

The High Desert Observer

July 2017



The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties and provides opportunities to work on Society and public educational projects. Members receive the *High Desert Observer*, our monthly newsletter, plus membership to the Astronomical League, including their quarterly publication, *Reflector*, in digital or paper format.

Individual Dues are \$30.00 per year

Family Dues are \$36.00 per year

Student (full-time) Dues are \$24.00

Annual dues are payable in January. Prorated dues are available for new members. Dues are payable to ASLC with an application form or note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004. Contact our Treasurer, Patricia Conley (treasurer@aslc-nm.org) for further information.

ASLC members receive electronic delivery of the HDO and are entitled to a \$5.00 (per year) Sky and Telescope magazine discount.



Table of Contents

- 2 *What's Up ASLC*, by Howard Brewington
- 3 *Outreach Events*, by Jerry McMahan
- 4 *Calendar of Events, Announcements*, by Charles Turner
- 5 *June Meeting Minutes*, by John McCullough
- 7 *Back at the Telescope*, by Berton Stevens
- 12 *Photos of the Month*: Jeff Johnson, Rich Richins

ASLC Board of Directors, 2017

Board@aslc-nm.org

President: Howard Brewington; President@aslc-nm.org

Vice President: Rich Richins; VP@aslc-nm.org

Treasurer: Patricia Conley; Treasurer@aslc-nm.org

Secretary: John McCullough; Secretary@aslc-nm.org

Director-at-Large: Sidney Webb; Director1@aslc-nm.org

Director-at-Large: Ed Montes Director2@aslc-nm.org

Immediate Past President: Daniel Giron; astrofix@comcast.net

Committee Chairs

ALCor: Patricia Conley; tconley00@hotmail.com

Apparel: Howard Brewington; comet_brewington@msn.com

Calendar: Chuck Sterling; csterlin@zianet.com

Education: Rich Richins; Education@aslc-nm.org

Grants: Sidney Webb; sidwebb@gmail.com

Loaner Telescope: Sidney Webb; sidwebb@gmail.com

Membership: Judy Kile; judykile3916@gmail.com

Observatories:

Leasburg Dam: David Doctor; astrodoc71@gmail.com

Tombaugh: Steve Shaffer; sshaffer@zianet.com

Outreach: Chuck Sterling; csterlin@zianet.com

Web-Site: Steve Barkes; steve.barkes@gmail.com

HDO Editor: Charles Turner; turnerc@stellanova.com

Masthead Image: February 10, 2017 From Las Cruces, Moon rising over the Organ Mts in Penumbral Eclipse.

July Meeting --

Our next meeting will be on **Friday, July 28**, at the Good Samaritan Society, Creative Arts Room starting at 7:00 p.m.

The speaker will be Jerry Armstrong, avid comet observer and astroimager talking about his observing trips to Africa.

Member Info Changes

All members need to keep the Society informed of changes to their basic information, such as name, address, phone number, or email address. Please contact Treasurer@aslc-nm.org and jkile3916@gmail.com with any updates.

Events

ASLC hosts deep-sky viewing and imaging at our dark sky location in Upham. We also have public in-town observing sessions at both the International Delights Cafe (1245 El Paseo) and at Tombaugh Observatory (on the NMSU Campus). All sessions begin at dusk.

At our Leasburg Dam State Park Observatory, we hold monthly star parties. Located just 20 miles north of Las Cruces, our 16" Meade telescope is used to observe under rather dark skies. Please see *Calendar of Events* for specific dates and times.

What's Up ASLC?

July 2017



As ASLC president, I'm very pleased to see the increased participation at club gatherings such as our monthly Moon Gaze and Leasburg observing session. Everyone is invited of course, but new members are especially welcome. These events offer our newbies the opportunity to meet and get to know some of ASLC's seasoned observers and astro-imagers. Likewise, we're also seeing a few more folks at the Pecan Grill of late. In case you've not heard, we extend our monthly meeting with an after-meeting refreshment. PG has a great selection of craft beers, but alcohol consumption is not required to participate. This post-meeting get together is just for fun and a few laughs. In my opinion, this type fellowship is the glue that holds a club together. Please feel free to join us for any of ASLC's events.

Amateur astronomy is a popular hobby, but there are many levels of participation. Some individuals may just admire the night sky on a camping trip while others spend tens of thousands of dollars on equipment. The estimated total of astronomy involvement in the US is about 300,000 people. And, much like the Borg, this close-knit community is tightly connected via the Internet, and that's how I met avid comet observer and astro-imager Jerry Armstrong of Atlanta.

