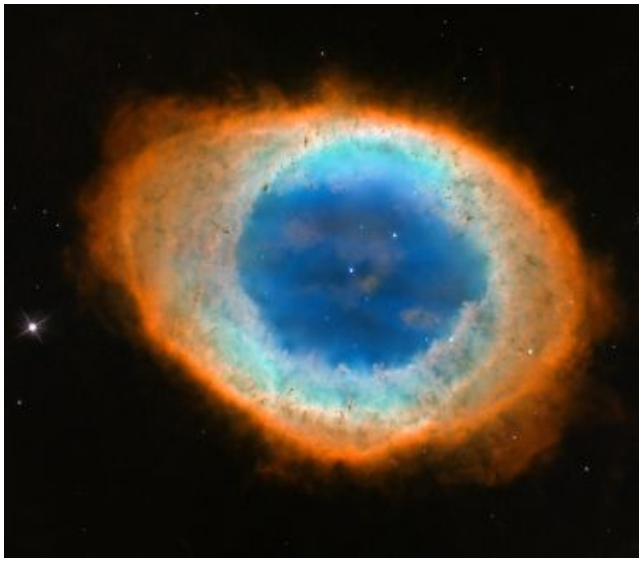
Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers Sep 2016

Events:

General Meeting : No meeting this month but watch your club email for upcoming events.

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



NASA APOD 5 Jun 13 : M57: The Ring Nebula

Image Credit: NASA, ESA, and the Hubble Heritage (STScI / AURA)- ESA / Hubble Collaboration

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.

Like us on Facebook

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

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Cosmic Comments – Sep/2016
by President Mark Baker

I always look forward to September. After a quiet July and August, we finally get back into doing Outreach for our local schools and communities. And yes, I really do enjoy the Star Parties. I don't always set up a scope, but I love to work the crowd, chatting about "what's up", pointing out objects with my light saber, and doing my best to augment the fine effort provided by our Astronomers. They do all the work and I get to have most of the fun it seems sometimes…

I'm especially looking forward to this September, as I will be interacting with Astronomers throughout SE Asia, mainly Malaysia and Singapore. Not only will I represent NASA / JPL in the Solar System Ambassador capacity, but I will be assisting the Astronomical League by paving the way to opening up international doors…doors that swing both ways!! And lastly, I hope to establish a relationship with TASOS in Singapore and maybe plant the seeds for becoming fellow organizations. What a wonderful new way to share our love of things Celestial…

But as always, here's to you, the TVA members that are involved in doing a good work, especially for those that come after us. Keep it up and Kudos to you all…

Clear, Dark Skies my Friends…

Looking Up – Sep 2016
by Curtis Croulet

Autumnal Equinox occurs on September 22 at 7:21 AM PDT.

New Moon is September 1 at 2:03 AM PDT; **First Quarter Moon** is September 9 at 4:49 AM PDT; **Full Moon** is September 16 at 12:05 PM PDT; **Last Quarter Moon** is September 25 at 02:56 AM PDT; **another New Moon** is September 30 at 5:11 PM PDT.

Mercury achieves superior conjunction on September 12. You might catch it near the horizon after sunset during the first week of the month, but you'll almost certainly need binoculars. During the last week of September Mercury leaps into the morning sky.

Venus is good in the early dusk sky. You should have no trouble seeing it before complete darkness. It brightens to mag -3.9 by month's end.

Mars moves rapidly from Scorpius into Sagittarius. Its eastward travel delays its setting until after 11 PM for the entire month of September. The God of War is too small for detailed study now. It's a very obvious gibbous shape in the telescope.

Jupiter passes within ½ degree of Venus on the evening of August 27. The giant planet rapidly disappears from the evening sky during September, reaching conjunction with the Sun on September 26.

Saturn is in southern Ophiuchus. The ringed planet remains in the evening sky through September, setting a bit after 9 PM by month's end.

Neptune is in Aquarius**.** It rises shortly after 7 PM at the beginning of September. It is in good viewing position the entire month.

