Temecula Valley Astronomer

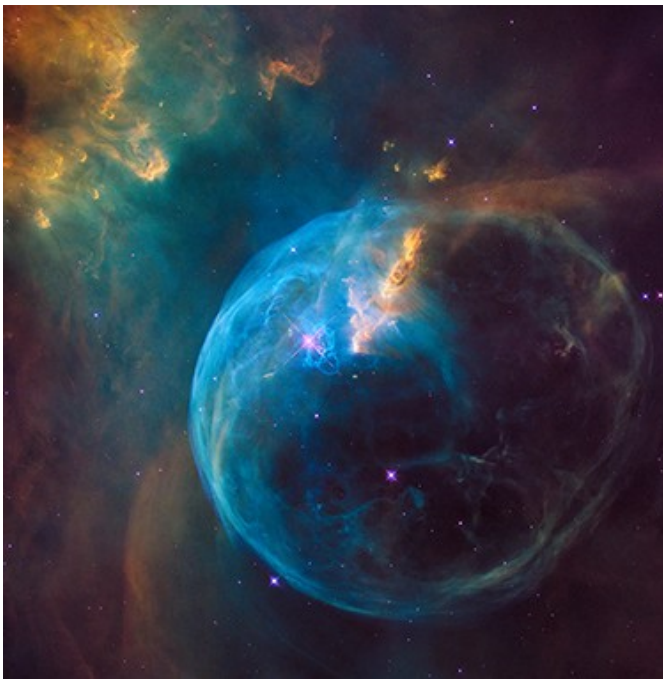
The monthly newsletter of the Temecula Valley Astronomers May 2016

Events:

General Meeting : Monday, May 2, 2016 at the Temecula Library, Room B, 30600 Pauba Rd, at 7 pm.

President Mark Baker will present his usual opening comments followed by a Mars Travelogue (or What's Curiosity been up to Lately??). Terry Ostahowski will then tell us about his O-Dome observatory.

For the latest on Star Parties, check the web page.



April 21, 2016: Hubble Sees a Star 'Inflating' a Giant Bubble. 26 candles grace NASA's Hubble Space Telescope's birthday cake this year, and now one giant space balloon will add to the festivities.

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Mark DiVecchio <markd@silogic.com> by the 20th of the month for the next month's issue.

General information:
Subscription to the TVA is included in the annual $25 membership (regular members) donation ($9 student; $35 family).

President: Mark Baker 951-691-0101 <shknbk13@hotmail.com>
Vice President: Chuck Dyson <mrplegia@gmail.com>
Past President: John Garrett <garrjohn@gmail.com>
Treasurer: Curtis Croulet <calypte@verizon.net>
Secretary: Deborah Cheong <geedeb@gmail.com>
Club Librarian: Bob Leffler <bobjleffler@msn.com>
Facebook: Tim Deardorff <tim-deardorff@yahoo.com>
Star Party Coordinator and Outreach: Deborah Cheong <geedeb@gmail.com>

Address renewals or other correspondence to:
Temecula Valley Astronomers
PO Box 1292
Murrieta, CA 92564

Member's Mailing List: tvastronomers@googlegroups.com
Website: http://www.temeculavalleyastronomers.com/

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Cosmic Comments – May/2016
by President Mark Baker

Here is an excerpt from a past years' commentary… AGAIN!!! Hard to believe we started talking about an observatory complex shortly after I purchased the property two years ago and we still have only dirt there…

"There is so much going on these days that I often find my mind drifting mega-Miles and Billions of years from home. Which would be okay if I was still pursuing the same cosmological dreams I did in my youth… but I am not!!

These days, I find my reward in associating with professionally amateur Astronomers and interacting within the communities surrounding me. So I apologize if I got distracted… my mission going forward is to help find that spark that stimulates minds, young and old, to seek out even a small understanding of the celestial glories around us. And hopefully it is one of personal and particular intrigue…"

The opportunity to provide a functional and viable Regional Observatory will allow us the opportunity to recreationally observe both the night and daytime skies, provide a standardized imaging setup, and provide numerous teaching and mentoring events. The TVA can even partake in hard science activities in the areas of NEO, Planetary, and Exoplanet studies. For example, KELT (Kilodegree Extremely Little Telescope) is using 9"-16" telescopes photometrically equipped to discover Exoplanets, primarily involving 8th to 10th magnitude stars…and they've already found and validated 17 to date!!! The need continues to outpace the support so there is a lot to do in our own backyard… and we "amateurs" are the ones that will, and have to, do it. And by making telescopes, as well as imaging and peripheral accessory equipment available to the interested and dedicated, I would love to see many contributions made in the upcoming years from our humble facility.