Jerry and I met after my fourth comet discovery. On 28 September 1992, I was sweeping the morning sky for unknown comets from my observatory in Mayhill, NM. And at 3:50 a.m., a small 12-magnitude diffuse glow drifted into the path of my 16-inch Newtonian. I quickly checked my star charts but found nothing plotted at that position. So, I made a sketch of the eyepiece field and the placement of the object in question. Then, I continued with my morning search. After an hour, I returned to the coordinates of the unknown object to have another look. If this fuzz ball was fixed to the exact same spot in the field, it was no more than a very distant galaxy or nebula. But, comets are within our solar system and will change positions by an arc minute or so after an hour. That's what I hoped to see, and I was not disappointed. After composing an email, I reported my discovery to the International Astronomical Union (IAU) in Cambridge, MA. And, they contacted amateurs in Japan to make the confirmation. Later that morning, the IAU announced my discovery.

The following morning while I was sweeping for comets, the phone rang in my observatory. The caller said, "Hi, I'm Jerry Armstrong in Atlanta. You don't know me, but I read about your new comet on the Internet." Jerry explained that he'd observed my three previous comets but was having no luck with the current one with visual observations or CCD camera. I explained that I was not surprised since it was just barely visible for me, and I was observing from a VERY dark site atop a 7300-foot ridge.

Jerry later visited me in Mayhill, and we spent four early-morning hours in my observatory while I comet hunted. I found no new comets during that session, but Jerry and I became friends that morning because of our shared interest. I hope the entire ASLC membership will be able to attend our July meeting and meet my friend, Jerry Armstrong. He will talk about his astronomy-related trips to the African continent.

Howard Brewington ASLC President

* * *



Outreach

Outreach is a very important part of ASLC. We are always looking for more volunteers to help us educate the public. Even if you do not have a portable telescope to bring to the events, please consider attending our public outreach programs to help answer questions, share knowledge and point out objects in the sky.

Outreach Events

June 2017

by Jerry McMahan

Leasburg, Saturday, June 17

Sid Webb, Bob Armstrong and Howard Brewington operated the 16 inch in the observatory. Goto gave some trouble late in the evening, but did fine before that time. Is there some slippage over time? El Paso Community College students made another appearance. They did their lab projects at the South side of the observatory.

Chuck Sterling set up his 10 inch on the grass and I had the ETX 125. Jupiter, Saturn, the ring nebula and the Sombrero galaxy were among the objects observed. Jerry Gaber also made an appearance with his family. Another group also set up their Orion 5 inch Maksutov on the grass, near Chuck and I. I think some of them joined the club at the following meeting.

Moongaze, Saturday, July 4

Howard Brewington had his back brace off and was able to set up the clubs 4 inch Unitron refractor. It did a good job. Ed Montes brought his cute, but excellent 50mm refractor. Steve Shaffer appeared with a 3 inch Newtonian. I set up the usual Meade ETX 125. We were also joined by Dan Washburn.

The seeing was good, but wind did shake the images, preventing using higher magnification. We had the Moon, Jupiter, and late in the session we had the year's first appearance of Saturn. It takes Saturn a while to get above the new, tall building to the East and South East of the observing area.

We have a second Moongaze, of the month on the 29th. So we have the first and last Saturday of July to set up at the restaurant.

As many of you know, Chuck Sterling had a stroke and was in the hospital for this event. I am writing this on the fourth of July and just talked to Chuck on the phone. He is scheduled to go home in a couple of days. His recovery time will probably cause him to miss the next couple of Moongazes and Leasburg events, but hopefully we will have him back in action after a couple of months.

* * *

Calendar of Events (Mountain Time - 24 hr. clock)

July	01	20:18	Sun Sets
	01	20:18	OUTREACH; MoonGaze, International Delights Café
	03	22:41	Jupiter Multi-Moon shadow transit (Io + Europa) (29° to 21° alt)
	04	00:00	Independence Day - All Day
	08	22:06	Full Moon
	15	20:00	OUTREACH; Dark Sky Observing at Leesburg Dam State Park
	16	13:26	Last Quarter Moon
	23	03:46	New Moon
	28	19:00	ASLC Monthly Meeting; Good Samaritan Society, Activities Meeting Room
	29	20:00	OUTREACH; MoonGaze, International Delights Café
	30	09:24	First Quarter Moon
Aug	01	20:05	Sun Sets
	07	12:11	Full Moon
	07	12:22	Partial Lunar Edipse - Not visible from NM
	12	13:00	Pereid Meteor Shower Peak
	12	20:00	OUTREACH; Dark Sky Observing at Leesburg Dam State Park
	14	19:15	Last Quarter Moon
	21	10:21	Solar Eclipse begins
	21	11:46	Total Solar Eclipse - Partial from NM
	21	12:30	New Moon
	25	19:00	ASLC Monthly Meeting; Good Samaritan Society, Activities Meeting Room
	26	19:30	OUTREACH; MoonGaze, International Delights Café
	29	02:13	First Quarter Moon

Be sure to visit our web site for ASLC information: www.aslc-nm.org

* * *

Announcements

1. The program for the July meeting will be a presentation by avid comet observer and astroimager, Jerry Armstrong of Atlanta, GA. Jerry will show slides and images from his recent observing trips to Africa. .
2. Road-Trip to Mount Graham, Saturday, July 15 has been cancelled due to forrest fires in the area. Mike Nuss is attempting to arrange a new time later in the year. If you need more info, contact Mike Nuss (nuss1419@msn.com)
- 3 The agreement to use the facilities at Good Sam for our meeting prohibits members from bringing in ANY food or beverages, except water in a container with a screw lid. Take note: no more Starbucks or Saturn Cookies!

