

FarFarOut



Stellar Myths and Marvels

Volume 3, Issue 3

October 2024

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STARSociety
South Texas Astronomical Society

Editorial

The thing's hollow—it goes on forever—and—oh my God!—it's full of stars!

Arthur C. Clarke has a way with words. In the novelization of *2001: A Space Odyssey*, these are astronaut David Bowman's final remarks as he enters the monolith he was unknowingly sent to investigate. The words are chilling in implication: do we really understand our origin as a species? Do we know how the universe truly works? What sort of mysteries remain out there beyond our wildest speculation?

Since time immemorial, humans have sought meaning from the stars. Astrology, or "meaning of the stars", is as old a tradition as astronomy, which means "law of the stars". While the latter became the scientific discipline as we understand it today, the seeking of meaning in the skies above us still resonates in the hearts and minds of many. In this issue, FFO #11, we bring to you a variety of works centered on an interesting theme - the old tradition of finding meaning in the stars. We also take the opportunity to delve into some strange theories of the universe that show just how much we have yet to understand.

We bring to you several wonderful essays to share, including a student's inspiring journey to an aerospace academy, an introduction to the wonders of astronomy, and a discussion of a current tension in the field of cosmology. I'm proud to introduce for the first time two works of poetry, "Silent Bear" and "Event Horizon". We include several fantastic student art pieces, a pantheon of Zodiac constellations, and some brilliant astrophotography of celestial objects. And, of course, we have our regular columns as well: Carol's Corner describing the seasonal patterns in the sky, the Recollections of a Wannabe Astronaut discussing monoliths, and a myth retelling of Cygnus and friendship.

I write to you from the deserts of Argentina, where I've witnessed some extraordinary astronomical phenomena that I hope to share with you upon my return. They have certainly turned this lifelong astronomer toward many thoughts of meaning – and wonder.

Wishing you clear skies,

Richard Camuccio
Editor-in-Chief

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STARsociety

South Texas Astronomical Society

To the STARS Community:

While our event schedule has been relatively quiet lately, we've been hard at work behind the scenes, focusing on organizing things and collaborating with our partners to ensure the long-term sustainability of STARS and our impact in the community. These efforts will allow us to continue providing exciting and educational astronomy events and initiatives for years to come. Here are some upcoming events we hope to see you at:

- **10/8: Monthly Meetup** - Our next community meetup is on October 8th at 6:30 pm at the Southmost Public Library (4320 Southmost Rd, Brownsville, TX 78521).
- **12/16: Resaca de la Palma's Sweet 16** - Our partners at RDLP State Park (1000 New Carmen Ave, Brownsville, TX 78520) are celebrating their 16th anniversary! Join us from 6-10 pm for family-friendly activities, including observatory tours and stargazing.

Be sure to follow us on social media and sign up to our [email list](#) to make sure you don't miss any upcoming events.

We have one more exciting event on our calendar that deserves a closer look...

STARS is hosting the 40th Annual Turkey Trot at the Heart Institute of Brownsville!

On Saturday, November 23 at 7:30 am, STARS will lead the 40th Annual Turkey Trot, featuring a 4-mile run/walk and 1-mile "Gobble" run/walk. The event will take place at the Heart Institute of Brownsville (213 Heart St, Brownsville, TX 78520), the generous primary sponsors of the annual run/walk. Participation in the 4-mile run/walk is \$30. The 1-mile "Gobble" run/walk is \$10 for children and students, and \$12 for adults. Registration includes the race timing chip, bib, medal, and a special running event T-shirt.

Proceeds from the 40th Annual Turkey Trot will be going to our *Carol Lutsinger STEM Scholarship* fund, benefiting RGV students pursuing degrees in Science, Technology, Engineering, Math (STEM) and related fields. Starting February 2025, we will begin accepting applications from graduating high school students around the RGV. Announcements and awards for scholarship recipients will be made May-June 2025. Scholarship amounts and number of awardees will depend on the total amount of funds raised. After the Turkey Trot event, we will continue raising funds for the scholarship through March-April 2025.

For more information and to register for the event, please visit starsocietyrgv.org/turkeytrot. For more information on the Carol Lutsinger STEM Scholarship, please visit starsocietyrgv.org/scholarship.

For any inquiries on participation in the 40th Annual Turkey Trot event - and/or any aspect of STARS - please send us an email at:

contact@starsocietyrgv.org

Newsletter: South Texas Astronomical Society

The **South Texas Astronomical Society (STARS)** is a nonprofit organization connecting the Rio Grande Valley community to space and science.

Our Mission is to ignite curiosity in the RGV through space science education, outreach programs, and by serving as a liaison between community members and space organizations and resources.

Our Vision is that STARS nurtures the innate human desire for exploration and discovery by fostering connections to science and the cosmos across the RGV.

Make sure to follow @STARSSocietyRGV:





Hello to everyone from The Science Academy Astronomy Club!

We are very much looking forward to what this school year is going to bring. Over the summer we had the opportunity of joining STARS at a Garcia Bros Earth and Space science event. At the event we had the opportunity to talk to community members about what The Science Academy Astronomy Club is all about, engage with other community organizations in similar fields, we met a lot of new people, and had a stellar time doing it.

We are looking forward to having STARS at our campus in the near future once again to present and educate our club members on a new astronomical concept. Please stay tuned to the upcoming issues and see what far out things we do this year at Science Academy. Stay Stellar!

Our purpose as the **Astronomy Club of the South Texas ISD Science Academy** is to share our passion of all things related to astronomy, not only with our club members, but with the entire student body as well.

Some of the activities we do as a club include:

- Discuss astronomical concepts and phenomena during our routine meetings and talks.
- Conduct lab activities and experiments where we try to model different cosmic related phenomena to further grasp and visualize important concepts.
- Have star watch parties to put our discussed skills into practice and strengthen our appreciation of our night sky using a variety of telescopes.
- Observe astronomical events such as the 2023 and 2024 solar eclipses.

Our club's 2024-2025 officers:

- Osric Dienda (President)
- Dariana Leal (Vice President)
- Aditya Dantu (Secretary)
- Gael Robles (Treasurer)
- Isabella Garcia-Cortez (Historian)
- Serene Feng (Parliamentarian)

Club sponsor: Mario Guzman



Carol's Corner of the Cosmos

Carol Lutsinger



September

With so much of what goes on in our human experience either a surprise or undependable, it may comfort us to recognize that the constancy of the motions in our Solar System is definitely predictable. September brings the noticeable change of season from steaming hot summer and long hours of daylight to fresher breezes, blessed rain in our region, and sunrise occurring later each dawn and sunset earlier each afternoon. Of course, you are more aware of this than the average inhabitant of Earth because of your interest in sky watching, so it will not surprise you to read that autumn's predictable and expected equinox will occur on the 22nd of September. Thanks to geometry between the Sun and our home planet we experience a variety of seasons and appreciate the hints of approaching autumn: longer morning shadows, a freshness in the dawn breeze, and some emerging constellations, not to mention the slow traverse of Sol along the horizon and the change of the location of the Sun at sunrise and sunset. What a marvelous pleasure to recognize change and ponder those essential motions that we take for granted.

If there is a tall light post or palm tree or even rooftop to gauge the motion of the Sun against, you might want to design a chart to record that motion and discover more about the equinoxes and the solstices we experience during a year. It might even be something to design a science fair project around for the upcoming school competitions.

Late September constellations to search out include the Great Square of Pegasus, or what I much prefer, the Baseball Diamond in the Sky. This huge group of stars definitely resembles your favorite professional baseball team's field, with the players at the bases, the umpire and batter's box behind home plate and with Princess Andromeda playing first base. Her

parents' constellations of Queen Cassiopeia and King Cepheus in the bleachers, making sure no one makes it to first base with their darling daughter, make a complete story in the sky. Gotta love those ancient Greeks and Romans and how we still enjoy their stories with our own spin on them.

Cassiopeia is a W shaped group of stars in the north part of the sky now, with Cepheus just below. His stars resemble a flat-topped raspa or an upside-down crooked little house like kindergartners draw. Andromeda is a bent elongated V stretching out into space off the first-base star in the Great Square of Pegasus/BD. The Square faces out to the edge of our Milky Way and leads to infinity. Conversely, the Scorpion's direction leads toward the center of our galaxy.

Scorpius is still in the night sky this month but edging ever closer to the western horizon. The rotation of Earth causes the march of constellations from east to west as we rotate on our axis tilted 23.5 degrees off 90 degrees from west to east. This in turn makes the constellations in the north appear to be rotating in a counterclockwise motion about the North Star, Polaris.

October

Autumn is now in full swing and our children look forward to trick-or-treating. On October 2nd we will have a New Moon, with the Full Moon occurring two weeks later, which makes things appear mysteriously changed as we stroll the neighborhood those crisp evenings and bring memories of our own adventures long (or not so long) ago. However, for Halloween, the Moon will again be invisible. A second New Moon in the same month is preparing to challenge serious sky watchers to glimpse the youngest waxing crescent phase. How early will you spy it? A few

hours or perhaps a day? Let us know via our Facebook site.

It may interest you to know that when a second New Moon occurs in a single month, it is called the Black Moon. There have been so many songs written about the stars and moons. What is your favorite 'good old days' astronomy-based tune? Our Moon is interesting in that it is tidally locked – we only see one side of Luna as a result. Its rotation time is the same as Earth's. Until the space missions to orbit the Moon we were not aware of what its far side features looked like. From what we know now, it is a wonderful thing to have our Moon because Earth has been spared many strikes from comets, asteroids, and meteors over the millennia, judging from the craters on the far side of our shield.

Check out Saturn this month, as it is well up in the east after dark among the stars of Aquarius. Forty years ago, I watched two bright 'stars' in the sky as I took my evening walk through my neighborhood. Later I realized I was seeing a slow dance of Jupiter and Saturn over many months. I had not known any astronomy at the time, but I did figure out they had to be planets. Isn't it amazing to be able to enjoy the constant changing or never changing cycles and be able to identify things?

Low in the south will be the 'lonely star' Fomalhaut, the brightest star in the constellation Piscis Austrinus. This region of the sky has faint stars in it so if you see a bright one, you'll have Fomalhaut.

Looking up, the sky will be crowded with constellations and Messier objects to explore. If you just lay back on a lawn chair or in the back of a pickup it will be easy to use binoculars and see the Milky Way's path from northeast to southwest and just scan the sky. Passing in front of the galaxy will be Serpens (and Ophiucus), Aquila the Eagle from

the Summer Triangle, and Cygnus the Swan. From the zenith northward and on either side will be Cepheus and Pegasus, then Cassiopeia (NE), and Perseus near the horizon, and ending in Auriga the Charioteer. Whew!

November

The world turns and we turn another page of our calendars, the October constellations are now farther along their paths across the sky. Emerging from the east are the next-in-line of the 'merry-go-round' displays of our consistent constellations. The Milky Way galaxy sweeps closest to the north pole of the sky near the constellation Cassiopeia. This group of stars is filled with open star clusters. If we had really dark skies you would be amazed to see the blur of starlight from their contents. New stars form, begin their soft glow as a protostar, swell, add mass, and become blue giants, red giants, or 'regular' yellow stars like our Sun, just a fascinating sequence to explore. Cassiopeia harbors M103 and M52, and NGC 457, 663, and 7789. It is the location of the star Tycho Brahe saw go supernova, which formed the Crab Nebula. Astronomers have been anticipating something like this to happen with Betelgeuse the red supergiant star in the shoulder of the constellation Orion. Perhaps it has already happened but the light from it has not yet reached us. Wouldn't that be exciting to see?

On the night of the 17th/18th the Leonid meteor shower will once again have us outside after midnight hoping to glimpse a few of the 'falling stars'. As asteroids and comets and meteors streak through our sky, they leave debris trails behind them for us to imagine the stars are falling. These heavenly visitors do occasionally hit Earth and create excitement – without warning, as happened this past year on a ranch outside Edinburg/McAllen, Texas area. They are rocky chondrites and the whole thing was quite exciting.

As inept as I am with apps connected with modern communications, I am able to share a site for a unique NASA adventure connected to the Artemis mission to return to the Moon. If you have a precocious elementary student they might be interested in checking this out, although I believe it is more for middle school, but how would I know – I am well beyond that group. Check out the site with your member of the group and let them decide [1]. First Woman tells the tale of fictional Callie Rodriguez, the first woman to explore the Moon. While Callie is a fictional character, the first female astronaut will soon set foot on the Moon – a historic milestone and part of upcoming NASA missions. Through a series of graphic novels and digital platforms, First Woman aims to capture our attention and unite the next generation of explorers who will return to the Moon.