Uranus rises very late in the evening as August begins. It rises shortly after 9 PM at the beginning of September, shortly after 7 PM by month's end. Uranus is in Pisces. *Sky & Telescope*'s October 2016 has finder charts for both Uranus and Neptune (pp.50-51).

Pluto is in eastern Sagittarius. It's up most of the night. Expect to use a big telescope and spend some time hunting to identify it. The July issues of both *Astronomy* and *Sky & Telescope* have finder charts for Pluto. Yes, this is, verbatim, the same thing I said the past two months.

We have two minor meteor showers: **Epsilon Perseids** (September 9) and **Epsilon Eridanids** (September 12).

Let's look up.

Let's look at planetary nebulae, one my favorite classes of deep-sky objects. Planetary nebulae are unrelated to planets. William Herschel was an 18th Century astronomer who

picked up where Messier had left off in cataloguing all of those fuzzy bits that sometimes looked like comets. But Herschel went much further than Messier. Some objects looked sort of like the planet Uranus, which he had personally discovered in 1781. So Herschel called them “planetary nebulae.”

Planetary nebulae are shells of gas that have been ejected by dying stars. These are red giant stars that are not massive enough to become supernovae. Ultraviolet radiation from the white dwarf star that remains is sufficient to cause the expanding, ejected shell to glow in visible light and also in the wavelengths of doubly-ionized oxygen and ionized hydrogen. Unlike many astronomical phenomena that have lifetimes on the order of hundreds of millions or even billions of years, planetary nebulae are very short-lived. Most dissipate into space within 10,000 to 50,000 years. Some nebulae that may not be recognizable as planetary nebulae, like the Veil Nebula complex in Cygnus, are in fact the last wisps of what were probably spectacular planetary nebulae several thousand years ago.

Planetary nebulae are particularly rewarding to view in that many of them are visible (in the telescope!) in suburban skies. When viewing planetary nebulae in the telescope, an OIII (“oh-three”) filter is particularly effective at enhancing the doubly-ionized oxygen. If you’re serious about chasing down planetary nebulae, then I highly recommend an OIII eyepiece filter or a UHC filter (both available from Lumicon and, perhaps, other manufacturers.) These filters work by passing the desired wavelengths and suppressing others, so the background sky becomes darker. Some stars may disappear or become much dimmer when viewed with such a filter.

The most famous planetary nebula of all is the Ring Nebula (M57) in Lyra. Although it looks like a ring, the Ring Nebula is actually an elongated donut, and we’re looking down the hole. The Ring is particularly easy to find, because it lies between Beta and Gamma Lyrae, which are the two stars at the south end of Lyra’s parallelogram asterism. The Ring Nebula is magnitude 8.8, which places it within the range of ordinary birding binoculars. Alas, even though the Ring is quite large as planetary nebulae go, in typical 8x or 10x binoculars, it looks like a faint star. But not much more magnification is needed to see it clearly in a telescope. I’ve often viewed it at 18x in my TeleVue NP101is refractor (101mm aperture, or 4-inches). But cranking up the power to 150x or 200x provides a more interesting view, in my opinion. If you view the Ring Nebula in any but the smallest telescope, your observing companions are almost certain to ask, “Can you see the central star?” At the center of the nebula is the magnitude 15 white dwarf remnant of the star that formed the nebula. Ordinarily, a 12-inch scope should be sufficient to see a 15th magnitude star very faintly. But the center of the Ring is filled with gauzy nebulosity that kills the necessary contrast to see the star. I’ve seen the star in very large telescopes (a 60-inch observatory reflector!), but it’s hit-and-miss in large amateur telescopes in the 15-inch to 25-inch range. Sharp optics and good “seeing” help immensely.

To my dismay, I’ve already run out of space. We’ll talk about some more planetary nebulae next month.

Clear skies.

Random Thoughts
by Chuck Dyson

This month Random Thoughts starts out with a big OOPS and an apology to Mark Baker and Jack Morris as both of them helped me with my talk in August and I forgot to acknowledge them; so, a big thanks to both of you for your help and encouragement on the talk.