* * *

HDO Articles:

Howard noted that Society members have been submitting excellent articles for publication in the HDO. Articles are always welcome.

Budget Committee:

Trish Conley reminded Howard that a budget for 2017-2018 needs to be presented to the membership soon. Howard, Trish, and Steve Barkses will work on the proposed budget for next year.

Presentation:

This month's presentation started with Howard Brewington giving an overview of 2017 Star Parties. Each spring members of the Society grab their gear and head out for a week of camping, comraderie and imaging. Historically, they've headed to the Texas Star Party (TSP), but not this year. Most went to the Cosmic Campground (near Alma, NM) while a couple of folks headed to Rusty's RV Park (near Animas, NM). One brave soul (Howard) actually braved the rain at TSP. The group shared their experiences and their images. There were some incredible 'eye candy' pictures of galaxies, nebula and star clusters, and a humorous story or two.

This month's presentation also featured ASLC's first astrophoto contest. Members submitted one image taken during the previous 12 months. The eventual winner was John Kutney's image of the Rosette Nebula. Howard thanked John, Tony Levantino, Steve Barkses, and Chuck Sterling for submitting images for consideration.

John Kutney followed with a report on the imaging gathering at Rusty's RV Park in the Chiricahua Mountains.

The June meeting of the Astronomical Society of Las Cruces concluded at 8:32 pm. A social time followed at Pecan Grill.

-Respectfully submitted by John McCullough, ASLC Secretary

* * *

Back at the Telescope

by Bert Stevens

Solar systems form in similar ways to spiral galaxies and possibly larger structures in our universe. Giant gas clouds rotating slowly around an axis collapse to form a smaller, more compact object. In our case, the gas cloud collapsed to form our Solar System.

The proto-clouds own gravity pulls material toward the center of mass, slowly compressing the cloud into a smaller and smaller space. The cloud rotates around a common axis and the material perpendicular to the axis traveling fast enough along what you can think of as the equator of the cloud is able to orbit the axis.

Once the rotation of the cloud is established, the average of motion of particles around the axis defines a plane that is perpendicular to the axis and includes the center of mass. Particles that are moving fast enough parallel to the plane will be able to keep from being pulled into the center of mass, basically in orbit.

Most particles in the cloud will not be able to hold an orbit and will be slowly pulled down toward the center of mass. Particles moving along the equatorial plane are less likely to strike another particle, lose their kinetic energy and fall inward. Particles above or below the plane that manage to have an orbit will pass through the plane, making them more likely to impact a particle in the more heavily populated plane. This will most likely cause both particles to lose enough kinetic energy and fall toward the center of mass. Over millions of years, the cloud will eventually appear to flatten out as most of the remaining material will be in the plane of rotation or will have fallen toward the center.