Another device-related app is called Neptune and is designed to aid persons taking astronomical photographs. For information, check [2]. I have no idea how useful it is, but the McDonald Observatory magazine had an article about it, so it must be good.

Until next time, DO let some stars get in your eyes and remember to KLU! ★

References

[1] <https://www.nasa.gov/specials/calliefirst/>

[2] <https://apps.apple.com/us/app/nocturne-by-unistar/id1577337929>

Biography

Carol Lutsinger is the founder of the South Texas Astronomical Society. She spent 40 years as a teacher, serving students from Pre-K through college. Carol attributes her astronomy enthusiasm in part to her experience in the American Astronomical Society's AASTRA program from 1994-96, and her space excitement from serving as a Solar System Educator, and later Ambassador, for the NASA/JPL program. She has been writing the Stargazer newspaper column since 1998, which is carried in the Brownsville Herald and the Valley Morning Star. Retired from formal education since 2020, she still makes every opportunity to share meteorites which she carries in her purse and to ask folks in parking lots if they know what that point of light is.



Aries

Ram

Mar 21 - Apr 19



Taurus

Bull

Apr 20 - May 20



Gemini

Twins

May 21 - Jun 21



Cancer

Crab

Jun 22 - Jul 22



Leo

Lion

Jul 23 - Aug 22



Virgo

Virgin

Aug 23 - Sep 22



Libra

Ram

Sep 23 - Oct 23



Scorpio

Scorpion

Oct 24 - Nov 21



Sagittarius
Archer
Nov 22 - Dec 21



Capricorn
Goat
Dec 22 - Jan 19



Aquarius
Water Bearer
Jan 20 - Feb 18



Pisces
Fish
Feb 19 - Mar 20

The Recollections of a Wannabe Astronaut

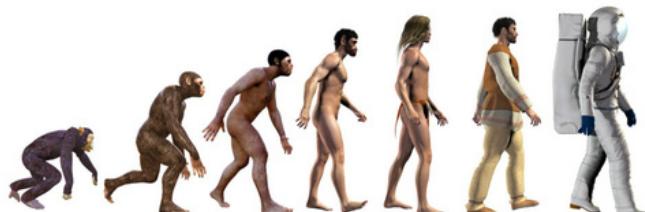
Stephen J. Camuccio



I wanted to take a different approach to this issue. As of today's date, September 19th, this conglomeration of atoms has successfully completed its 70th orbit of our Sun. As I looked back on our exploration of space, a thought occurred to me. Even though we cooperate in sharing the ISS with various space faring nations, excluding China, why hasn't this cooperation spilled over to lessen tensions on Earth? Why are our astronauts, cosmonauts, and astronauts of other countries able to co-exist in space, but our governments cannot find common ground on Earth?

Now I'm not suggesting a one government on Earth and a dissolution of national boundaries. But we are all humans riding on the same "spaceship"...Earth. Surely if this species can do and discover amazing things, we can find a way to transcend our differences and move beyond the petty differences that hold *Homo sapiens* tethered to the cave we ventured from.

We have as a species evolved to the point of being able to leave our home world and establish ourselves on other planets. We can cure disease, fly, create wondrous inventions to increase the yield from farms to feed the world. Yet, we remain a violent species not much different than our ancestors who discovered fire and set them on the path to mastering their environment.



In the movie, *2001: A Space Odyssey*, the opening scene was with apes touching an obelisk.



They eventually discover weapons and the scene jumps to a space station. An obelisk was discovered on the Moon. That being said, are we part of an experiment? I believe we are and have been visited by a more advanced civilization, and the experiment has progressed to the point that we are either going to destroy ourselves or are we going to realize we can achieve greater things and prove the experiment was a success.

After all, as a fan of Star Trek, in the 24th century the Starship Enterprise had a crew of all nationalities. As my father used to say: "If it can be dreamed, it can be done."

It's up to us. By the way, those obelisks have been showing up around the world again. ★

Biography

Stephen J. Camuccio hails from Philadelphia, PA (Go Eagles!). He attended Community College of Philadelphia and Drexel University, and received an associate degree in mechanical engineering. Stephen worked in careers spanning several domains, including restaurants, insurance, and automobile sales (the latter starting with Saturn cars, named after the Saturn V Moon rocket, not the planet). He is currently retired... sort of. His hobbies include building scale models of spacecraft, amateur astronomy, and deep sea fishing. Stephen is married, a father of four, and a grandfather of eight.

Silent Bear

Blood Poet



somewhere in the universe
beyond jupiter or mars
a silent bear leaves paw prints
they rest among the stars

somewhere in the cosmos
way up beyond above
silent bear is standing
giving unconditional love

somewhere beyond the present
or maybe it is time long ago
silent bear is a Warrior
he is the desert snow

we see the same stars
from each other far away
but wherever i walk
my Brother you will stay

somewhere among the stars
sahallie* mika** Mother
silent bear is watching
silent bear is our brother

* to look at
** your

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Biography

Tracie Myrick Meyer (Blood Poet) is Santiam Kalapuya, lifetime resident of the Pacific Northwest. She became a writer after the death of her husband. She shared her words primarily with her internet group Red Road Recovery, when her writing *To Walk the Red Road* became an internet success. Tracie currently lives in the Grand Ronde Agency in Oregon. At age 70 she still writes of "things Indian", has her work shown at Cultural and Tribal Art Shows and permanently at the Chehalem Cultural Center.



Event Horizon

Space Age Charybdis

Electromagnetic waves

Struggle to escape

Isaac Saldaña
2407 04

From South to Rice

Rayyan Farooqui



"Congratulations! We are honored to invite you to attend the Aerospace Academy at Rice University in Houston for the summer of 2024," read the letter I received. The paper crumbled as I squeezed it, hugging my parents. However, a thought ignited as I perused the cost of attendance: \$6700 seemed almost impractical to me. My spirit sank like a stone in water, knowing that despite my educational merit, a price tag was being put on receiving the benefits of this program that may significantly impact my academic journey. Therefore, I started discovering avenues to acquire funds to support the admission fee. Nevertheless, I overlooked how difficult it would be to obtain the funds for the program. A pathway, many said, may be worth more than the actual program.

Upon applying several months back, the acceptance letter came in February 2024, and payment for the program was due toward the end of June. This meant I had four months to strategically plan to reach the \$6700 amount.

For many, the pursuit of the Aerospace Academy commenced on the day the program started; mine began on the day I made a GoFundMe account. Launching the GoFundMe brought in the first \$1000, a generous contribution from my teachers, marking the beginning of what I hoped would be many more donations. Following that, I worked day and night to promote my cause to Brownsville, which led to the involvement of the South Texas Astronomical Society, a nonprofit organization of which I was already an avid member. I reached out to the organization's executive director, Victor De Los Santos, in hopes of getting this story out to the public. Consequently, I was tasked with creating a video describing my motive.

As I sat in the library's quiet room with a blank document, ready to put down the first word, I paused to reflect deeply on how far this journey had come despite its newness. At that point, I had already secured \$1800 and realized what I was working on would be my ticket to Rice University. The day the video was rolled out, donations began pouring in from all over the Valley and beyond. I could hardly sit still, my heart racing with every new notification. Each ping of my phone felt like a personal affirmation, a sign that my vision was unfolding perfectly before my eyes.

However, the path wasn't all joyous and straightforward. There came a moment when the flow of donations trickled to a halt, casting a shadow over my initial excitement. After a challenging conversation with my parents, I emailed to decline the acceptance. With a dark cloud of grief above my head, my hands flew across the keyboard, racing against the ticking clock with only 30 minutes before the cancellation window closed. Despite my frustration, a gut feeling urged me to call the following day to request an extension. Surprisingly, my persistence paid off, and I gained the extended deadline. Ultimately, it all came down to acquiring only \$3000 more.

That is when the tides shifted. The Rotary Club of Brownsville reached out to me and donated \$600, followed by the Greater Brownsville Incentive Corporation, which covered the remaining amount of \$2400. As I held the four-foot-tall check ready for the picture, the weight of my hard work finally lifted. My hands trembled, and a rush of joy swept over me as I faced the camera.

Now, it was all about getting there. On the same day, I found myself loading the bags in my trunk. The

From South to Rice

five-hour ride from Brownsville to Houston fueled my anticipation as every mile cut off. The next day, the rain commemorated the 30-minute drive to campus, leading to nervous excitement as all my efforts from the past few months came down to this very moment. The campus vicinity was beautiful—the colossal red brick facades with marvelous marble work dating back to the early 1900s—like I had entered a time capsule. Eventually, I located the college I would spend the next two weeks at, Duncan College, one of the 11 most recent residential colleges established in 2009.

I took off my bags from the trunk and said my goodbyes. The next thing I knew, I stood before a program representative, briefed about my badge and room key. My dorm was on the third floor, and it was a double; that meant I had a roommate, which I was looking forward to. Upon setting my bags down, I was immediately taken to our group's classroom at Lovett Hall. The first day involved familiarizing ourselves with the program as we attended the opening ceremony hosted at the Rice University Mechanical Engineering Department. After that, we ate dinner in the dining hall of Duncan College. We participated in icebreakers for the remainder of the day to get to know our group. And just like that, the first day had ended, and we would be in our dorm by 9 pm.

The following day, breakfast was at 8 am. I had a script in my hand as I indulged in my meal to prepare for the introduction speech I would give for Dr. Leroy Chiao, hosted in the Plenary Space. Dr. Chiao shared with us tremendous insights into his career and how he became an astronaut, leading multiple Space Shuttle missions to facilitate the construction of the International Space Station. As his presentation ended, I had the time to engage in an insightful conversation and ask him questions regarding the growing aerospace engineering industry.

Following that, we participated in enlightening panel discussions with admission officers, undergraduate students, and current and post-doctoral students from Rice University. I gained valuable information about what I must remember when applying to this university. After dinner, we had our first lecture of many to come, hosted by Dr. Patrick Rody, one of the leading professors in the Mechanical Engineering Department. The lecture mainly focused on orbital mechanics, concentrating on aerospace propulsion, high-speed aerodynamics, and aerothermodynamics. This was the first time I was introduced to a higher level of studies in a field that has captured my interest for a while. It was eye-opening.

The next two weeks consisted of lectures from Steven Rickman, a NASA technical fellow for thermal control and protection, Dr. Ulyana, a Doctor of Philosophy for Geological Earth and Planetary Sciences, and many other experts in the field. The feeling of sitting in a lecture hall at my dream school and being lectured by such talented people alongside 100 other students grew more intense each time. I often found myself taking a moment to reflect on how meaningful this was while jotting down notes.

Some other activities on campus included CAD (computer-aided design) workshops, where we worked on a software called OnShape to create three-stage rocket models. This was a terrific opportunity to learn a new skill that I knew I would apply in the future, especially with Launchpad, a program I am a member of, where we are building a rocket. We also participated in AI workshops, diving deeper into the algorithms of AI and its ethical uses in society. These workshops provided eye-opening experiences as we explored the intricacies of how computers generate algorithms.

Additionally, the pressurized bottle rocket challenge

From South to Rice

was something that we all looked forward to. As the project manager of my group, I worked tirelessly to create the perfect rocket for launch. From calculating the center of mass and descent rates to working within a tight budget to construct the rocket, it was a remarkable experience—until we launched.

My program also included a trip to the LoneStar Flight Museum in Houston, TX. There, we spent a day learning about historically significant planes from the past, such as the Boeing-Stearman N2S Kaydet and the Corsair Warbird. We also experienced an immersive Cessna flight simulator and conducted pre-flight checks on a real Mooney Ovation N2DXR. Seeing all these planes that have flown in the past, along with the authentic NASA Space Shuttle mockup where all the astronauts trained, was a rare, unforgettable experience.

We were taken to Space Center Houston for an entire week to participate in the Space Center University Atmospheric Payload Workshop. Here, we sent a weather balloon to 100,000+ feet in altitude, well into the stratosphere, to conduct experiments. As my group's project manager, we experimented with temperature and pressure at such high altitudes. Other group members tested altering magnetic fields by sending analog watch dials, and some even experimented with flip bits in a USB consisting of binary code. The week was spent familiarizing ourselves with the flight operations and working within a tight weight limit for the payload. We also learned how to apply math to calculate ascent and descent rates concerning the components of the weather balloon.