Hopefully, my TVA friends will come along for the journey, as well as a whole new crop of students, scholars, explorers and pioneers. Here's to the future….and many exciting events along the way!!! Who knows, Asteroid TVA2016, Comet Garrett – Dierdorff, and/or Exoplanet Stann2017-1 may just be right around the corner!!"

Clear, Dark Skies my Friends… coming soon to a neighborhood near you!!!

Looking Up – May 2016
by Curtis Croulet

New Moon is May 6 at 12:29 PM PDT; First Quarter Moon is May 13 at 10:02 AM PDT; Full Moon is May 21 at 2:14 PM PDT; Last Quarter Moon is May 29 at 5:12 AM PDT.

The big news for **Mercury** is its transit across the face of the Sun on May 9. The transit will be in progress as the Sun rises at 5:51 AM. Mid-transit is 7:58 AM. The transit ends at 11:49 AM. If you have a dedicated solar telescope or a good white-light solar filter for the front aperture of your scope, then you're in business to view the transit directly. Otherwise you should project the Sun's image onto a white card held in back of the scope. **Mercury** will appear as a tiny dot crossing the southern part of the solar disk. Its image will have a hard edge, in contrast to a small sunspot, whose edges will be softened by the sunspot's penumbra. If you choose to view the Sun via solar projection, you should be alert to heat build-up inside your scope, particularly if you use a refractor. The concentrated Sun's rays could be hot enough to damage the eyepiece in your optical train. It may be better to try a cheap eyepiece for projection rather than risking your expensive Naglers.

Venus is in the morning sky, but it's too close to the Sun for viewing. Superior conjunction is on June 6.

Mars reaches opposition on May 22, 2016. More about **Mars** below.

Jupiter is in prime viewing position most of the night. It's in eastern Leo, and it passes nearly overhead.

Saturn rises shortly before 10 PM as May begins and about 7:46 PM by month's end. Opposition is the night of June 2-3.

Uranus, Neptune, and **Pluto** are post-midnight objects. It'll probably be mid-summer before there's much interest in chasing down the gas giants. **Pluto** is in eastern Sagittarius. It rises shortly after midnight on May 1.

There are two meteor showers: the **Eta Aquarids**, which peak the morning of May 5, and the **Eta Lyrids**, which peak on the morning of May 8. Of the two, the **Eta Aquarids** are the better bet, and the Moon should be out of the way during the best pre-dawn viewing hours. Southern Hemisphere observers consider the **Eta Aquarids** to be one of their best showers. It's autumn south of the equator, and the sky is still dark when the radiant is at the meridian. That doesn't do us much good, of course. Don't confuse the **Eta Lyrids** with the plain-old **Lyrids**, which are peaking as I write this.

Let's look up.

Mars reaches opposition on May 22. That's when Mars is exactly 180 degrees opposite the Sun in celestial longitude. Closest approach is on May 30, at which time Mars will be 46.8

million miles away. On that day Mars will be 18.6 arc seconds across. This is about the size of Saturn minus its rings.

This is Mars's closest approach since 2005. That's the good news. The bad news is that Mars will be in northern Scorpius, nearly as far south as it can be. Still, we aren't as bad off as the poor observers in Canada and the UK, where Scorpius doesn't even totally clear the horizon.

For viewing Mars, a huge scope isn't necessarily required, but you'll want high-quality optics and good "seeing" (atmospheric steadiness). Several years ago I used a TV-85 refractor (85mm aperture, about 3.35 inches) when Mars was about 14 arc seconds across, and I was surprised at the amount of visible detail. You're going to be operating at magnifications greater than 150x, preferably greater than 200x, so you'll want good eyepieces, too. $600 eyepieces with 100-degree fields-of-view aren't necessary. In fact, the additional optical elements typical of such eyepieces may reduce contrast. Good-quality Plössls and orthoscopics will be perfectly OK. Red or yellow eyepiece filters can enhance contrast.

Mars's north pole will be slightly tilted in our direction. You should be able to see the north polar cap. It's usually surrounded by a dark ring, which helps to set off the cap from the rest of the planet. The solar day on Mars is 24 hours 39 minutes, or slightly longer than Earth's solar day. This means that Mars shows nearly the same face when viewed at the same time on successive nights.