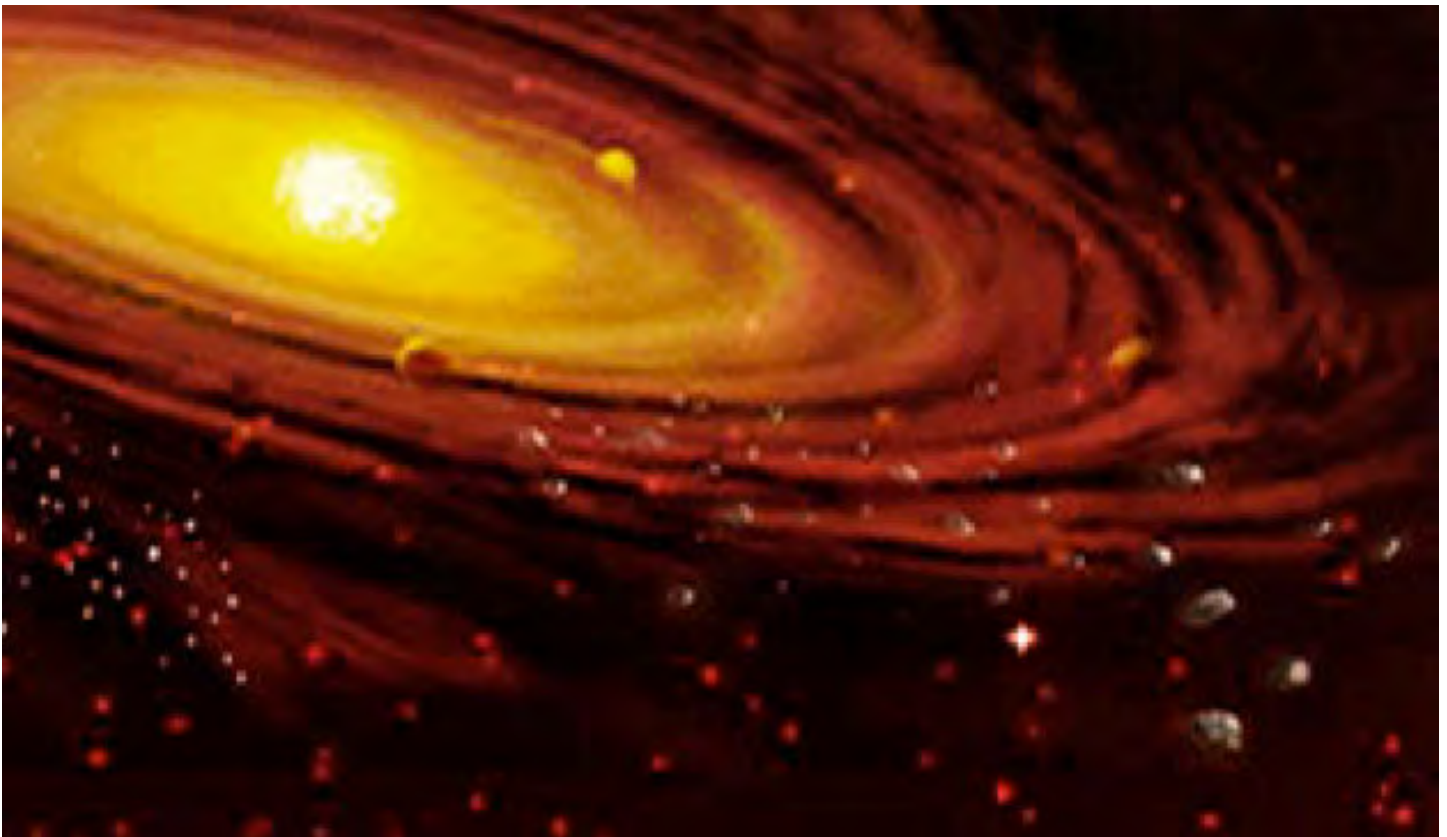


Figure 1: Most of the out-of-plane dust and gas has been absorbed by the proto-star or has fallen into the plane. Local clumps of matter are starting to form proto-planets, but many collisions will occur before they settle into permanent orbits. Credit: STSCI/NASA

Clumps of orbiting material form their own centers of attraction and build into planetesimals. These then merge and eventually form planets. All of these objects remain more-or-less in the original plane of rotation of the proto-cloud. Since each of the planets formed by different combinations of planetesimal collisions, they each have slightly different orbital inclinations. This makes it very difficult to define a single plane that is the average of all of the objects in the system.

In our Solar System, astronomers have decided to define the plane of the Solar System by that of the Earth's orbit, which we call the ecliptic plane. The other planets are inclined to the ecliptic plane by as little as 0.77 degrees for Uranus to just a little over seven degrees for Mercury. The minor planets in our Solar System are not as well behaved.

Minor planets are smaller and less massive, so their orbits are far more affected by the pull of the larger planets. Many of them are the planetesimals left over from the formation of the Solar System that formed in more inclined. In addition, they may have been fragments that resulted from a collision between larger planetesimals that threw them into a more inclined orbit.

Nevertheless, minor planets in general still stay close to the ecliptic plane. Astronomers searching for new minor planets search near and along the ecliptic in the area opposite in the sky from the Sun, called the opposition zone.

