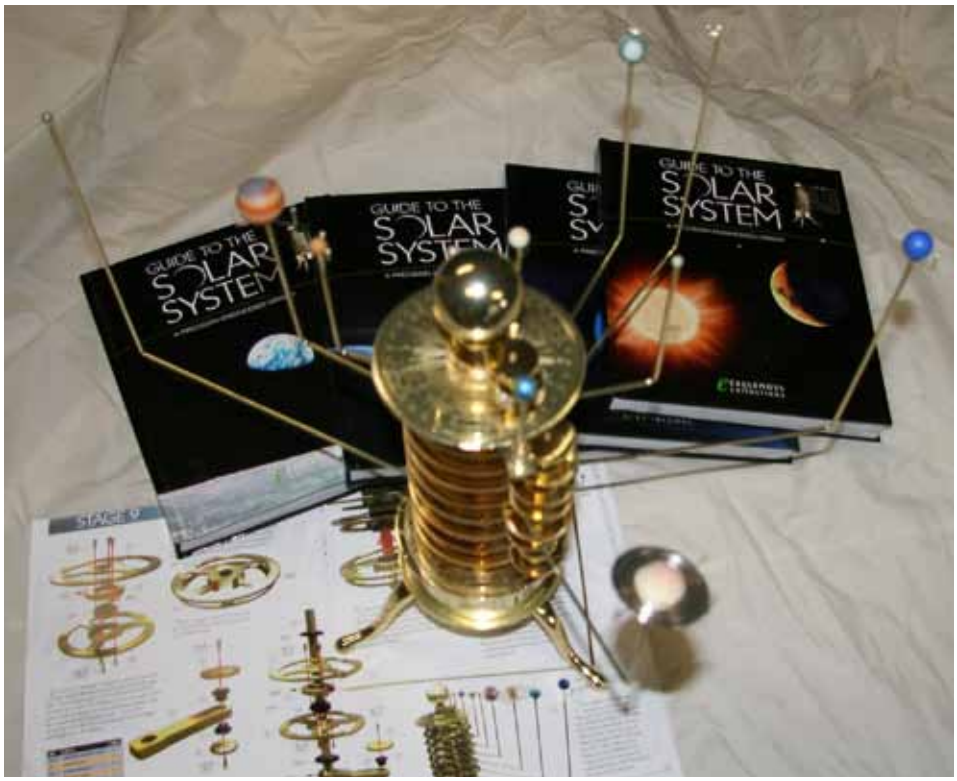
An orrey is a clockwork model of the solar system. In this version, the sun sits in the center with Mercury, Venus, Earth with an orbiting Moon, Mars, Ceres, Jupiter, Saturn, Uranus, Neptune, Pluto, and Eris all spinning around. I find the most amazing thing about the orrery is the complexity of the clockwork. Each object has its own specific gearing to approximate the actual rate of rotation of the object.

With a little research, we found this orrery available at www.build-solar-system.com/ as a kit for $200 plus $50 shipping. Jay Nelson, a regular at our monthly planetarium shows, offered to pay for it and it arrived in late December.

The kit comes with detailed step by step instructions, a tool kit, a comprehensive 4 volume set of everything you could possibly want to know about the orrery, and parts — lots of parts. In spite of the number of parts, the step-by-step instructions are straightforward.



The assembled orrery made an appearance at our annual meeting and our monthly planetarium show in January. It ran for several hours but has developed a gear binding problem. I believe the central shaft is not as round as it should be and needs to be replaced. Once I get that problem ironed out, it will take up residence at the Observatory. — *Steve Ruhl*



1. With apologies to the Knights who say Ni and *Monty Python and the Holy Grail*

2. The Orrery at the Dr. Who Anniversary belongs to Elliot Swanson

Finding the Holes

"It was a dark and stormy night; the rain fell in torrents — except at occasional intervals, when it was checked by a violent gust of wind which swept up the streets (for it is in ~~London~~ Bainbridge Isle that our scene lies), rattling along the housetops, and fiercely agitating the ~~scanty flame of the~~ light polluting lamps that ~~struggled against~~ overwhelmed the darkness." — with apologies to Paul Clifford, Edward Bulwer-Lytton

Such have been the opportunities to observe lately. Chances are rare—one must take advantage of the moments. Here are a few moments since the last newsletter.

All images are from Bainbridge Island taken with a 10" RC (focal length - 2000mm), SBIG ST-8300M camera on a Losmandy G-11 Mount with a Sidereal Technology controller. The images are processed with CCD Stack2 and Photoshop CS5.

M1 (The Crab Nebula, in the constellation Taurus) is the first object on Charles Messier's list of things that are not a comet. I have visited this object previously but with a shorter focal length, 690mm. The 2000mm focal length provides a larger image. It also enlarges the stars slightly more than I like. So for these skies, the camera and telescope are pretty well maxed out. Increasing the focal length just results in a bigger fuzzier image.