Mars has distinctive dark and light features on its surface. These are called "albedo features." The intensity and exact dimensions of the albedo features subtly vary over time. Back in the 1950s, when I devoured Patrick Moore's classic *Guide to Mars*, some astronomers thought the dark areas might correspond to areas of primitive life, perhaps algae or lichens. To date, no evidence has been found for life of any type on Mars. Most of the large albedo features do not correspond to plateaus or valleys. They are merely areas where dark rock has been exposed by the tremendous winds. The most prominent dark albedo marking is Syrtis Major. If you see it, you'll be looking at the most interesting hemisphere of Mars. The opposite hemisphere can appear almost featureless. The "canals" seen by Percival Lowell were illusions. You may see atmospheric clouds on Mars. They will be white patches not shown on maps of Mars. Mars is prone to developing planet-wide dust storms during oppositions. If you can't see any detail, even though you have a good scope and good seeing, it may be because of a dust storm.

Mars has two moons: Deimos and Phobos. They were discovered in 1877 by Asaph Hall as he was testing the then-new 26-inch Alvan Clark refractor at the U.S. Naval Observatory in Washington, D.C. The moons are probably captured asteroids. They are very small and faint, and you won't see them in ordinary amateur telescopes.

A good reference for the current opposition of Mars is the April 2016 issue of *Sky & Telescope*, pp.48-50.

Clear skies.

Random Thoughts – Eyepieces & Eyes
by Chuck Dyson

OK, I will go first and man-up; yes I do have one and now it is your turn to admit that you probably have one too. What am I talking about? I am talking about that box, case, locker, tomb, or closet full of eyepieces that where once the perfect eyepieces for your observing tastes at the time of purchase but then eyepiece design and your tastes changed and the old perfect eyepieces went into your storage locker to make way for the new perfect eyepieces.

Why do we do this, is it necessary, how much eyepiece do we really need?

First I find it to be just fascinating that people can go and buy an Orion 80mm short tube refractor and slap a TeleVue on the back end of it and loudly proclaim that the image of object X in this scope is just as good as he remembers the image of the same object being in his buddies 80mm Takahashi-TeleVue combination when they looked at it last week. I do not think so, although the Orion is a decent scope it is no Takahashi and although the TeleVue is a great eyepiece it is not magic.

Personally whether it is a compound scope, a refractor, or a reflector, I view these things as having four components that contribute to the quality of the final image, the first three are the objective lens or the primary mirror and then the eyepiece diagonal in the compound and refractor scopes and the diagonal mirror in the reflector (I do not include the secondary mirror in the compound scope as it is well fixed and rarely if ever needs adjusting, the diagonal in the reflector however is another story) finally the light goes through the eyepiece and out of the scope. Now any one of these components can degrade the image and the other components have not the ability to resurrect a degraded image, having said all that though let's be honest after getting started in astronomy by going out and purchasing a modest scope and accessories very few of us have the financial wherewith all to go out and purchase a high quality and bigger scope with better and more accessories when we want to move up in astronomy.

This financial brake on our urge to spend more money on a hobby that we are excited about is a good thing because it gives us time to actually use and become familiar with our equipment and ourselves as in what we like to look at and how good is our equipment at showing us what we spend the majority of time observing. If I spend the majority of time on planets then I would be interested in a high power narrow field of view eyepiece in order to maximize my ability to see detail, but If I am into extended objects like globular clusters or galaxies I may want a medium high power eyepiece with a wide field of view to give me that floating in space effect of the object under observation at the expense of detail especially with the objects that are 75% or more to the edge of the field of view. It is also goes without saying that you should buy eyepieces that will work with the scope that that you intend to upgrade to. As an example, I purchased a 3.2mm FL eyepiece for my 600mm FI refractor and it gave me a 187X image and that is about as much magnification as I like; however, my next refractor has a FL of 990mm and that gives me a 309X image with the 3.2mm FL eyepiece, this eyepiece now spends much of its life in my eyepiece box. Another habit that I have that fills up my eyepiece box is to

purchase one eyepiece of a new series of eyepieces for trial and then decide that I do not want the series, hello box here is your new resident. My final habit that leads to the box is the path that runs through my psyche. I have two eyepiece sets that I keep for personal reasons, the first is a set of Edmund RKE eyepieces and those were the first eyepieces that I ever purchased when I started to observe in the 80's, and the second is a set of Vixen 2in eyepieces (old style) that I just wanted to collect, I don't use them I just have them.