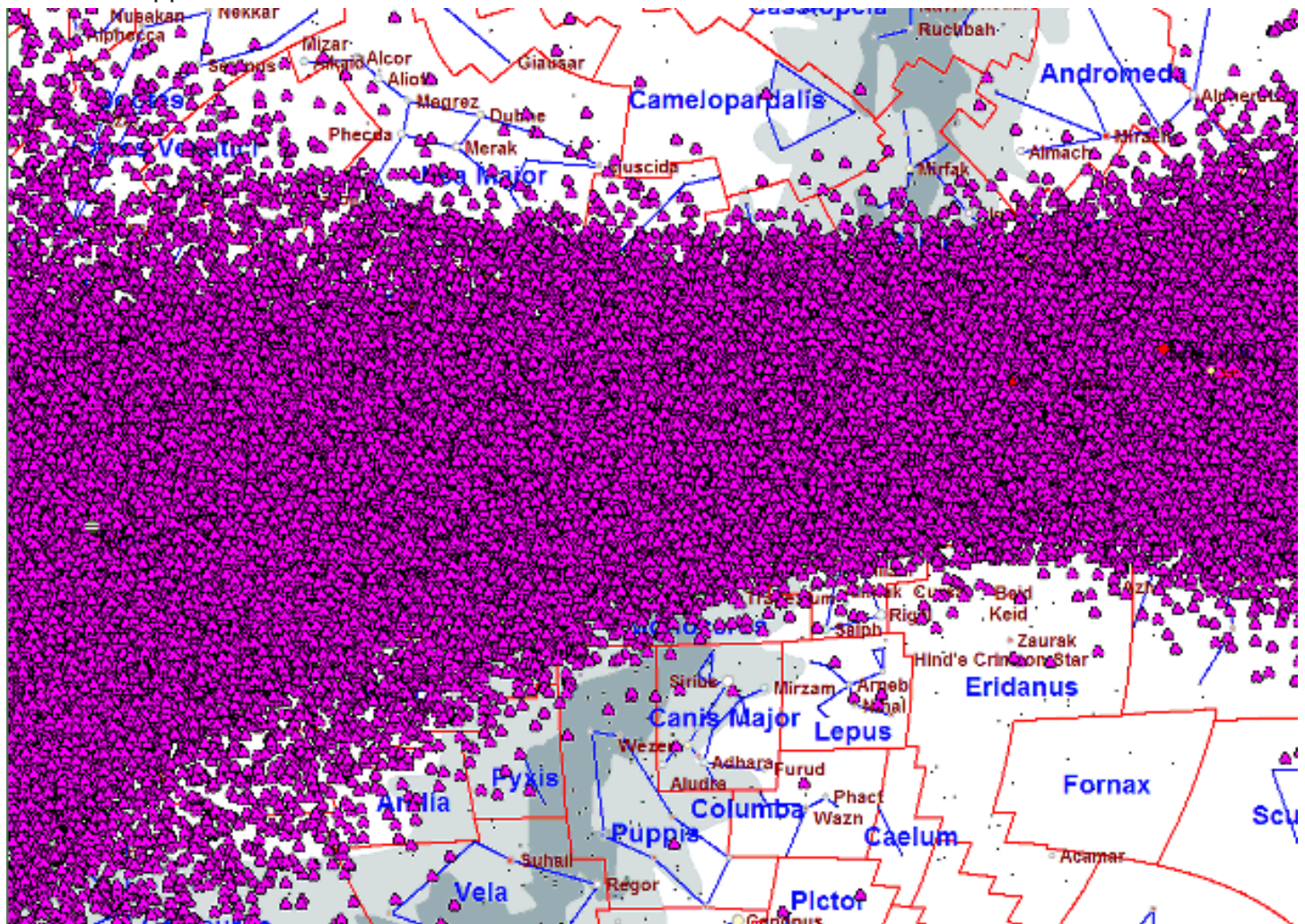


Figure 2: Population distribution of minor planets
 Over 370,000 minor planets are plotted against the stellar background. They form a band along the ecliptic. The further away from the ecliptic you look, the fewer minor planets you will find. Only relatively nearby near-Earth minor planets can be found near the poles.

In the opposition zone, the minor planet is near its maximum brightness. Since most of these objects are outside the orbit of the Earth, they are closest to us at opposition, making them brighter. In addition, at opposition the phase angle (the angle between the Sun, the minor planet, and the Earth) is near zero degrees. This means that the object is at full phase, meaning the entire visible surface of the object is completely illuminated by the Sun.

There is an unusual effect that happens at phase angles very near zero degrees called the opposition or Seeliger effect, which causes the minor planet to be even brighter. The exact cause of this effect is not well understood. One possible explanation is that at zero phase angle, the regolithic (rocky) surfaces are penetrated by sunlight down through the small pores and pits in the rocky surface. Observers on Earth are able to see these additional illuminated areas. This increases the total sunlit surface, increasing the brightness of the object. This is called the shadow hiding theory that was first proposed by Hugo von Seeliger in 1887.

The other theory is coherent backscatter. The tiny individual particles that do the actual scattering of light from the Sun are about the size of the wavelength of light, but they are more than a wavelength apart. The light from the Sun partially penetrates the surface. The sunlight bounces around from particle to particle and eventually goes back out the way it came in. It merges with the light being reflected off the surface in a coherent way, increasing the brightness.