The second random thought is attributed to one of Mark's comments at the August meeting; at the meeting Mark encouraged everyone and anyone to get involved in the club's educational mission by giving a meeting presentation, doing a what's up talk, doing a welcome to astronomy talk at an outreach star party, or helping out Mark DiVecchio with an article for the newsletter. Now I know that you are saying to yourself what if I write or say something stupid or wrong, no worries you will learn from your mistakes and get better and in addition as one of my professors said "The best way for you to learn something is to teach it". When preparing for a talk/ slide presentation I always find that I do not know half as much about the subject matter as I thought I did and thus to keep from saying or writing something stupid or wrong I do a tremendous amount of fact checking and as my professor said you learn. I also find myself wanting to know much more on the subject than I intend to talk about because of the question and answer period that always follows a presentation. To give you an idea of just how dangerous the question and answer period can be on my last star party talk at the end of the just a general introduction to astronomy talk one child raised his little hand and asked "why is the Moons center of mass offset from its geometric center?" Now the little mucker was right of course because there is a two kilometer difference between the centers, but how did he know this; the answer is with the internet everyone has access to massive amounts of information and the possibility always exists that someone in the audience will have latched onto a part of the subject that you have not reviewed and the best thing for you to do is be honest and say "I just don't know". Jeff Foxworthy had a show on TV titled "Are You Smarter than a 5th Grader?" and it turns out that with fifth grade level questions in subjects that people have not prepared for it is a toss-up as to who will get the right answer, the adult or the fifth grader; so, if you prepare a presentation to the level of a seventh grader you will really wow most of your audience. The other thing that club members who have looked through telescopes dozens or hundreds of times should remember is that the viewing expectations and experience for us is entirely different than it is for the general public who may have never looked through a telescope before. This fact was brought home to me a while back when some of my neighbors wanted to come over and look through one of my telescopes and I of course said yes to the request; now the seeing was not the best as the Menifee haze was about, and several of my neighbors had their back patio lights on but I got Saturn into the eyepiece and yes it was there but the bands on the planet were not visible and the Cassini division was only hinted at in moments of good seeing. For me the view of Saturn was definitely mediocre, but for one of the neighbors, who is in her mid-sixties, and had never looked through a telescope before, the view was phenomenal and she is still talking to me about it. Our experience with something adjusts our expectations and my neighbor with no experience but with sixty years of anticipation was blown away with the view. I have never set up one of my telescopes at a star

party and not have at least one person just be astounded at the view through the telescope, to participate at a star party is to open up doors of wonder for other people.

For my last random thought for this month I must say what were those boys in Spain thinking? A research group in Valencia Spain has come up with a new way to model black holes by using a geometric structure (graphene) to describe the singularity and by using a model with a black hole that does not rotate (most if not all do) and has a charge (black holes tend to be electrically neutral) but by having a non-rotating black hole the math needed to describe the motion of particles inside of the event horizon is greatly simplified and by having a charged environment there is electrostatic repulsion between particles and that could alter the nature of the singularity to behave more like singularities in real black holes behave when matter is added to them (they don't grow as much as they should grow) but what has the boys in Spain really excited is in their model of the singularity there is a spherical shape they have decided is a worm hole, yay the era of trans-galactic travel is here! Not so fast people, first we need to remember that this "worm hole" exists in a math model of a black hole and not in an actual black hole. Second, most people working with black holes today agree that by the time you get through all the X ray energy surrounding the black hole and get to the event horizon you will look like an extremely well done McDonalds ¼ pounder. Third, assuming you survive the X ray experience and are now ready for the spaghetti treatment and please know that it gets worse, mostly because as spaghetti you will be 0.1905 cm in diameter, yes that the official diameter of round spaghetti, and we want to go through the worm hole that is slightly smaller than the average atomic nucleus that is 0.0000000000015 cm but with an increased charge the black hole could grow to be 0.00000005 cm in diameter and that is the size of an atom; so, with an increased charge and a reduction of the "spaghetti you" another 3,810,000 times to get you to be a stream of single atoms through the worm hole you go to where no one knows. The final complication is, of course, just how do you get yourself reassembled; now the boys in Spain are a little fuzzy on the details, but are sure it can happen. My final advice on this subject is that if you are approached by Richard Branson and he offers to sell you a reservation on the first flight of Virgin Trans-Galactic Worm Hole Flights, just smile and say "thanks, but NO thanks.