This project enabled me to refine my leadership and collaboration skills as we worked with people from different departments to prepare for our flight, which took place early in the morning at MSR Houston. Our trips to the Space Center also included exclusive

tours of NASA Johnson Space Center's facilities, such as the Astronaut Space Vehicle Mockup Facility, current NASA Mission Control, Apollo Mission Control, Mars Simulation, and Rocket Park, where the Saturn V is located. Getting to see all these wonders in real life left me in awe, as I had previously only seen them in movies. Passing through the buildings where active work was being conducted to advance the space industry ignited my passion to pursue this field.

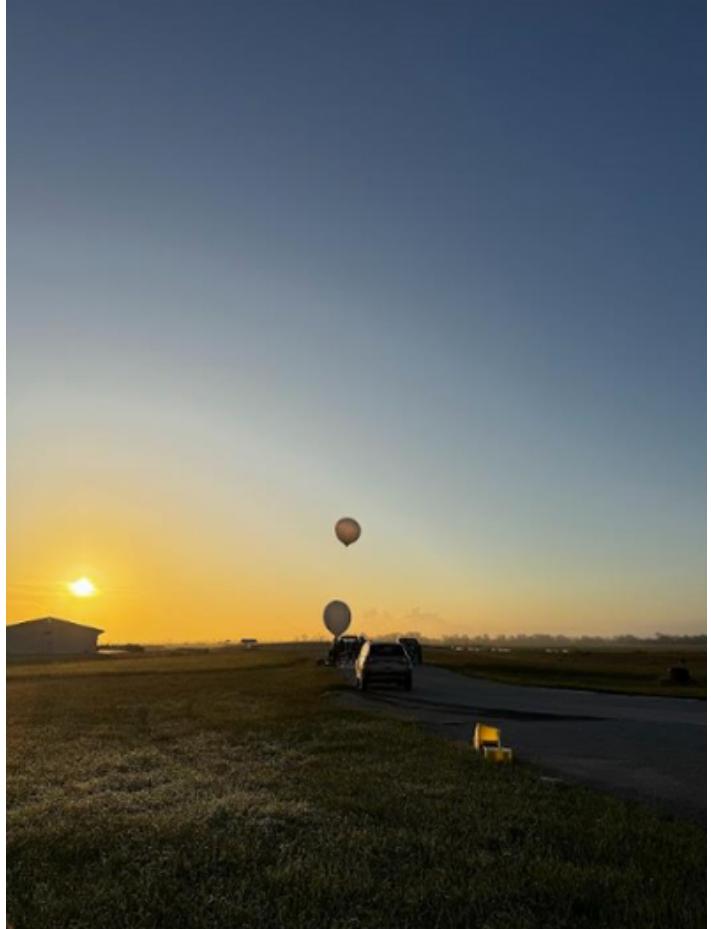
To wrap up, this program opened my eyes to various aspects of the space industry, allowing me to dwell further on what it takes to be part of something greater than myself. Being part of this experience fueled my drive to give it my all and made it my mission to attend this program and many more in the future. I will never forget this as my first real exposure to aerospace; everything I learned will better assist me. Deepening my understanding of what space is, this experience was truly irreplaceable. I will cherish the knowledge I gained and the friends I made for years to come, and that was the ultimate payoff for all my hard work.

I would like to close out this writing with a quote that I most resonated with, especially when I was at work to turn this goal into a reality, and I hope my story inspires those that have a vision, to always work hard and persevere no matter the circumstance, and success shall come to you. The quote goes like this, "Perseverance is a great element of success. If you only knock long enough and loud enough at the gate, you are sure to wake up somebody." - Henry Wadsworth Longfellow

I want to give special thanks to the Rotary Club of Brownsville, the Greater Brownsville Incentive Corporation, the South Texas Astronomical Society, and every single person who believed in me and considered this opportunity significant for me. ★



Rayyan as a project manager at Space Center University, Houston, working on a payload mission to high altitude.



At MSR Houston during sunrise, preparing for launch of the Atmospheric Payload Mission

Rayyan with the 2024 Group A batch.



Rayyan at the NASA Mission Control in Johnson Space Center, Houston, TX.



Only flight-certified Saturn V rocket's main engines, at George W. S. Abbey Rocket Park, Johnson Space Center.



Conducting pre-flight check on a Mooney Ovation single propeller plane, at LoneStar Flight Museum.



CAD Workshop at RICE University Lovett Lecture Hall.



View of the real Apollo mission control center preserved to date at Johnson Space Center.



Receiving a check from the Greater Brownsville Incentive Corporation just days before leaving for the program.



View from the active NASA Astronaut Training and Space Vehicle Mockup Facility.

Biography

Rayyan Farooqui is a junior high school student at IDEA Brownsville, a Pakistani immigrant moving from Saudi Arabia to the States in 2020, a volunteer and a Social Media Marketing Intern at the South Texas Astronomical Society. He is passionate about Aerospace and hopes to pursue it as a career. Rayyan aspires to work as an aerospace engineer and an astronaut for NASA. His hobbies consist of filmmaking, observing deep space with telescopes, swimming, and playing soccer. Rayyan hopes to inspire and introduce the wonders of the cosmos to his community in all ways possible.

Crisis? What Crisis?

Richard Pomeroy



Two Camps Arise...

For the last two decades there have been two main ways of measuring the Hubble constant (H_0) - the parameter that cosmologists use to describe the rate of expansion of the universe. These methods involve either accurate analysis of the cosmic microwave background (CMB) or alternatively, measurement of the light from variable stars known as Cepheids and transient events known as Type Ia supernovae (SNe). As techniques, and technology, have improved over the last twenty years, the accuracy of the Hubble constant predicted by both of these different methods has improved significantly, but ironically, they have also diverged to the point that the uncertainties in each method no longer overlap. This is a big deal.



Figure 1. '42' can obviously be taken as a working hypothesis to the ultimate question! Adams [1]. Credit: BBC Archives.

In simple terms, it implies there may be something wrong with our understanding of the universe. While good scientists would never profess to have all the answers to life, the universe, and everything (see Figure 1), the fact that these two robust and otherwise very successful observational techniques disagree so profoundly is disturbing enough that

astrophysicists have declared a crisis in cosmology, and colloquially named the problem "The Hubble Tension".

However, we're getting ahead of ourselves. If you need a primer on the science of cosmology, and how it has developed over the last hundred years, then previous articles of FFO will interest you (see *Cosmology 101*, FFO - #10).

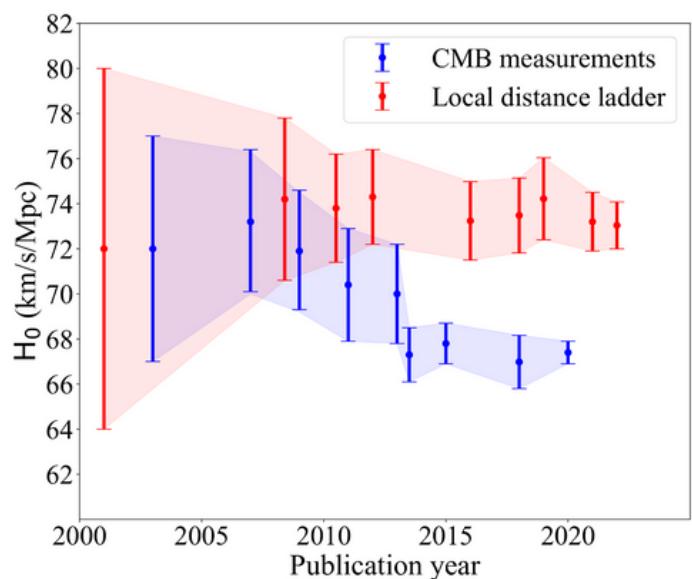


Figure 2. The 'Hubble Tension'. Over many years improvements in measurement have caused different means of calculating the Hubble parameter to diverge to the point that they are no longer compatible. Credit: Perivolaropoulos and Skara [2].

The Hubble Tension

The data obtained over many years from key missions such as first the Hubble Space Telescope, and more recently the James Webb Space Telescope, have set a value on the 'current' value of the Hubble parameter (H_0) of about 73 km/s/Mpc. This includes calibrations from the Type Ia SNe and Cepheid variables as key rungs on the distance

ladder, but there are many other observations and methods, too numerous to cover here, included in the calculation.

Conversely, determination of the Hubble parameter using primarily data from the WMAP and Planck satellites based on the CMB suggests a lower value of about 67 km/s/Mpc.

These differences may seem small, but as the uncertainty in the measurement types has improved, the overlap between the competing methods has disappeared to the point that over the last decade the methods are no longer compatible (see Figure 2). The direct observation method of measurements, i.e., the Cepheids and Type Ia SNe, are based on relatively local measurements and these rely on accurate calibration of the standard candles. The indirect method, involving analysis of the CMB, has a lower level of uncertainty, but relies upon accurate models, which themselves are based on other measurements and observations.

It is as though there is a gap in our understanding between very close methods and very far methods. Either way, the detail and analysis that has gone into the measurements suggest the discrepancy is unlikely to be associated with systematic measurement error and JWST validation of long-standing HST Cepheid and Type Ia SN measurements recently confirmed this to be the case [3]. This is a very current topic of debate.

Breaking the Deadlock

Wendy Freedman, at the University of Chicago, has pioneered an additional measurement method for large stars at the end of their lives (red giants and asymptotic giants) which experience a sudden drop in brightness, and which can be used as a standard candle. The method, known as the 'tip of the red giant branch' (TRGB) developed by her and others [4]

has been used to calibrate the local distance Cepheids and Type Ia SNe, and from this she has obtained a value for $H_0 \sim 69$ km/s/Mpc [5].

Box 1. The Distance Ladder

In astronomy, we measure distances by a variety of methods, known as the 'distance ladder'. The main methods used are parallax, standard candles such as variable stars and SNe, and cosmological redshift.

Parallax is a geometrical measurement based on a comparison of 'movement' of nearby objects against their background. While this first step is accurate, it is only good for objects in our Galaxy (the Milky Way).

Variable star observations exploit the relationship between the period with which a star varies to its intrinsic luminosity. Variable stars called Cepheids are typically used for these observations.

Supernovae observations are based on the consistent and predictable brightness of Type Ia SN explosions.

Cosmological redshift measures the recession velocity of distant objects, but relies on accurate models of the expansion rate of the universe.

Each subsequent method builds on the foundation, and calibration, of closer methods, and relies upon overlap of observations as we observe to greater distances.

Over the last few years, the team has also been pioneering observations using so called JAGB (J-Region Asymptotic Giant Branch) stars (colloquially referred to as 'carbon' stars) as another method of

Crisis? What Crisis?

local calibration of the distance ladder. Initial results have been in good agreement with the RGB results from the same team [6] with a Hubble value of H_0 68 km/s/Mpc being determined, and although at this stage the tolerance is wide, this correlates with the Planck/CMB observations, suggesting there may not be a Hubble Tension after all.

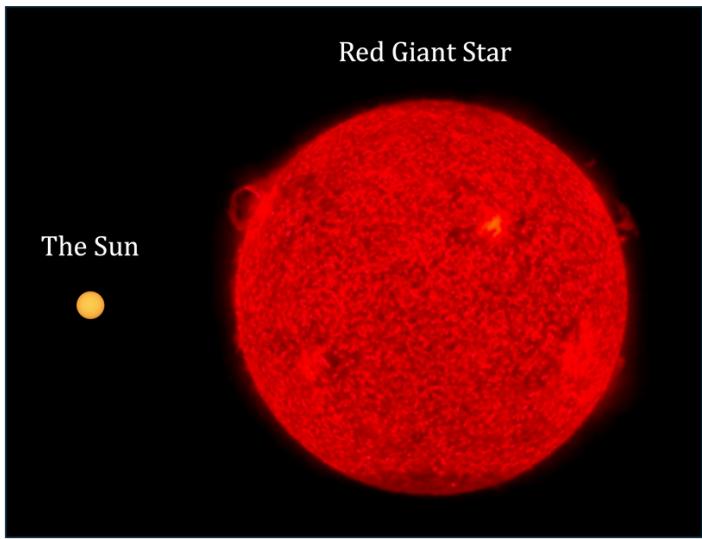


Figure 3. Red giants are stars which have finished burning hydrogen in their cores, and started to fuse heavier elements, but have not yet died in a SN (Type II). Credit: Author.