Finally we get to that fourth component that is necessary for a quality image and it's your eye. Your eye actually performs two functions, the first is to focus the pencil of light coming from the telescope via a two lens fluid spaced system (the cornea is also a lens), and the second is to process the photons into a chemical/electrical signal that goes to your brain and is transformed in to a mental image. Now the funny thing about your eye is that the cones are way bigger than the rods so for a given area there are more rods and your visual acuity (ability to see detail) should be better in an area that is mostly rods compared to an area that is mostly cones, right? Nope, because the signal coming from rods is bundled several rods to one nerve and that makes several rods in one element that is larger than the cone and each cone has its own nerve ending to accept its signal. The result of this arrangement is that if one rod in a bundle gets excited then a signal is sent to your brain and an image can be built up from the signals coming from different bundles a low resolution signal to be sure but a signal; on the other hand, if a cone does not receive enough photons to excite it there is no signal sent to your brain and no picture, but with enough photons many or all of the cones get excited and a high resolution picture can be formed in your brain. Probably the best example of this phenomenon is the blinking nebula most people can see it with averted vision (rod rich vision) and cannot see it when looking directly at it (cone rich vision). The cones in your eye are mostly concentrated in an area that is within 30° of the eye's central axis and this results in a 60° area of high definition images, but after that the rods start taking over and the image becomes low definition; so, eyepieces with AFOV of greater than 60° will show you more sky but the area of high definition viewing will stay the same, are you comfortable with that and do you want to pay the price of that 120° eyepiece?

Now it goes without saying that just as no two people are exactly alike, no two eyes are exactly alike and yet how often, if ever, do we go to the optometrist or ophthalmologist and say I am an amateur astronomer please examine my eyes and let me know what is the largest cone of light my eyes will accept, how good is my visual acuity, is there visual field impairment, and how good is my contrast sensitivity? Not only do we not get our eyes checked that often, but how many times have you gone on-line to look at user reviews of an eyepiece you want to buy and how many of these reviews have given you the reviewers last eye exam results? In my experience the number is zero.

What we are ultimately left with is what I usually do; buy the eyepiece with the best ad and hope for the best.

Cheers All
Chuck

Hubble Shatters The Cosmic Record For Most Distant Galaxy
by Ethan Siegel

The farther away you look in the distant universe, the harder it is to see what's out there. This isn't simply because more distant objects appear fainter, although that's true. It isn't because the universe is expanding, and so the light has farther to go before it reaches you, although that's true, too. The reality is that if you built the largest optical telescope you could imagine -- even one that was the size of an entire planet -- you still wouldn't see the new cosmic record-holder that Hubble just discovered: galaxy GN-z11, whose light traveled for 13.4 billion years, or 97% the age of the universe, before finally reaching our eyes.

There were two special coincidences that had to line up for Hubble to find this: one was a remarkable technical achievement, while the other was pure luck. By extending Hubble's vision away from the ultraviolet and optical and into the infrared, past 800 nanometers all the way out to 1.6 microns, Hubble became sensitive to light that was severely stretched and redshifted by the expansion of the universe. The most energetic light that hot, young, newly forming stars produce is the Lyman-α line, which is produced at an ultraviolet wavelength of just 121.567 nanometers. But at high redshifts, that line passed not just into the visible but all the way through to the infrared, and for the newly discovered galaxy, GN-z11, its whopping redshift of **11.1** pushed that line all the way out to 1471 nanometers, more than double the limit of visible light!

Hubble itself did the follow-up spectroscopic observations to confirm the existence of this galaxy, but it also got lucky: the only reason this light was visible is because the region of space between this galaxy and our eyes is mostly ionized, which *isn't true* of most locations in the universe at this early time! A redshift of 11.1 corresponds to just 400 million years after the Big Bang, and the hot radiation from young stars doesn't ionize the majority of the universe until 550 million years have passed. In most directions, this galaxy would be invisible, as the neutral gas would block this light, the same way the light from the center of our galaxy is blocked by the dust lanes in the galactic plane. To see farther back, to the universe's first true galaxies, it will take the James Webb Space Telescope. Webb's infrared eyes are much less sensitive to the light-extinction caused by neutral gas than instruments like Hubble. Webb may reach back to a redshift of 15 or even 20 or more, and discover the true answer to one of the universe's greatest mysteries: when the first galaxies came into existence!