Cheers
Chuck

Star-B-Q Photos
by Deborah Cheong & Steve Clark

by Steve Clark

by Steve Clark

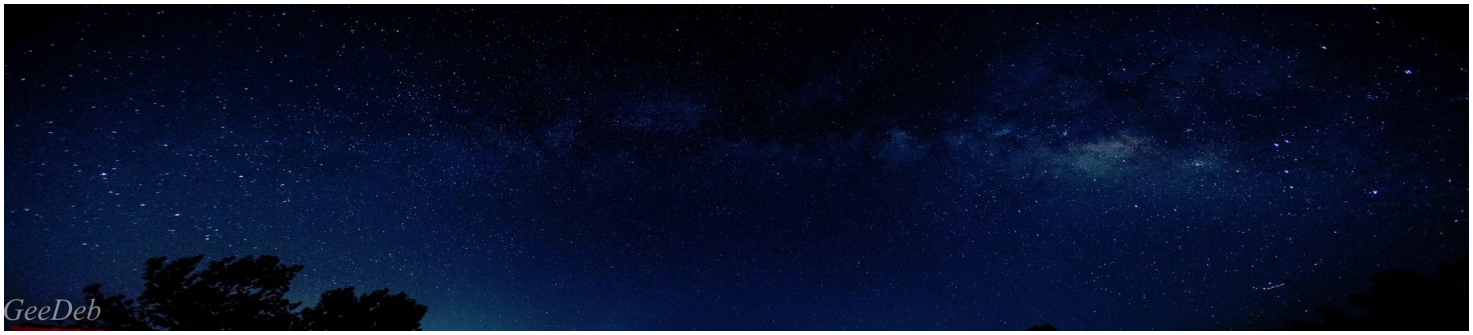
by Steve Clark

by Steve Clark

by Steve Clark

by Steve Clark

by Deborah Cheong



by Deborah Cheong

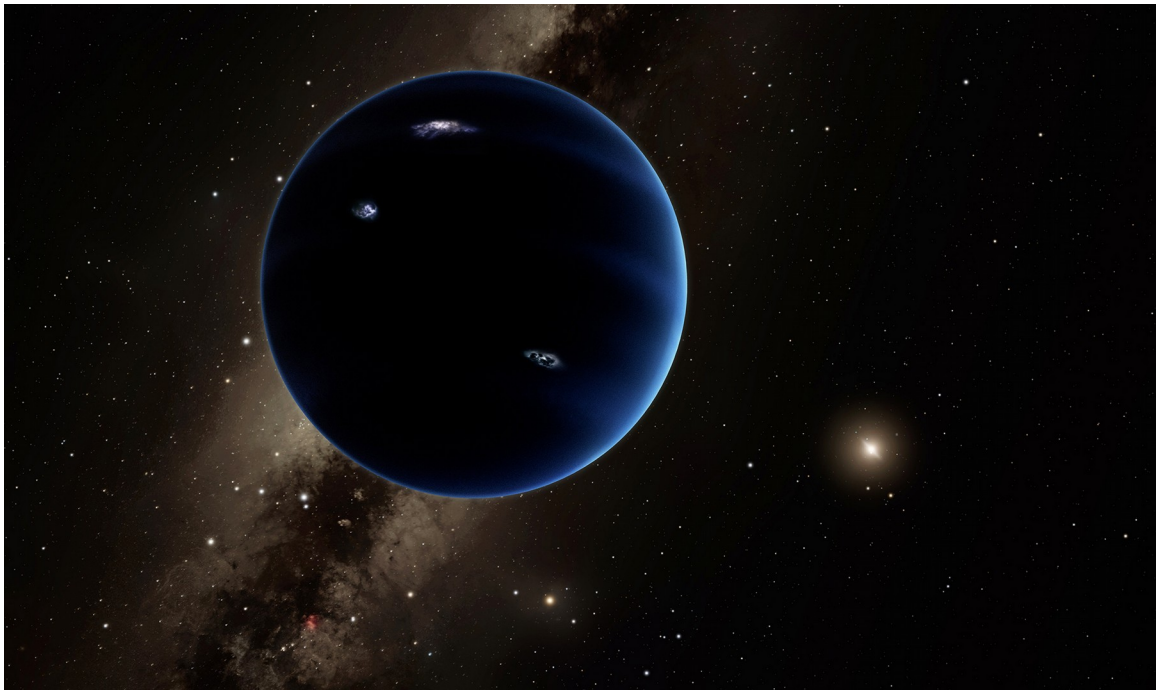
Is there a super-Earth in the Solar System out beyond Neptune?
by Ethan Siegel