Others have been developing methods to measure the shape of gravitational waves (GW) emitted by merging neutron stars (the very dense, compact remnant of a large dead star). Although these are infrequent events, preliminary measurements also suggest a value for H_0 70 km/s/Mpc [7], consistent with Freedman's results. This method has been referred to as GW sirens or 'standard sirens' in a play on the astronomer's standard candles.

Many, many other methods, which we haven't got time to go into here, have also been used, such as quasar lensing, megamasers, and fast radio bursts (FRBs), but, as illustrated in Figure 4, many of these

methods have a wide variation or are infrequent, and so do not help to solve the dilemma.

There are even more theories as to what the 'cause' of the tension might be, that is, what the source of the discrepancy between early and late time observations is. Many of these include changes to the dark energy part of the Λ CDM model, either early in the life of the universe or more recently, or potentially that the value of dark energy varies throughout the universe. As yet undiscovered, and unobserved, particles have also been suggested, and in a similar vein, the manner in which dark matter interacts with normal matter and radiation may be more complex than initially suggested.

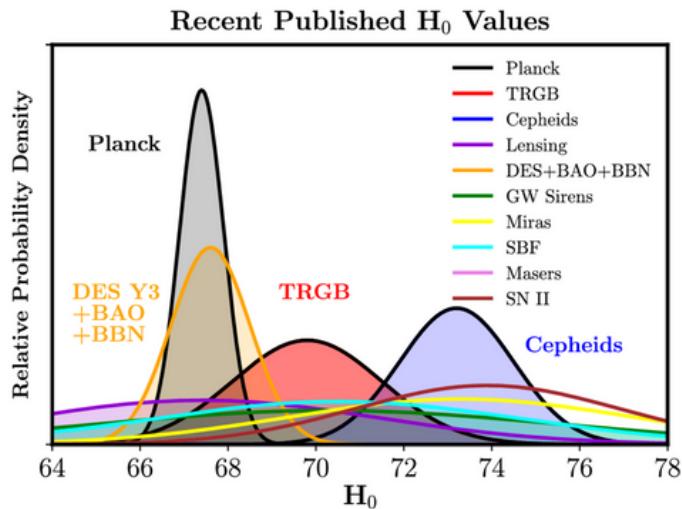


Figure 4. Recent (2023) estimations of the Hubble parameter H by various methods, including CMB measurements by the Planck Collaboration, local measurements of Cepheid variables from HST and now JWST, and 'tip of the red giant branch' (TRGB) measurements by Freedman and her team. Credit: Madore and Freedman [8].

'Tensions' in science are not uncommon. In order to advance, the scientific method relies upon the rigorous cycle of modeling and observations. If observations do not match theory, it is suggestive

that a new theory is required. As a result, much theoretical effort by cosmologists, astrophysicists, and particle physicists, along with observational efforts by astronomers, is continuing to be applied to this problem. If the tension is real, and all indications are that it is, we may be on the verge of our next big breakthrough in understanding the physics of the way the world works and how the universe came to be the way we see it today. ★

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<https://iopscience.iop.org/article/10.3847/1538-4357/abdc7>
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<https://doi.org/10.48550/arXiv.2305.19437>

Biography

Richard Pomeroy, from the United Kingdom, originally trained as an electronics engineer, but spent many years both managing teams and developing application software for industries as diverse as defense, telecoms and finance, most recently as associate director of information systems for the European Bank for Reconstruction and Development. He changed career six years ago, following a lifetime passion for the stars, having completed a bachelors degree in astronomy, and a masters in astrophysics. He is currently a graduate research assistant and physics and astronomy PhD student at the University of Texas, Rio Grande Valley.

Astronomy - An Expository Essay

Ulises Jarquín



Astronomy is defined as "the branch of science that deals with celestial objects, space, and the physical universe as a whole" by Oxford Languages, but it is way more than just a branch of science. Astronomy is beautiful. Astronomy is the study of existence, of objects that go beyond imagination, and oftentimes is the stepping stone for curious kids that want to know more and why. Astronomy has been key for the development of humanity because of how big the study of the universe can be, going from engineering to computation, and there from physics, even reaching out to biology and chemistry. Astronomy is beautiful, and today my goal is to share what makes this science so special. We could say that the important parts of astronomy are objects, physics, and engineering. I am going to focus on the objects—the most interesting there are—and explain in a nutshell the physics behind them; if needed, I will talk about the engineering and how it helps to know more about them.

Small to Big

We start from the start of everything: the Big Bang. The Big Bang happened almost 14 billion years ago, and we are not very sure of how things looked at the exact moment of the expansion. According to our models, the Big Bang must have been first a singularity of matter that had the universe in an infinitely small space, that expanded at an unimaginably fast speed unleashing with it all the matter, antimatter, exotic matter, photons, and fundamental forces of the universe, something that we know happened after an infinitely small amount of time thanks to our particle accelerators. How did the Big Bang happen? We are not sure, because everything is said to have a cause and an effect, but what was the cause of the Big Bang? We cannot see anything before it, or at least up to 400,000 years after it, because the oldest thing we can see with our

current technology is the cosmic microwave background (CMB), which is our next stop.

The way observatories work is that they capture the light/radiation of distant objects, like stars or galaxies, but the farthest light/radiation our telescopes can ever detect is from 13.4 billion years ago, the CMB. Fun fact: observatories and detectors are needed to look that far, but we can hear the CMB with nothing but an old TV, adjusting it to show static. TV static is affected by cosmic radiation, and it faint displays the sound of the CMB. The sound and the light of the CMB are transmitted through energy waves, and with those we can "translate" it into any visual or audible form. The most powerful objects in the universe can transmit super energetic waves, like black holes and novae, next in list.

To understand black holes and novae we must first talk about stars. The states of matter we learn in elementary school are solid, liquid, and gas, but there are more. The fourth state of matter is plasma and is the most common state in the universe thanks to stars. The Sun is a star, and almost all the tiny specks of light we see in the night sky are stars like our Sun (the other specks are the planets of the Solar System, galaxies, distant novae, satellites, etc). Nothing is forever, and as energetic and powerful as they are, stars also have a life cycle. Stars are born in a certain type of nebula as a cumulus of hydrogen and helium that get so big that the gravity in their center begins to fuse the atoms of hydrogen together, forming helium, and with that a great amount of energy. The fusion doesn't happen once, it happens multiple times, every second, generating immense amounts of energy, therefore becoming a star. The birth is always the same, but depending on how much mass and energy a star has, it has different outcomes. The outcomes of a star are to

Astronomy – An Expository Essay

become a white dwarf, a nova, a black hole, or a neutron star. Novae are immense explosions, so energetic that they're capable of destroying planets with pure energy, and cause ripples through space and time. Black holes are an exaggerated amount of mass concentrated in an infinitely small space that attracts and destroys everything in its path; not even light, the fastest thing in the universe, can escape from them.

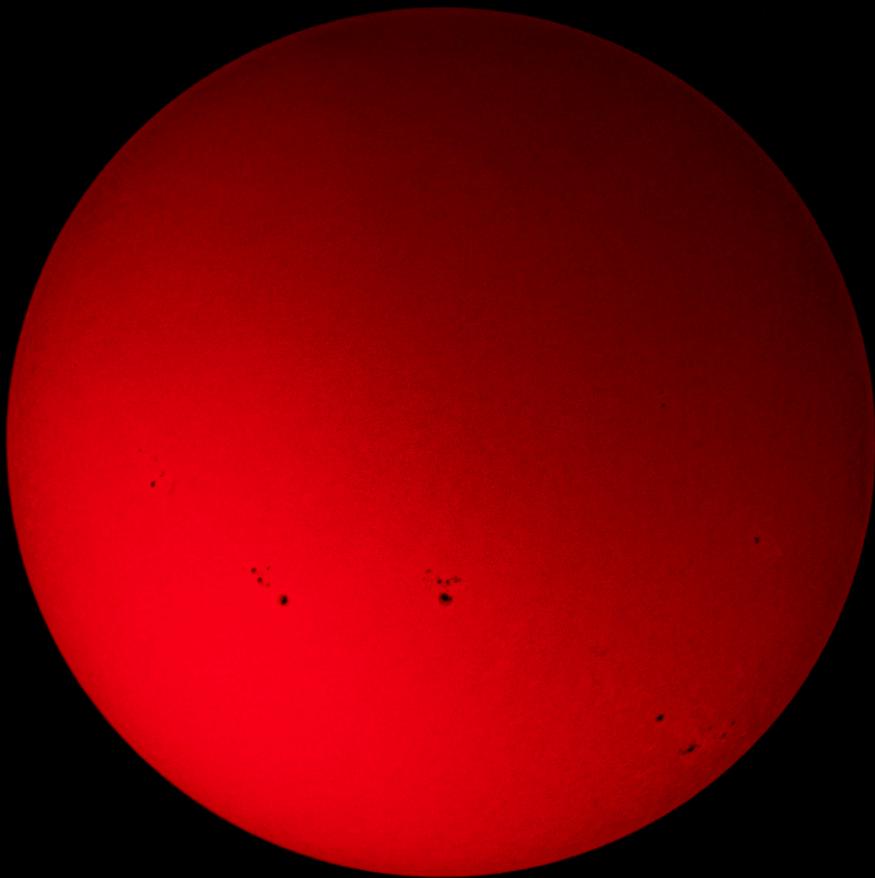
What I have detailed so far, as an explanation, may not sound too interesting, but the beauty of it is not in what it means, but what it implies. Looking farther and farther away is looking into the past, and humanity has achieved a level of science so advanced that we are able to see and hear the beginning of the universe. Stars are everywhere, and the most interesting things that happen in space come from stars, like their birth, the different outcomes of their death, and the effects of their remains – the way their sheer power escapes our imagination and any science fiction that could be ever written. And the most thrilling and beautiful thing about astronomy is the fact that we have been able to understand anything about how space works: from nuclear fusion to relativity, from Newton's laws to quantum field theory... things that only hint that there will be more and more to learn about, and that, compared to the immensity of the universe, we still know nothing. ★

Biography

Ulises Jarquín is a senior at Saint George Prep School in Heroica Matamoros. He volunteers at the South Texas Astronomical Society and has received training at the Cristina Torres Memorial Observatory. His interests span science, space, philosophy, and video games. Ulises aspires to become an astrophysicist to contribute to a better future for humanity

Astrophotography

Art Gallery



Author: Americo Hinojosa

Object: Sun

Date: 28 September 2024

Equipment: Canon T7i camera, Coronado SolarMax III telescope, H α filter (1/40 sec, ISO 100)

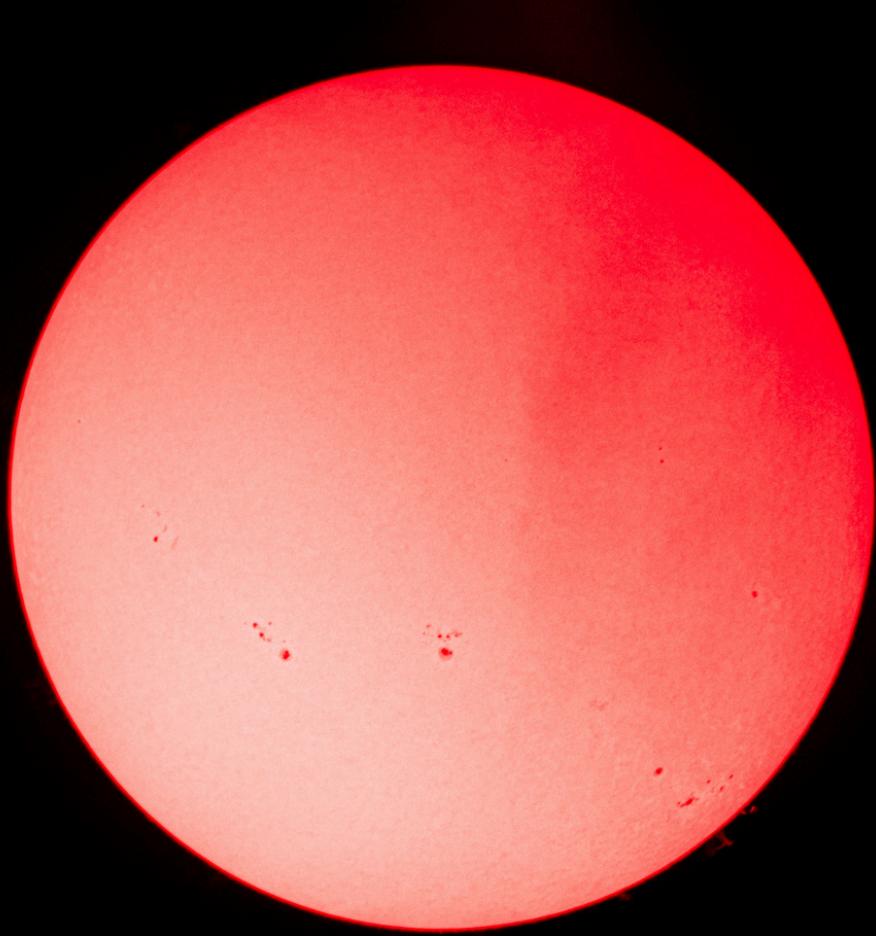


Author: Americo Hinojosa

Object: Sun

Date: 28 September 2024

Equipment: Canon T7i camera, Coronado SolarMax III telescope, H α filter (1/40 sec, ISO 400)