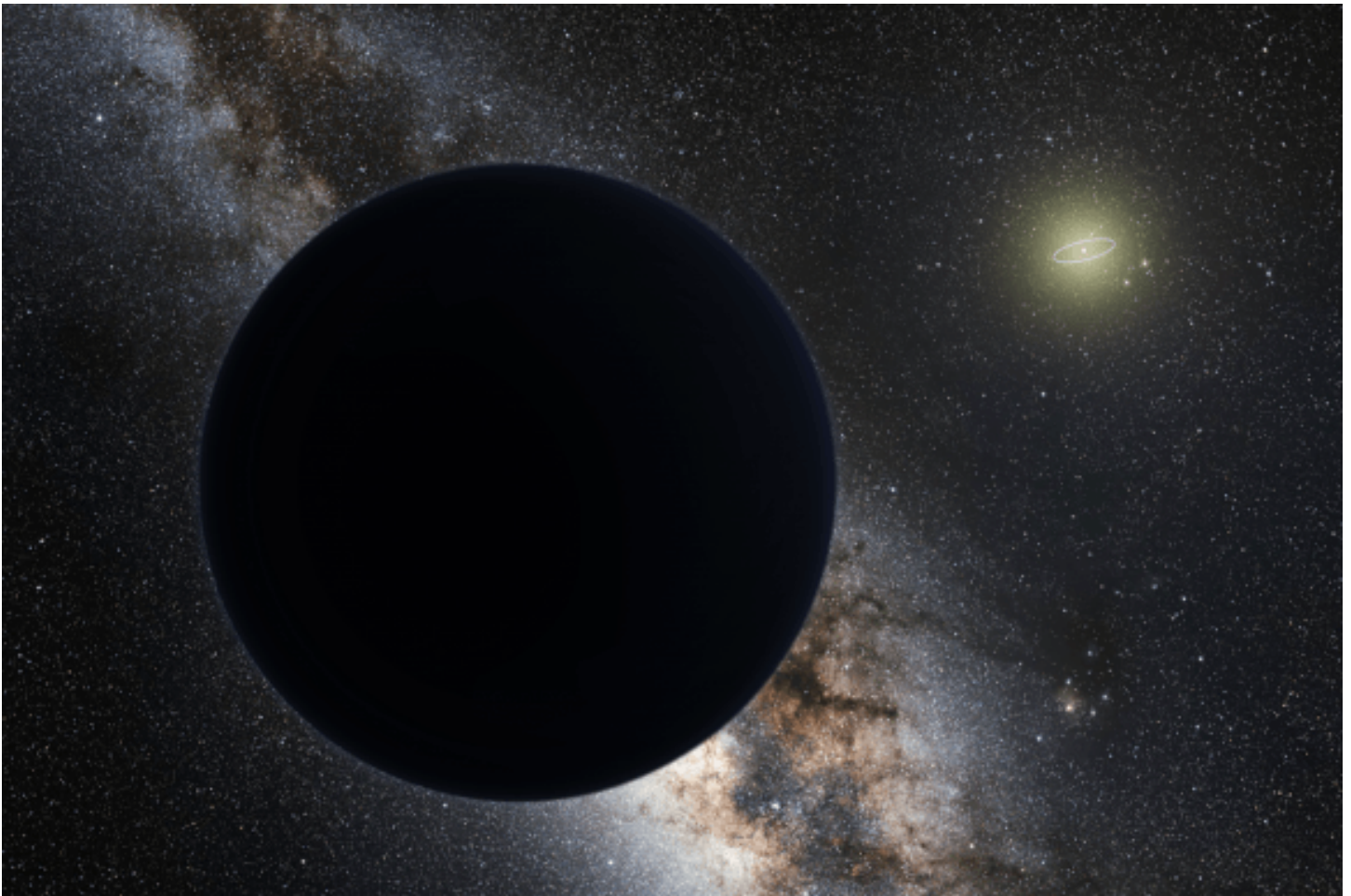


Figure 3: An artist's impression of Planet 9 viewed from the night side, blocking out part of the Milky Way. The Sun is in the distant upper right. The orbit of Neptune is shown as a ring giving you an idea of the distance of this object from most of our Solar System. Credit: ESO/Tomruen/nagualdesign.

All these effects make the opposition zone a prime area for minor planet discovery. Minor planets in the asteroid belt between Mars and Jupiter move fast enough for their motion to be detected over relatively short periods in the tens of minutes. Minor planets out in the Kuiper belt beyond Neptune move much more slowly, so slowly that their motion cannot be detected in a /single night's observing.

To find these distant objects, astronomers compare deep images taken over a period of days or weeks. This has only been possible in the past ten years with larger CCDs and faster computers. Many of the Kuiper Belt Objects (KBOs) have been discovered and their orbits computed, moving the Kuiper Belt from theory to reality.

Most of the KBOs nearer the Sun tend to have lower inclinations, travelling closer to the ecliptic. Surprisingly, the highly distant KBOs do not stay near the ecliptic, but have an assortment of inclinations surprisingly much larger than those nearer the Sun have.

Astronomers from the Lunar and Planetary Laboratory (LPL) at The University of Arizona studied the orbits of about 600 KBOs. While the individual KBO's orbits have seemingly random orientations, when you average them together, the average should be along the ecliptic. When they averaged the actual orbits, the average inclination was about eight degrees off the ecliptic.