When the advent of large telescopes brought us the discoveries of Uranus and then Neptune, they also brought the great hope of a Solar System even richer in terms of large, massive worlds. While the asteroid belt and the Kuiper belt were each found to possess a large number of substantial icy-and-rocky worlds, none of them approached even Earth in size or mass, much less the true giant worlds. Meanwhile, all-sky infrared surveys, sensitive to red dwarfs, brown dwarfs and Jupiter-mass gas giants, were unable to detect anything new that was closer than Proxima Centauri. At the same time, Kepler taught us that super-Earths, planets between Earth and Neptune in size, were the galaxy's most common, despite our Solar System having none.

The discovery of Sedna in 2003 turned out to be even more groundbreaking than astronomers realized. Although many Trans-Neptunian Objects (TNOs) were discovered beginning in the 1990s, Sedna had properties all the others didn't. With an extremely eccentric orbit and an aphelion taking it farther from the Sun than any other world known at the time, it represented our first glimpse of the hypothetical Oort cloud: a spherical distribution of bodies ranging from hundreds to tens of thousands of A.U. from the Sun. Since the discovery of Sedna, five other long-period, very eccentric TNOs were found prior to 2016 as well. While you'd expect their orbital parameters to be randomly distributed if they occurred by chance, their orbital orientations with respect to the Sun are clustered extremely narrowly: with less than a 1-in-10,000 chance of such an effect appearing randomly.

Whenever we see a new phenomenon with a surprisingly non-random appearance, our scientific intuition calls out for a physical explanation. Astronomers Konstantin Batygin and Mike Brown provided a compelling possibility earlier this year: perhaps a massive perturbing body very distant from the Sun provided the gravitational "kick" to hurl these objects towards the Sun. A single addition to the Solar System would explain the orbits of all of these long-period TNOs, a planet about 10 times the mass of Earth approximately 200 A.U. from the Sun, referred to as **Planet Nine**. More Sedna-like TNOs with similarly aligned orbits are predicted, and since January of 2016, another was found, with its orbit aligning perfectly with these predictions.

Ten meter class telescopes like Keck and Subaru, plus NASA's NEOWISE mission, are currently searching for this hypothetical, massive world. If it exists, it invites the question of its origin: did it form along with our Solar System, or was it captured from another star's vicinity much more recently? Regardless, if Batygin and Brown are right and this object is real, our Solar System may contain a super-Earth after all.



A possible super-Earth/mini-Neptune world hundreds of times more distant than Earth is from the Sun. Image credit: R. Hurt / Caltech (IPAC)

To teach kids more about Venus and Jupiter, visit the NASA Space Place webpages titled “All About Venus” [http://spaceplace.nasa.gov/all-about-venus/en/] and “All About Jupiter” [http://spaceplace.nasa.gov/all-about-jupiter/en/].

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The TVA is a member club of The Astronomical League.