Author: Americo Hinojosa

Object: Sun

Date: 28 September 2024

Equipment: Canon T7i camera, Coronado SolarMax III telescope, H α filter (1/40 sec, ISO 100)



Author: Rayyan Farooqui

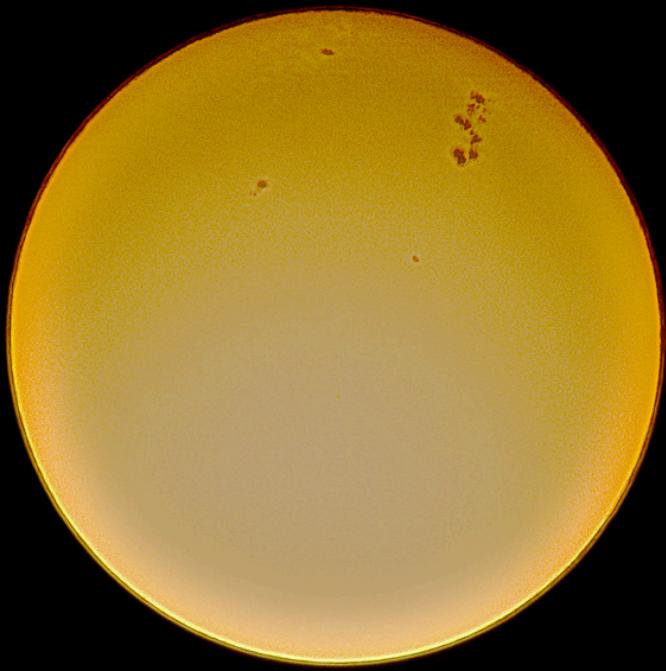
Object: Jupiter

Date: 18 November 2023

Location: South Padre Island, TX

Equipment: Orion 134mm telescope, Celestron Omni 6mm eyepiece, iPhone 15 pro

Description: The mighty Gas Giant. This was the first time I ever peeked at a planet through the time machine, in other words, a telescope. This image is completely raw and no edits have been made. This picture holds significance to me since it was the first picture of a planet I had captured.



Author: Rayyan Farooqui

Object: Sun

Date: 27 March 2024

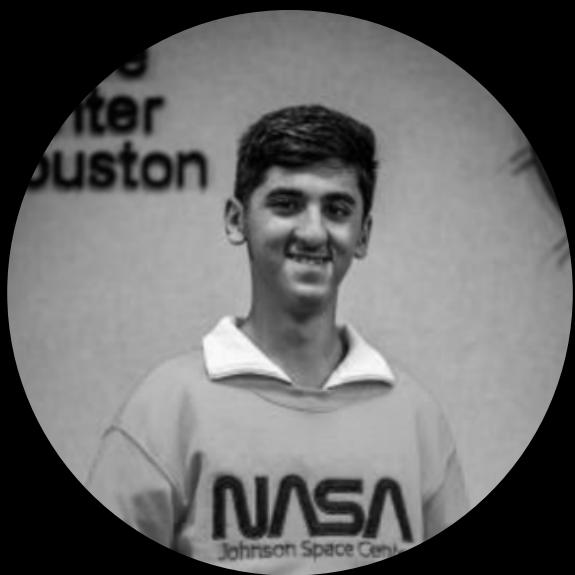
Location: Brownsville, TX

Equipment: Orion 134mm telescope, Orion 5mm eyepiece, Thousand Oaks Optical solar film, SVBONY Variable polarizing filter, iPhone 15 pro

Description: First attempt to capture the captivating sunspots where solar activity peaks. The image is slightly edited to enhance the visibility of the sunspots. Field of vision had been protected by a homemade solar filter.



Americo Hinojosa was born and raised in Matamoros, Tamaulipas, Mexico. He grew up in a family that instilled a deep love for learning. From an early age, Americo was encouraged to question everything and nurture his curiosity, sparking a lifelong passion for understanding how everything worked around him and explaining it to others. Americo holds a Bachelor of Science in Industrial Engineering, a Master of Education, a Master of Science in Science and Technology with a focus on Physics Education, a Master of Arts in Higher Education Administration, and a Doctorate in Education. Americo has experience in the automotive industry, where he held various engineering roles. He has taught courses in physics, astronomy, and science. Americo serves as the Laboratory Supervisor in the Department of Physics and Astronomy at UTRGV, where he is able to merge all his passions and continues learning every day.



Rayyan Farooqui is a junior high school student at IDEA Brownsville, a Pakistani immigrant moving from Saudi Arabia to the States in 2020, a volunteer and a Social Media Marketing Intern at the South Texas Astronomical Society. He is passionate about Aerospace and hopes to pursue it as a career. Rayyan aspires to work as an aerospace engineer and an astronaut for NASA. His hobbies consist of filmmaking, observing deep space with telescopes, swimming, and playing soccer. Rayyan hopes to inspire and introduce the wonders of the cosmos to his community in all ways possible.

Cygnus: A Tale of Friendship

A Greek Myth Retold by Carol Lee



One of the summer sky beauties is the Summer Triangle asterism. Composed of three constellations, Lyra the Lyre, Aquila the Eagle, and Cygnus the Swan. Each of these three constellations has one star brighter than the rest and those create the triangle, Vega, Altair, and Deneb. Deneb is in the tail of Cygnus. This beautiful group of stars is celebrated in myth as well. This is my version of why Cygnus is memorialized in the story, and a reminder that keeping promises is important but making them is even more important.

Long ago, in the days of the Greek and Roman ancient gods and goddesses, along the shore of the Aegean Sea there lived a pair of teen-aged boys who were life-long friends. These young men enjoyed learning in the open-air school and joining other young men practicing to participate in the just-beginning Olympic Games. They were great runners and wrestlers, as well as swimmers. Cygnus was the strongest of the swimmers and Phaethon was the best at working with horses. Of course, as among teens everywhere, there was also the group that scorned one of the group, Phaethon, because his father was absent. It didn't help that he bragged that his father was actually Apollo/Zeus, the sun god. His mother, Clymene, had told him who his father was and added that his father had promised to grant him proof one day when he asked for it. Scorned and ridiculed by his companions, who demanded proof of his parenthood, Phaethon decided he would prove that he was telling the truth that his father was going to let him drive the Sun chariot across the sky for his birthday. He bragged to the boys that he would be driving the chariot of the Sun the following morning.

Phaethon got up early to make the trip to Mount Olympus, and to demand the promise be kept. Rising early, Phaethon, dressed in his best tunic and

sandals, made the trek to the gates of the villa where Apollo lived. And his friend Cygnus and the other boys went down to the seashore to wait and see their friend celebrate his birthday gift.

The armed guards at the gate crossed their spears in front of the doors and demanded to know what this unknown youth was doing at the royal residence. Phaethon stood proudly up as tall as he could manage and stated in a firm voice: "I am Phaethon, youngest son of Apollo and I have come to see my father for my birthday wish. Let me pass."

One of the guards decided to open the doors and the youth walked in and was led down the marble hall to the throne room where Apollo sat administering justice and granting favors to a throng of humans who expected fairness and impartiality. Instead, Apollo told the guards to send them all away so he could hear what this brash young man had to say in private.

"Well, young sir," he asked, "what is it that has brought you to my private throne and why should I listen to what you have to say to me?"

Taking his courage in his hands, Phaethon replied, "Sire, you are my father and my mother has told me that you promised to grant a boon to me when I became old enough to come and talk to you about it. Here I am. My boon is that you let me drive the golden Sun chariot across the sky to mark my birthday."

"Oh, no! You cannot ask that of me. You are too young and inexperienced to manage those powerful horses and there is no way you could defend yourself against the monsters of the sky, the scorpion, the sea monster, the lion, the monstrous eagle..."

Cygnus: A Tale of Friendship

"Oh, father. I have grown up around horses all of my life. I may be young, but I demand that you keep your promise!"

So, against his better judgement, Apollo called his servants in from the stables, and admonished them to get the chariot ready for the day. Although the servants were skeptical of allowing this young stripling the control of the Sun chariot they did as they were told.

The team of golden horses were led to the golden chariot and placed in their harnesses while they snorted and stamped their displeasure at the gilded leather straps around their muscles. Steam from their flaring nostrils and rolling the whites of their eyes indicated fury at the thought of this young untried, untested youth being their master, even for one moment. But they were well-trained and allowed Phaethon to enter the chariot.

As he watched his son grasp the reins in his slim uncalloused hands, Apollo said, "Whatever you do, do NOT use the whip!" And those words drifted into thin air as Phaethon snapped the whip over their silky backs, while the steam seemed to actually shoot from the stable yard into the blue sky.

Racing across the sky, Phaethon dropped the reins as the horses raced erratically across the heavens where the Scorpion clacked his wicked pincers and swung his poisonous tail, while the Eagle clenched his talons in Phaethon's face, and the Lion roared fiercely, causing Phaethon to panic, and as he grabbed for the fallen reins, he fell out of the swooping chariot.

The boys on the shore shouted when they saw what they thought was a falling star headed for the sea. But Cygnus stood in shock: "That's no falling star - that is Phaethon!" and marked in his mind where he

had seen him falling into the sea as he dove into the Aegean trying to rescue his friend from drowning. Down, down, he dove until he thought his lungs would burst. Rising to the surface he gulped for air and dove again, down...down...without being able to find his friend and dying himself in his brave, but futile, attempt to rescue Phaethon.

In his mourning, Apollo placed Cygnus as a swan in the stars to commemorate the sacrifice made by the youth for his friend. And a reminder to himself and us that keeping a promise is sometimes a problem and we need to be careful about making them without thinking what might be the results.

So, as we watch the Summer Triangle, imagine the faithful friend who had Olympic dreams, diving into the sea of sky, desperately deep in search of his friend, as he sinks once again into the western horizon, to emerge and be remembered for his heroism by people thousands of years later.