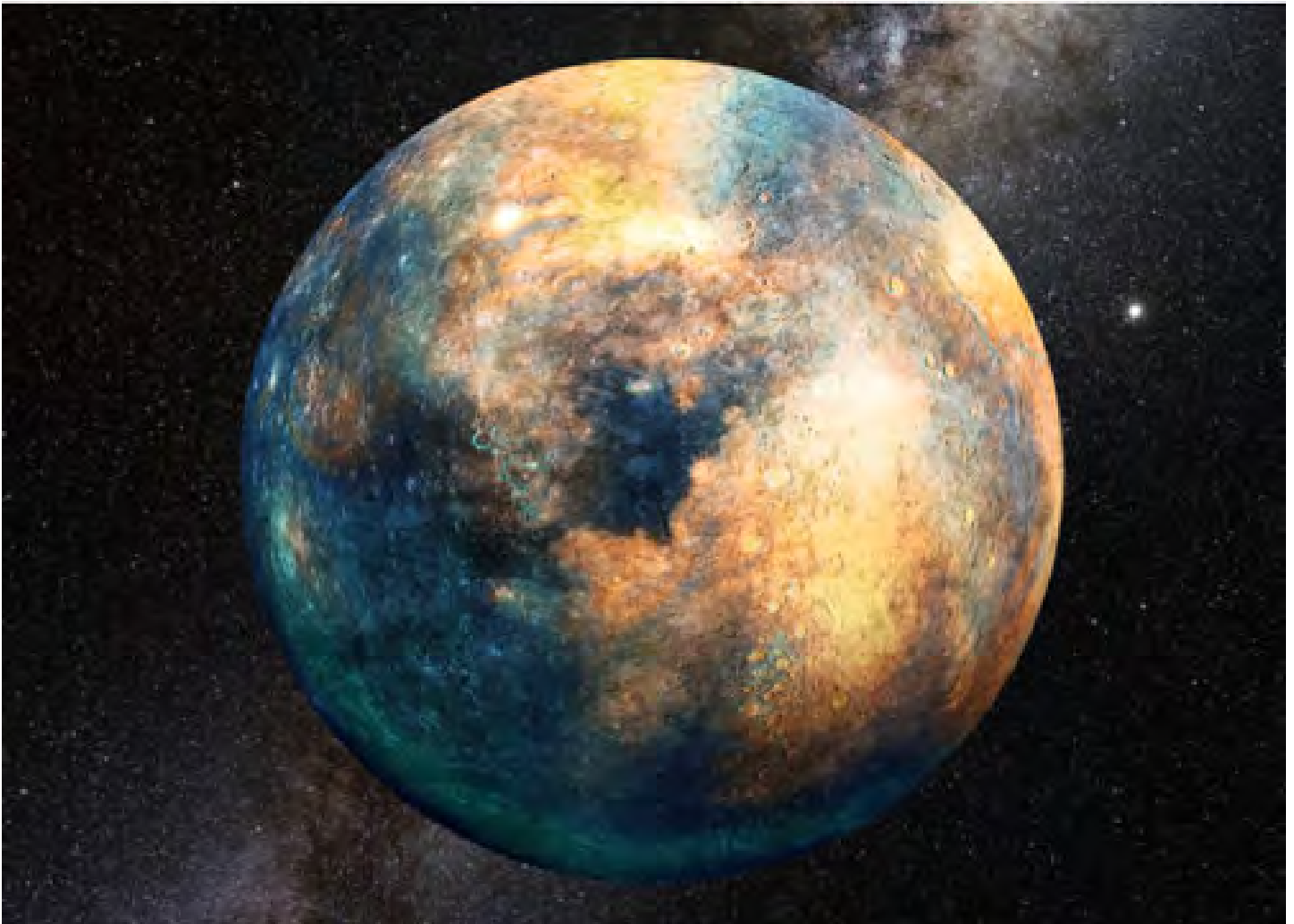


Figure 4: Hypothetical Planet 10 - Artist Concept

Orbiting out around 60 AU, the hypothetical Planet 10 is in an orbit that is tilted eight degrees to the ecliptic. Its gravity tugs on the nearby KBOs, causing their orbit to become tilted as well. Someday we may be able to find this object with larger telescopes coming on line every year.



The tilt suggests that at least one planet-sized object exists with an average distance of about 5.6 billion miles from the Sun. This is well beyond the orbits of Neptune and Pluto, but closer to the Sun than the theoretical Planet 9. Calculations made by the LPL astronomers indicate that this body should be about the mass of Mars, and its own orbital inclination would be around eight degrees.

Dubbed “Planet 10”, this large mass in the outer Kuiper Belt tugs on the orbits of distant KBOs and tilt their orbits. While the average plane of the orbits of the nearer KBOs is along the ecliptic, this eight-degree tilt bends the outer KBO plane, giving the overall KBO plane a warped look. A Mars-sized object in this orbit would warp the orbits of any KBOs within about 900 million miles either side of it, or from 4.7 to 6.5 billion miles from the Sun.

While their study did not rule out the possibility of multiple objects, the chance of this being just a statistical fluke is less than two percent. Another possible perturber is a passing star that warped the orbits of the outer KBOs. Once this passing star moved away, the orbits of the KBOs would return to their normal inclinations in less than ten million years. A star so close would have been discovered by now.

Unfortunately, the most likely location of Planet 10 would currently be in the galactic plane, hiding it among the millions of background stars in the Milky Way. Eventually, astronomers using very large telescopes and telescope arrays will start a search for this object. This will be similar to the search for Pluto that Clyde Tombaugh performed at Lowell Observatory. Only this one will be done with CCDs and computers, not photographic plates. It will also most likely be carried out in Chile and not in Arizona.