This nebula is a supernova remnant from a type 2 supernova explosion. The explosion was first observed on July 4, 1054 and has an extensive historical record. Much of the supernova's emissions are driven by the ash from an explosive neutron star. This particular neutron star is a variety called a pulsar. It has a strong magnetic field and generates a radio beacon as it spins 33 times a second. This pulsar generates radio waves that power synchrotron radiation which contributes to the nebula's glow.

In the last issue, I detailed my processing for normal LRGB images. In this object, there are significant Hydrogen-α emissions. Since the HA emissions are red, I modified the processing to add the HA exposures to the red part of the image. This adds red detail, revealing glowing red hydrogen emissions, but does not alter the basic star color.

The Triangulum Galaxy is the third largest member of our local group of galaxies (Andromeda and the Milky Way are the two larger). It

M1 — The Crab Nebula (NGC 1952)

December 7 – 8, 2013
6 -Luminosity (L) @ 300 sec (binned 1x1)
4- Red, Green, Blue (RGB) @ 300 sec (binned 2x2)
4- Hydrogen-α (HA) @ 600 sec (binned 2x2)
Total Exposure = 130 minutes

M33 — Triangulum Galaxy (NGC 0598)

December 3 – 4, 2013
10 - Luminosity (L) @ 120 sec (binned 1x1)
10 - Red, Green, Blue (RGB) @ 120 sec (binned 2x2)
10 - Hydrogen-α (HA) @ 300 sec (binned 2x2)
Total Exposure = 130 minutes

is a little further away from us than Andromeda at about 2,700,000 light years distant. Unlike Andromeda, there are many emission nebulas within the Triangulum. These areas emit large quantities of HA light so I used the same technique for enhancing these emissions as in the Crab Nebula. These emission nebulas indicate that there are many active star forming regions. Some of these regions are designated their own entry in various catalogs. NGC 604, NGC 595, NGC 592, NGC 588, IC135, IC131, IC139, IC137, and so on are all visible in this image.)

M33 is a fairly bright object. At a very dark site, it is visible to the naked eye. (Apparent Mag. = 5.72) If you notice, the individual exposures are only 120 seconds instead of my normal 300 seconds. This allows the maximum dynamic range from an image. Digital cameras basically count photons. My camera uses 16 bits to count which means it can count up to 65535. After that, the image is losing data. By reducing the exposure, less data is lost.

M31 Core is the heart of the Andromeda Galaxy. In the sky, the galaxy spans an apparent length over six times the size of a full moon (or about 3 degrees). This imagee is about 0.4 x 0.5 degrees. At a reasonably dark site (such as the Richie Observatory), it can be seen with the naked eye. At a distance of 2,500,000 light years, the Andromeda Galaxy is the most distant object you can typically see with just your eye. (Apparent Mag. = 3.44)

The Andromeda Galaxy is considered the largest member of our local group of galaxies. It has about twice the number of stars but about the same mass as the Milky Way has. Inside the core is a supermassive black hole with a mass about 200,000,000 times the mass of the sun.

Notice that there is a distinct lack of emission nebulas when compared to M33, which implies a reduced amount of new star creation. Studies have shown that the Andromeda is in transition to a galaxy creating fewer and fewer new stars. That will change. The Andromeda Galaxy is moving towards the Milky Way at about 300 kilometers/second, leading to a collision in about 4 billion years. Collisions of galaxies are frequent and result in a burst of new star formation. The collision of the spiral Andromeda galaxy and the spiral Milky Way galaxy will result in an elliptical galaxy that has been nicknamed "Milkdomeda."

Unlike M31 and M33, M81 is not

M31 Core — The Andromeda Galaxy (NGC 224)

December 3, 2013
15 - Luminosity (L) @ 120 sec (binned 1x1)
15 - Red, Green, Blue (RGB) @ 120 sec (binned 2x2)
Total Exposure = 120 minutes

M81 — Bode's Galaxy (NGC 3031)

December 3 – 4, 2013
10 - Luminosity (L) @ 300 sec (binned 1x1)
8 - Red, Green, Blue (RGB) @ 300 sec (binned 2x2)
Total Exposure = 170 minutes

in our local group. It is still very close (in galactic terms) at about 12,000,000 light years. It is claimed that at an extremely dark site, if the wind is blowing just right and your rub your stomach in the right direction, you can see M81 with your naked eye. If so, it would make it the furthest object visible to a naked eye. (Apparent Mag. = 6.94)

M81 and its nearby neighbors M82 and NGC 3077 are in the process of collision. M81 resides in the constellation Ursa Major.