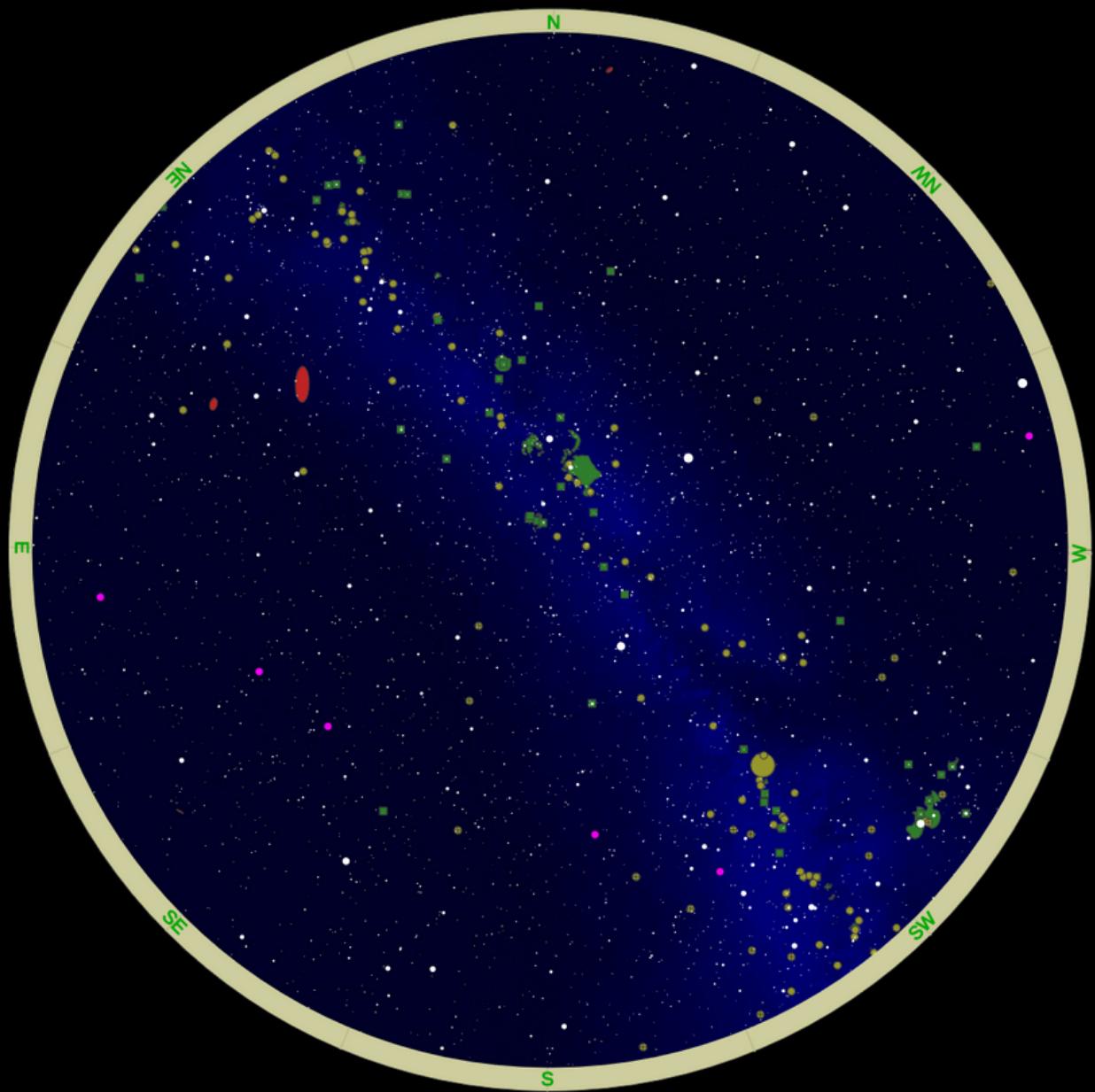
And that is the end of this story. ★

Biography

Carol Lutsinger is the founder of the South Texas Astronomical Society. She spent 40 years as a teacher, serving students from Pre-K through college. Carol attributes her astronomy enthusiasm in part to her experience in the American Astronomical Society's AASTRA program from 1994-96, and her space excitement from serving as a Solar System Educator, and later Ambassador, for the NASA/JPL program. She has been writing the Stargazer newspaper column since 1998, which is carried in the Brownsville Herald and the Valley Morning Star. Retired from formal education since 2020, she still makes every opportunity to share meteorites which she carries in her purse and to ask folks in parking lots if they know what that point of light is.

Cosmic Coordinates

Fall 2024

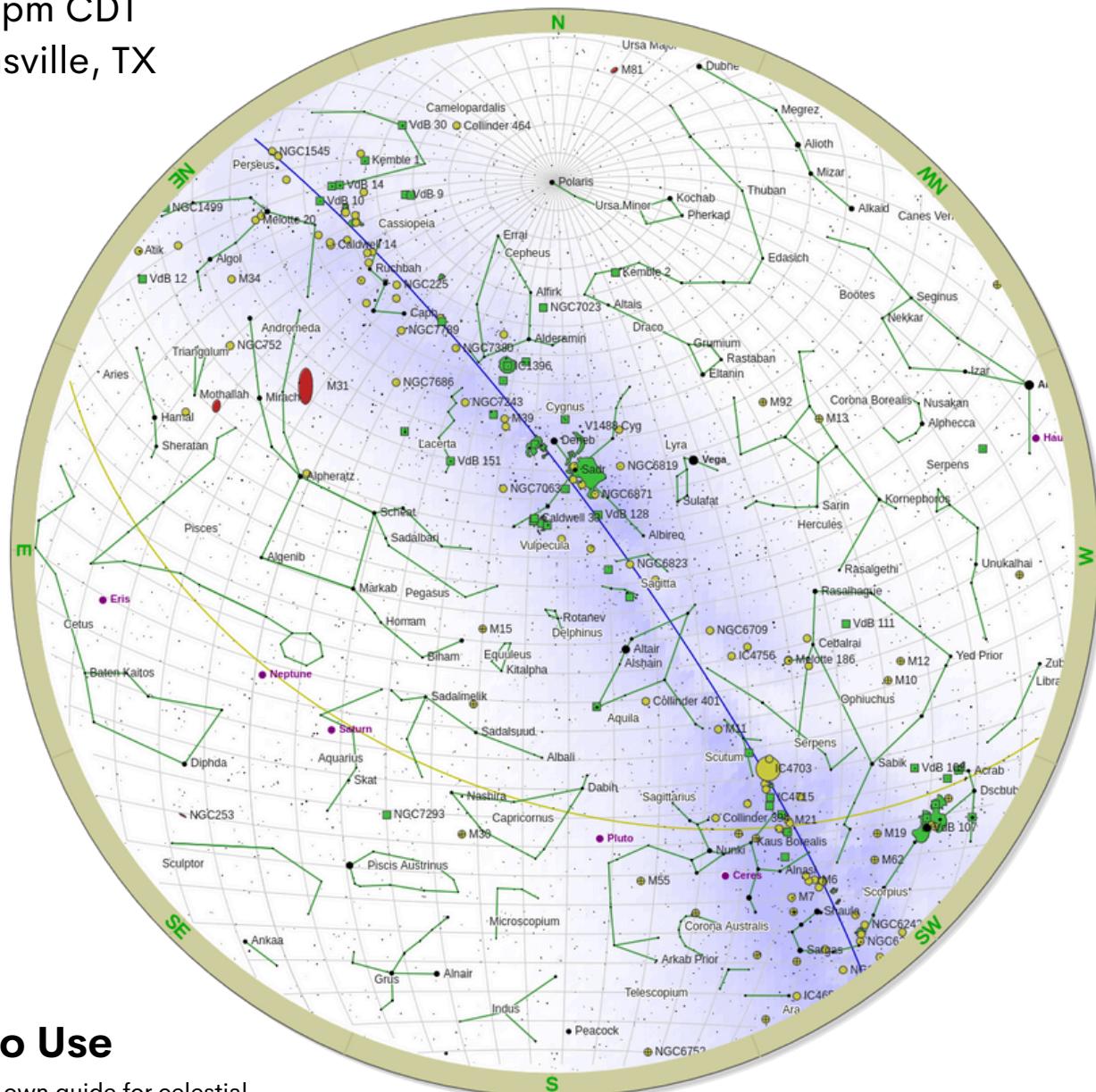


Sky Map

22 September 2024

10:00 pm CDT

Brownsville, TX



How To Use

Here is your own guide for celestial navigation: your very own sky map, allowing you to select and observe the finest of cosmic objects. If you find yourself within the Rio Grande Valley, this map will be accurate to help you along your celestial journey. Good luck, and clear skies! [Credit: Dominic Ford, In-The-Sky.org]

Sky Map Legend

The legend identifies four elements:

- The Equator**: Represented by a purple line.
- Ecliptic Plane**: Represented by a yellow line.
- Galactic Plane**: Represented by a blue line.
- Galaxy**: Represented by a red circle.
- Bright nebula**: Represented by a green square.
- Open cluster**: Represented by a yellow circle with a black outline.
- Globular cluster**: Represented by a yellow circle with a black outline.

Sky Events

Fall 2024

Appulses

An *appulse* is the minimum apparent separation of two astronomical objects in the sky.

Appulse of Moon and Saturn

Tue, Sep 17 | 05:07 CDT | Aquarius

Appulse of Moon and M45

Sun, Sep 22 | 05:57 CDT | Taurus

Appulse of Moon and Jupiter

Mon, Sep 23 | 17:22 CDT | Taurus

Appulse of Moon and Mars

Wed, Sep 25 | 07:45 CDT | Gemini

Appulse of Moon and Venus

Sat, Oct 05 | 13:00 CDT | Libra

Appulse of Moon and Saturn

Mon, Oct 14 | 13:07 CDT | Aquarius

Appulse of Moon and M45

Sat, Oct 19 | 15:39 CDT | Taurus

Appulse of Moon and Jupiter

Mon, Oct 21 | 02:09 CDT | Taurus

Appulse of Moon and Mars

Wed, Oct 23 | 16:34 CDT | Gemini

Appulse of Moon and Venus

Mon, Nov 04 | 17:42 CDT | Ophiuchus

Appulse of Moon and Saturn

Sun, Nov 10 | 19:38 CDT | Aquarius

Appulse of Moon and M45

Sat, Nov 16 | 01:40 CDT | Taurus

Appulse of Moon and Jupiter

Sun, Nov 17 | 07:52 CDT | Taurus

Appulse of Moon and Mars

Wed, Nov 20 | 16:27 CDT | Cancer

Apsides

Apsis, from the Ancient Greek for 'arch' or 'vault' ($\alpha\psi\iota\varsigma$), is the farthest (*apoapsis*) or nearest (*periapsis*) an orbiting body gets to the primary body. Special terms are used for specific systems: *aphelion* and *perihelion* are used for any object with respect to the Sun; *apogee* and *perigee* are used for any object with respect to the Earth.

Mercury at Perihelion

Mon, Sep 09 | 10:15 CDT | Leo

C/2023 A3 (Tsuchinshan-ATLAS) at Perihelion

Fri, Sep 27 | Sextans

C/2023 A3 (Tsuchinshan-ATLAS) at Perigee

Sat, Oct 12 | Virgo

Mercury at Aphelion

Wed, Oct 23 | 09:46 CDT | Libra

Venus at Aphelion

Wed, Oct 30 | 11:03 CDT | Ophiuchus

333P/LINEAR at Perihelion

Thu, Nov 28 | Canes Venatici

Sky Events

Conjunctions

A *conjunction* is when two astronomical objects appear close to each other in the sky, and share the same right ascension (or ecliptic longitude). For superior planets, conjunction occurs when the planet passes behind the Sun (*solar conjunction*). For inferior planets, if the planet is passing in front of the Sun, it is called *inferior conjunction*; if behind, it is called *superior conjunction*.

Conjunction of Moon and Saturn

Tue, Sep 17 | 05:21 CDT | Aquarius

Conjunction of Moon and Jupiter

Mon, Sep 23 | 18:22 CDT | Taurus

Conjunction of Moon and Mars

Wed, Sep 25 | 06:50 CDT | Gemini

Mercury at Superior Solar Conjunction

Mon, Sep 30 | 16:19 CDT | Virgo

136472 Makemake at Solar Conjunction

Wed, Oct 02 | 18:54 CDT | Coma Berenices

Conjunction of Moon and Venus

Sat, Oct 05 | 15:26 CDT | Libra

Conjunction of Moon and Saturn

Mon, Oct 14 | 13:12 CDT | Aquarius

Conjunction of Moon and Jupiter

Mon, Oct 21 | 03:05 CDT | Taurus

Conjunction of Moon and Mars

Wed, Oct 23 | 14:56 CDT | Gemini

136108 Haumea at Solar Conjunction

Thu, Oct 24 | 07:53 CDT | Bootes

Conjunction of Moon and Venus

Mon, Nov 04 | 18:16 CDT | Ophiuchus

Conjunction of Moon and Saturn

Sun, Nov 10 | 19:42 CDT | Aquarius

Conjunction of Moon and Jupiter

Sun, Nov 17 | 08:54 CDT | Taurus

Conjunction of Moon and Mars

Wed, Nov 20 | 15:08 CDT | Cancer

Dichotomies

A dichotomy is when the Moon or an inferior planet appears half-illuminated by the Sun.