* * * *

Photo of the Month

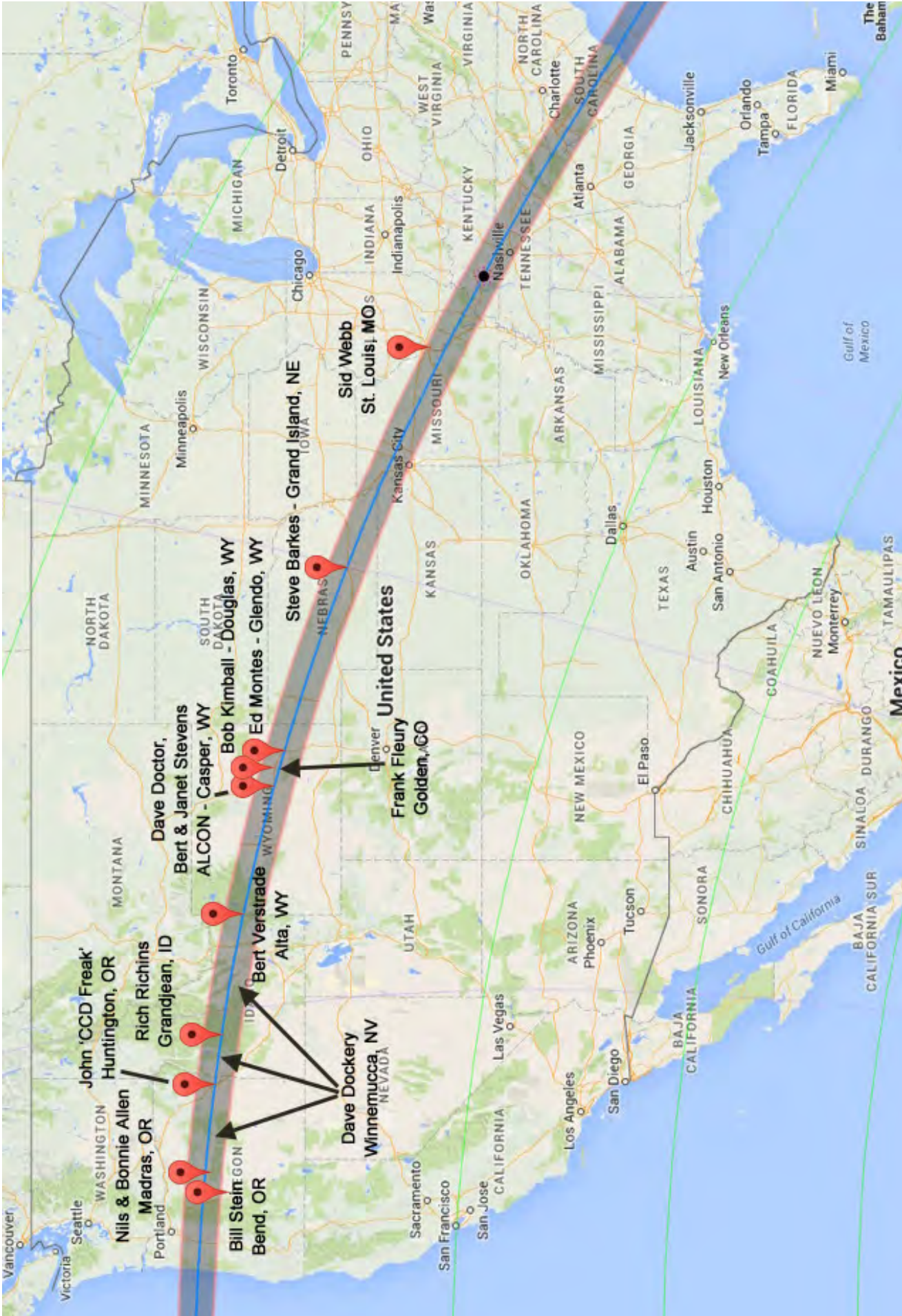


© Jeff Johnson | jeffastro.com

OBJECT	Leo Triplet (M65 M66 NGC 3628)	Distance: 35 million light years
Telescope	Takahashi FS-60C @ f/6.2	
Mount	Takahashi EM200 Temma II	
Camera	QSI 540wsg @ -15C	
Filters	Astrodon Tru-Balance I-Series LRGB Gen 2	
Guider	SX Lodestar	
Settings	9x10min L (bin1x1); 2x5min ea RGB (bin2x2); AstroArt5, CS4 (slightly cropped, 10xdarks/flats/fdarks/bias)	
Date/Location	29 January 2017 - Las Cruces, NM	
Notes	Published as Astronomy Magazine Picture of the Day, 29 Jun 17. This image is LRGB.	

Copyright Jeffrey O. Johnson

Photo of the Month



Eclipse Path, Aug 21, 2017:
The path of totality and the location of ASLC members at the eclipse.