The Flaming Star Nebula (IC 405, Sh2-229, Caldwell 31) is an emission and refection nebula. The red is the emission from HA and the reflection is the blue scattering that occurs in molecular clouds. (It is blue for the same reason as our sky is blue.) What makes this nebula particularly interesting is the bright star AE Aurigae.

AE Aurigae is a very hot and bright O-type star about 1500 light years from us. It is a runaway star. It is moving about three times faster (60 km/s) than neighboring stars. If you trace its movements back about 2 million years ago, you end up in the Trapezium cluster in the Orion Nebula. Two other runaway stars, Mu Columbae and 53 Arietis, can be traced back to this location at this time.

So what happened two million years ago in Orion? A couple of possibilities are a supernova in a multi-star system (resulting in Barnard's Loop) or the collision of multiple binary star systems.

While Santa was busy delivering presents, the telescope was busy imaging. Similar to the Crab Nebula, IC 443 is a type 2 supernova remnant. It is estimated to be about 5,000 light years distant. The supernova remnant's age is uncertain but believed to be 3,000 to 30,000 years ago. The ash from the supernova is a neutron star at the core of this nebula. IC443 is studied extensively as a supernova remnant interacting with a galactic molecular cloud. Unlike the Crab Nebula, the center emissions are not driven by the central rapidly spinning pulsar. Instead, it is driven by the residual heat.

Many of the nebula's neighbors are massive short lived stars. It is likely that the progenitor star to IC 443 was just a little more massive than its neighbors.

The Jellyfish resides in the constellation of Gemini.

If you have a question on any of these objects or the processing of astrophotography, you can email me at president@bpastro.org.— *Steve Ruhl*

IC405 and AE Aurigae — Flaming Star Nebula (Sh2-229)

December 8, 2013
10 - Luminosity (L) @ 300 sec (binned 1x1)
7 - Red, Green, Blue (RGB) @ 300 sec (binned 2x2)
7 - Hydrogen-α (HA) @ 600 sec (binned 2x2)
Total Exposure = 225 minutes

IC443 — Jellyfish Nebula (Sh2-248)

December 24, 2013
15 - Luminosity (L) @ 300 sec (binned 1x1)
7 - Red, Green, Blue (RGB) @ 300 sec (binned 2x2)
7 - Hydrogen-α(HA) @ 600 sec (binned 2x2)
Total Exposure = 250 minutes

Dave Janich 1938–2014

Dave Janich was a friend of the Observatory. Though he had no experience with astronomy or telescopes he took off running at BPAA.

He learned how to use the Losmandy mount and the Ritchie telescope and was one of the few who used the Losmandy mount to help visitors find astronomical objects during our public star parties.

Dave liked to tinker and build things, so I asked him to help build the 16-inch string telescope with me. We worked on the telescope together , weekly for two years, bouncing ideas off each other, cutting, cutting again, gluing, measuring, balancing, wiring, all that it takes to build a good telescope. All along the way, when an idea turned into a success Dave would say "Now that's sexy!"

When we asked Dave to join our board as Chief Astronomer, He said "What you kidding? Me, Chief Astronomer? You're crazy — I'm the most unqualified Chief Astronomer there is!" But he did say yes, and was able to serve for several months.

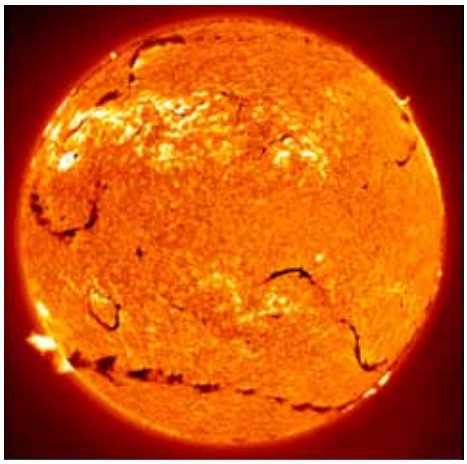
When we were almost finished building the 16-inch, Dave came down with a cough. It seems that is how lung cancer introduces itself.

Dave and I got several good nights to look through the finished telescope, and he was able to show his grandchildren the stars!

Sadly, Dave did not beat the cancer, and passed away January 26, 2014. He was 75. We miss you, Dave.

— *Nels Johansen*

The 16-inch string telescope.



LATE BREAKING NEWS

APRIL 1, 2014: We just received word that the Bainbridge Island Rotary has awarded BPAA a grant of $2,500 for a solar telescope. The telescope is for use in our outreach programs. This will be a very nice Hydrogen alpha solar telescope and should draw a lot of interest at our events, as well as enabling high-quality sidewalk astronomy.

Spring 2014

In this Issue

BPAA Quarterly is a publication of the Battle Point Astronomical Association.
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