Mercury at Dichotomy

Thu, Sep 05 | 23:34 CDT | Leo

Mercury at Dichotomy

Wed, Nov 20 | 18:32 CDT | Ophiuchus

Earth

The Earth is the Pale Blue Dot we call home.

September Equinox

Sun, Sep 22 | 07:42 CDT | Virgo

Elongations

Elongation is the angular separation in the sky between a planet and the Sun with respect to the Earth. When an inferior planet is visible in the sky after sunset, it is near its *greatest eastern elongation*. When an inferior planet is visible in the sky before sunrise, it is near its *greatest western elongation*.

Mercury at Greatest Western Elongation

Wed, Sep 04 | 21:24 CDT | Leo

Mercury at Greatest Eastern Elongation

Sat, Nov 16 | 03:18 CDT | Ophiuchus

Sky Events

Moon

For the Fall 2024 lunar season, we have the *Harvest Moon* in September, the *Hunter's Moon* in October, and the *Beaver Moon* in November.

New Moon

Mon, Sep 02 | 20:56 CDT | Leo

First Quarter Moon

Wed, Sep 11 | 01:06 CDT | Ophiuchus

Full Moon

Tue, Sep 17 | 21:34 CDT | Pisces

Last Quarter Moon

Tue, Sep 24 | 13:50 CDT | Auriga

New Moon

Wed, Oct 02 | 13:50 CDT | Virgo

First Quarter Moon

Thu, Oct 10 | 13:55 CDT | Sagittarius

Full Moon

Thu, Oct 17 | 06:26 CDT | Pisces

Last Quarter Moon

Thu, Oct 24 | 03:03 CDT | Cancer

New Moon

Fri, Nov 01 | 07:48 CDT | Libra

First Quarter Moon

Fri, Nov 08 | 23:56 CDT | Capricornus

Full Moon

Fri, Nov 15 | 15:28 CDT | Aries

Last Quarter Moon

Fri, Nov 22 | 19:28 CDT | Leo

Occlusions

An *occlusion* is when one astronomical object passes in front of the other. An *occultation* is when the foreground object completely blocks the background object. A *transit* is when the background object is not fully concealed by the foreground object. An *eclipse* is any occlusion that casts a shadow onto the observer.

Lunar Occultation of Saturn

Tue, Sep 17 | 05:07 CDT | Aquarius

Partial Lunar Eclipse

Tue, Sep 17 | 21:45 CDT | Pisces

Lunar Occultation of Neptune

Wed, Sep 18 | 02:04 CDT | Pisces

Lunar Occultation of Neptune

Mon, Nov 11 | 19:55 CDT | Pisces

Lunar Occultation of Spica

Wed, Nov 27 | 06:39 CDT | Virgo

Oppositions

Opposition is when two astronomical objects are on opposite sides of the celestial sphere. Opposition only occurs for superior planets and objects. Solar opposition is the best time to view a planet with a telescope.

194 Prokne at Opposition

Mon, Sep 02 | 21:22 CDT | Aquarius

Saturn at Opposition

Sat, Sep 07 | 23:27 CDT | Aquarius

Neptune at Opposition

Fri, Sep 20 | 19:08 CDT | Pisces

Sky Events

20 Massalia at Opposition

Sun, Sep 29 | 14:10 CDT | Pisces

39 Laetitia at Opposition

Mon, Oct 07 | 04:34 CDT | Cetus

19 Fortuna at Opposition

Thu, Oct 17 | 09:22 CDT | Pisces

136199 Eris at Opposition

Thu, Oct 17 | 14:51 CDT | Cetus

1036 Ganymed at Opposition

Sun, Oct 27 | 02:10 CDT | Pegasus

11 Parthenope at Opposition

Wed, Nov 13 | 15:34 CDT | Taurus

Uranus at Opposition

Sat, Nov 16 | 20:36 CDT | Taurus

Retrogrades

A planet undergoes *retrograde* motion when it reverses its direction of motion in the sky. A planet entering retrograde motion is an apparent phenomenon caused by the relative motion between the Earth and the object.

Uranus Begins Retrograde Motion

Sun, Sep 01 | 10:47 CDT | Taurus

Jupiter Begins Retrograde Motion

Wed, Oct 09 | 01:54 CDT | Taurus

Saturn Ends Retrograde Motion

Fri, Nov 15 | 08:37 CDT | Aquarius

Space Rangers

Fall 2024

🚀 Welcome Space Rangers! 🚀

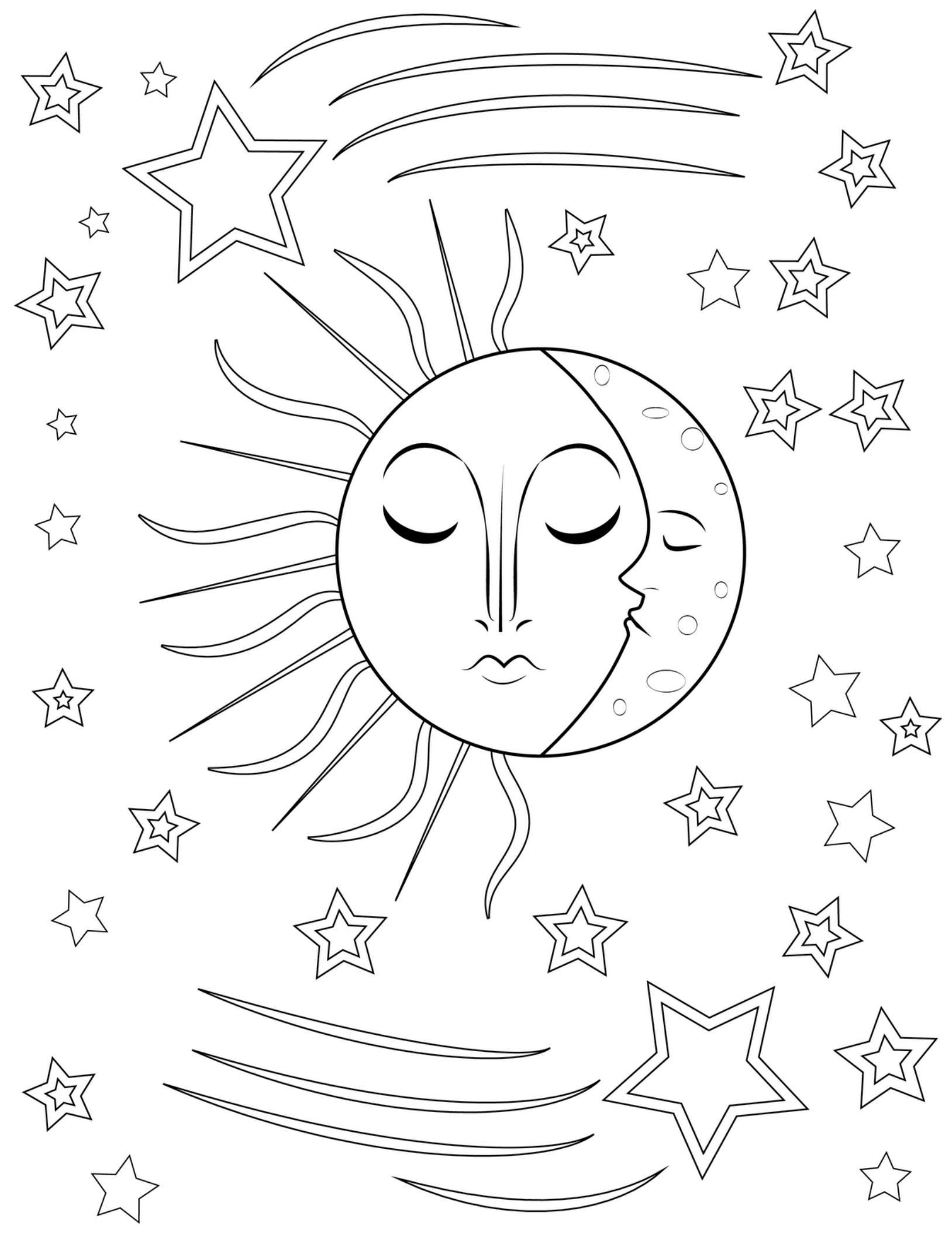
Time to use your creative skills and put them to the test!

We hope you enjoy our featured coloring page, word search, some fantastic eclipse artwork!

Your adventure awaits!

Table of Contents

1. Coloring
2. Word Scramble
3. Word Search
4. Crossword Puzzle
5. Artwork



Space Rangers

Word Scramble

1. RTAIAL

The brightest star in the northern constellation Aquila and the 12th brightest star in the sky.

2. SMATRSIE

A pattern of stars that is not a constellation. It can be part of a constellation, such as the Big Dipper.

3. JNUCTOINONC

When two astronomical objects appear close to each other in the sky, and share the same right ascension.

4. XNUIQEOO

Either of the two moments in the year when the Sun is exactly above the Equator and day and night are of equal length

5. FOMALHAUT

The brightest star in the constellation Piscis Austrinus.

6. LFLU OMNO

The lunar phase when the Moon appears fully illuminated from Earth's perspective

7. SREMESI SECJTBO

A collection of deep sky objects, such as galaxies, nebulae, and star clusters

8. RNNOI

A giant Boeotian hunter who pursued the Pleiades and was eventually slain by Artemis; was then placed in the sky as a constellation. mythical being.

9. LXALPARA

A geometrical measurement based on a comparison of 'movement' of nearby objects against their background.

10. RLBAIAVE ASTR

Any star whose observed light varies notably in intensity. The changes in brightness may be periodic, semiregular, or completely irregular.

Space Rangers

Word Scramble (Solutions)

1. ALTAIR

The brightest star in the northern constellation Aquila and the 12th brightest star in the sky.

2. ASTERISM

A pattern of stars that is not a constellation. It can be part of a constellation, such as the Big Dipper.

3. CONJUNCTION

When two astronomical objects appear close to each other in the sky, and share the same right ascension.

4. EQUINOX

Either of the two moments in the year when the Sun is exactly above the Equator and day and night are of equal length

5. FOMALHAUT

The brightest star in the constellation Piscis Austrinus.

6. FULL MOON

The lunar phase when the Moon appears fully illuminated from Earth's perspective

7. MESSIER OBJECTS

A collection of deep sky objects, such as galaxies, nebulae, and star clusters

8. ORION

A giant Boeotian hunter who pursued the Pleiades and was eventually slain by Artemis; was then placed in the sky as a constellation. mythical being.

9. PARALLAX

A geometrical measurement based on a comparison of 'movement' of nearby objects against their background.

10. VARIABLE STAR

Any star whose observed light varies notably in intensity. The changes in brightness may be periodic, semiregular, or completely irregular.

Space Rangers

Word Search

Space has had such an influence on so many people past and present. While scientists are studying and finding out more and more, there have also been some alternative (and some fun but wild) theories along the way. See if you can find the space-related words – some scientifically sound and some, well, not so much, in this issue's word search.