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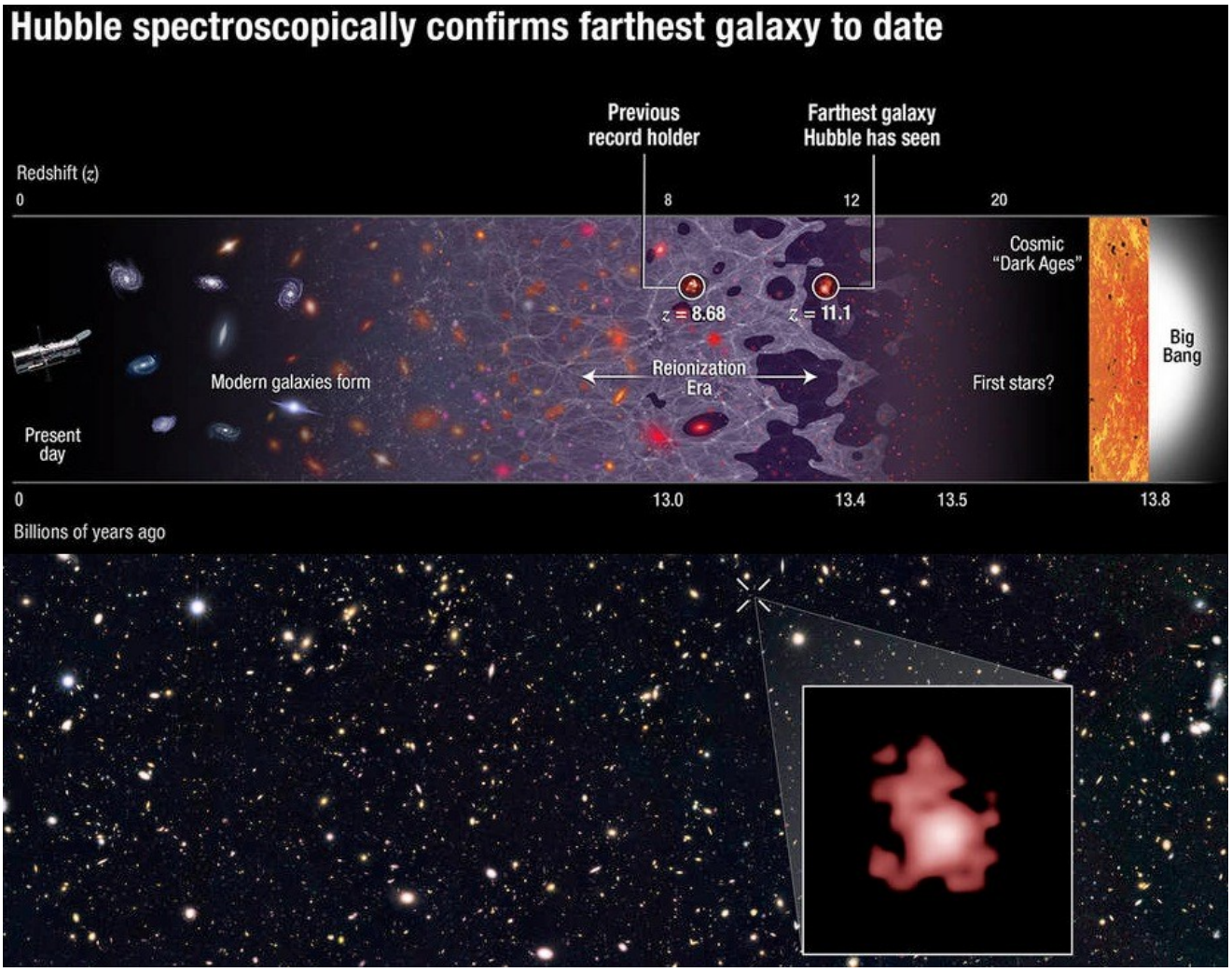

Images credit: (top); NASA, ESA, P. Oesch (Yale University), G. Brammer (STScI), P. van Dokkum (Yale University), and G. Illingworth (University of California, Santa Cruz) (bottom), of the galaxy GN-z11, the most distant and highest-redshifted galaxy ever discovered and spectroscopically confirmed thus far.

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