C	O	N	Y	P	Q	C	O	P	E	R	N	I
U	S	B	R	A	N	E	W	O	R	L	D	H
B	Z	C	O	P	E	R	N	I	C	U	S	O
I	H	O	E	R	O	B	I	Q	B	A	N	R
G	S	C	H	R	Ö	D	I	N	G	E	R	O
B	M	N	T	B	V	C	C	X	Z	L	K	S
O	J	H	G	G	F	D	S	A	A	Q	W	C
U	E	R	N	T	Y	U	I	O	I	P	M	O
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C	B	V	R	C	X	Z	L	K	J	C	O	E
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Space Rangers

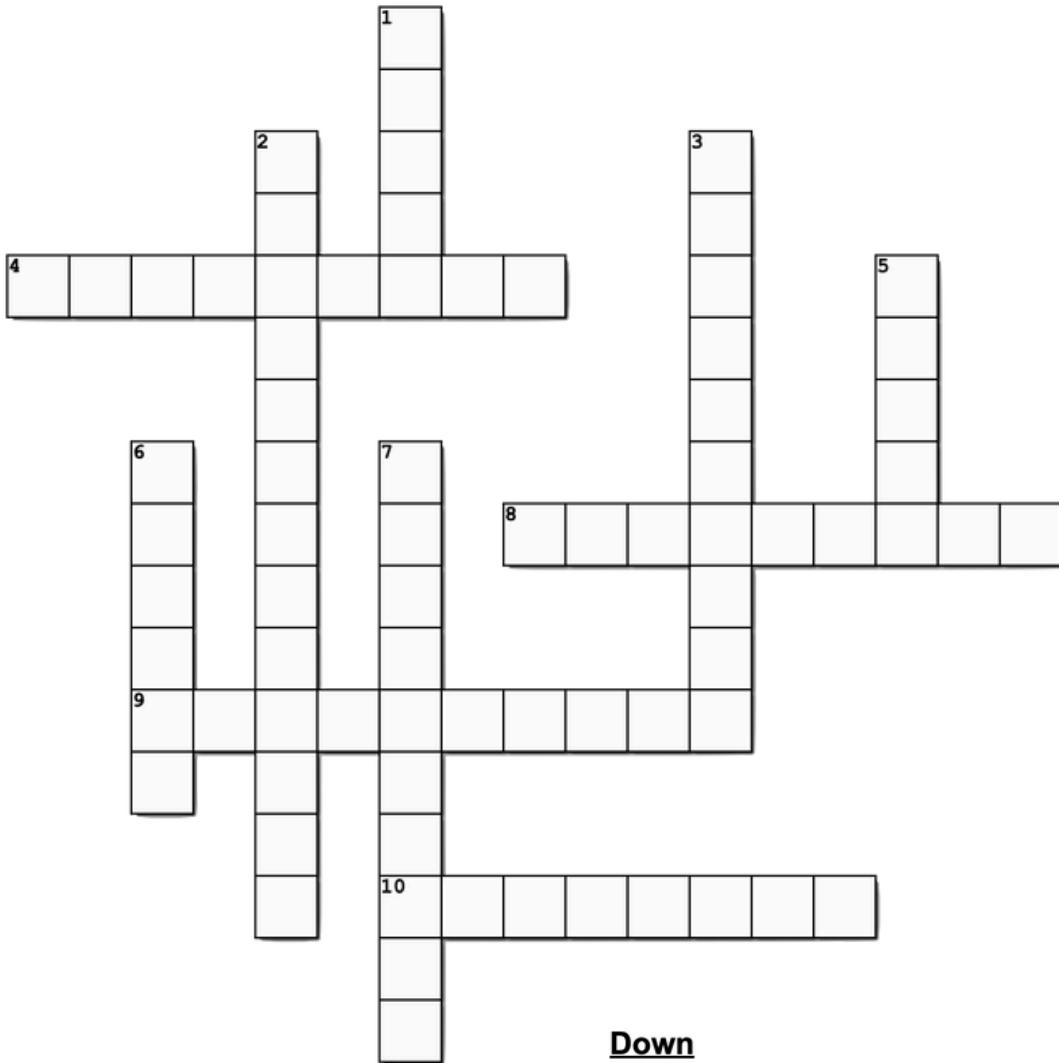
Word Search (Solutions)

(1) CONSTELLATION (a group of stars that form a pattern, like Ursa Major, the Great Bear), (2) ZODIAC, (3) HOROSCOPE, (4) SCHRÖDINGER (he found a way to illustrate how single particles could be in two places at once), (5) SPACETIME (a model that combines space and time to explain how the universe works), (6) STRING THEORY (once thought to be a way to combine theories of general relativity and quantum mechanics), (7) COPERNICUS (proved the Earth was not the center of the universe), (8) BIG BOUNCE (alternative theory to the Big Bang), (9) BRANEWORLD (theory that our universe is a 3-D membrane floating inside another higher dimension)

			Y									
		B	R	A	N	E	W	O	R	L	D	H
B		C	O	P	E	R	N	I	C	U	S	O
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G	S	C	H	R	Ö	D	I	N	G	E	R	O
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O			G					A				C
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Space Rangers

Crossword Puzzle



Across

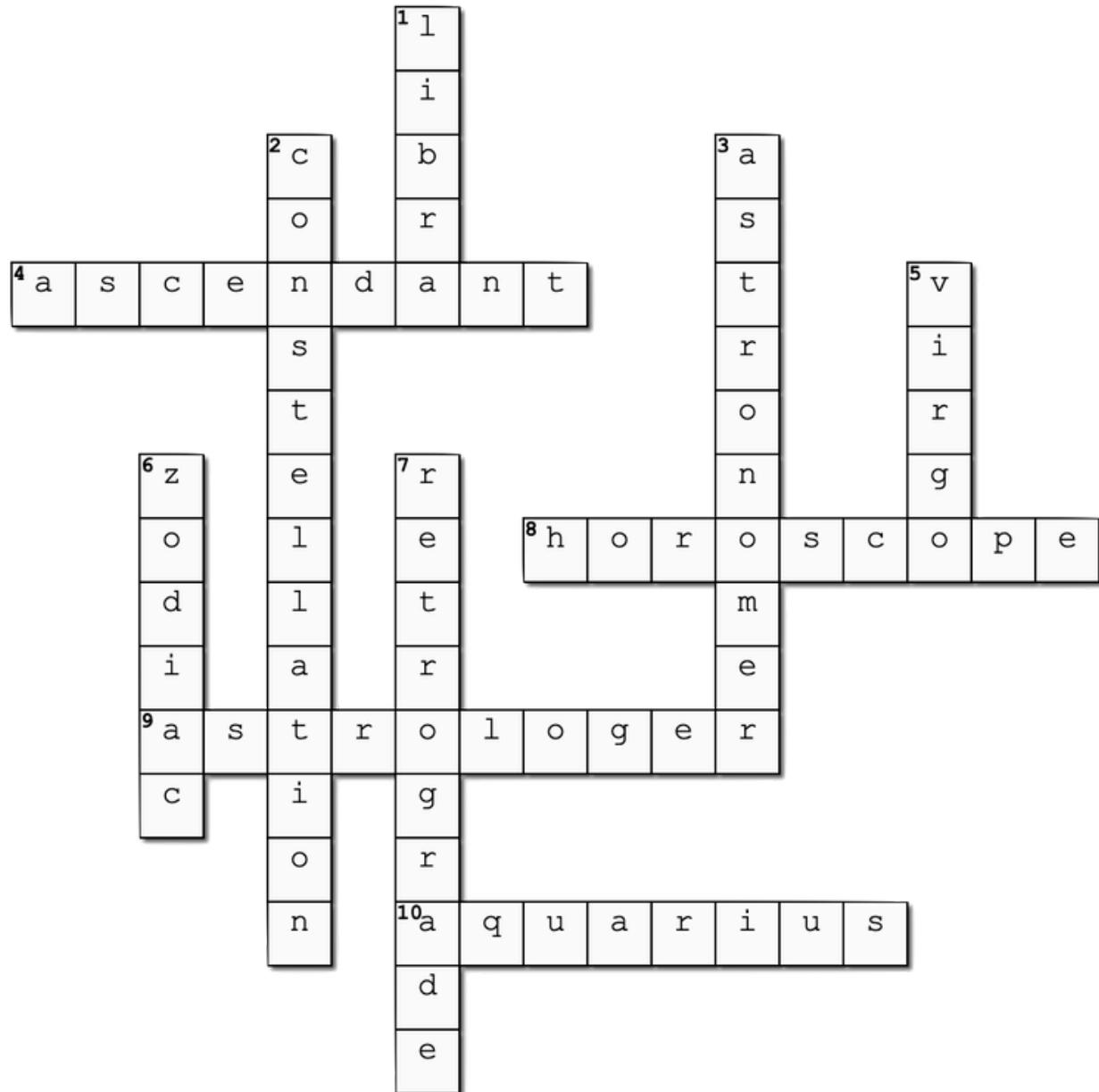
4. The point of the ecliptic or degree of the zodiac that rises above the eastern horizon at any moment
8. Diagram of planets' relative positions and zodiac signs at a specific time.
9. An observer of the stars, divination of how stars and planets influence our lives
10. A constellation lying in the southern sky between Capricornus and Pisces, "water-carrier, and its brightest star is Sadalmelik

Down

1. A pair of scales representing a southern zodiacal constellation between Virgo and Scorpio.
2. A group of stars that appears to form a pattern or picture.
3. An observer of the stars, divination of how stars and planets influence our lives.
5. A zodiacal constellation on the celestial equator that lies due south of the handle of the Big Dipper and is pictured as a woman holding a spike of grain.
6. An imaginary belt in the heavens that includes the apparent paths of most of the planets and is divided into 12-star groups or signs.
7. When a planet appears to move backward across the night sky from Earth's perspective.

Space Rangers

Crossword Puzzle



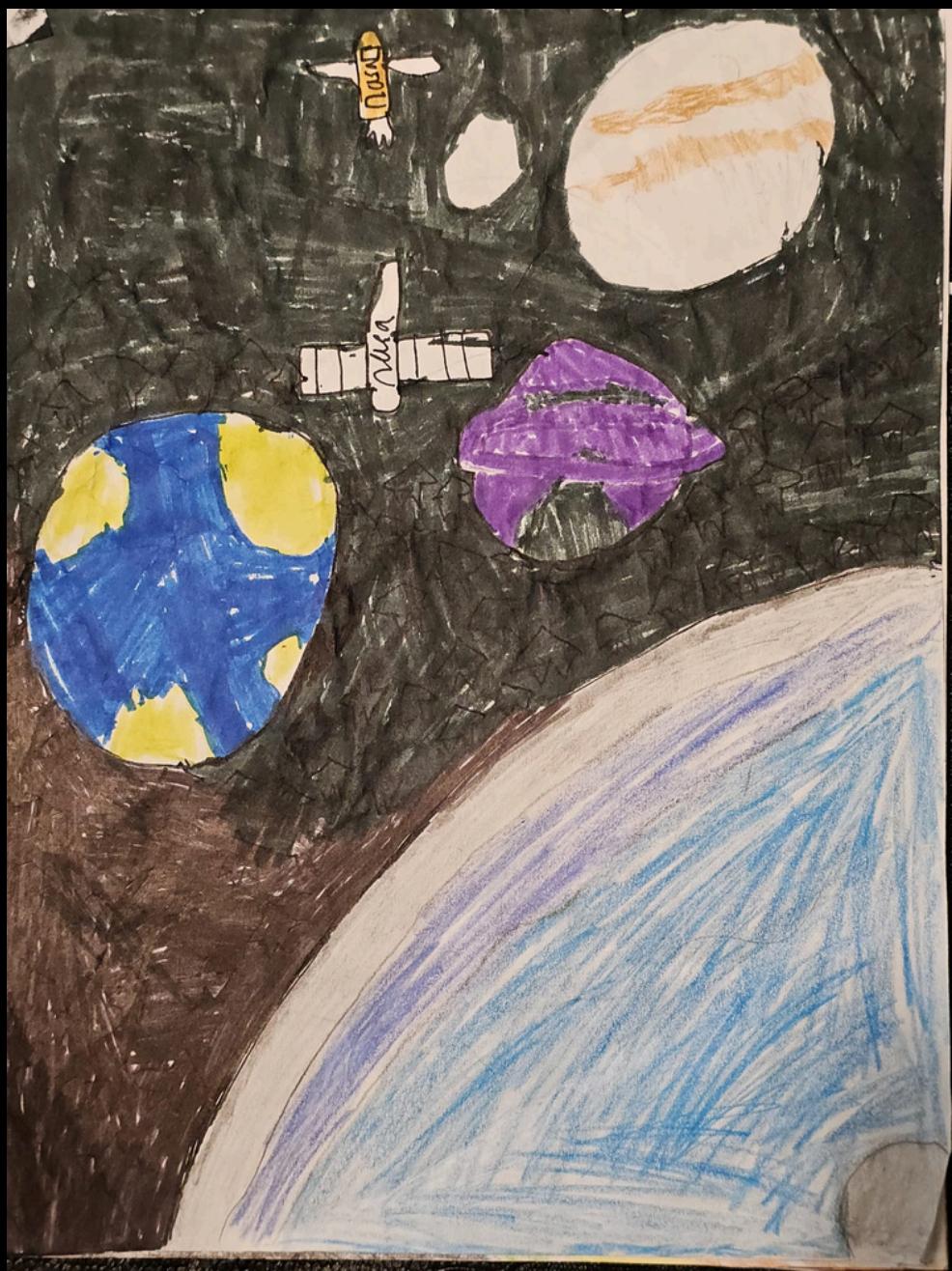
Space Rangers

Art Gallery

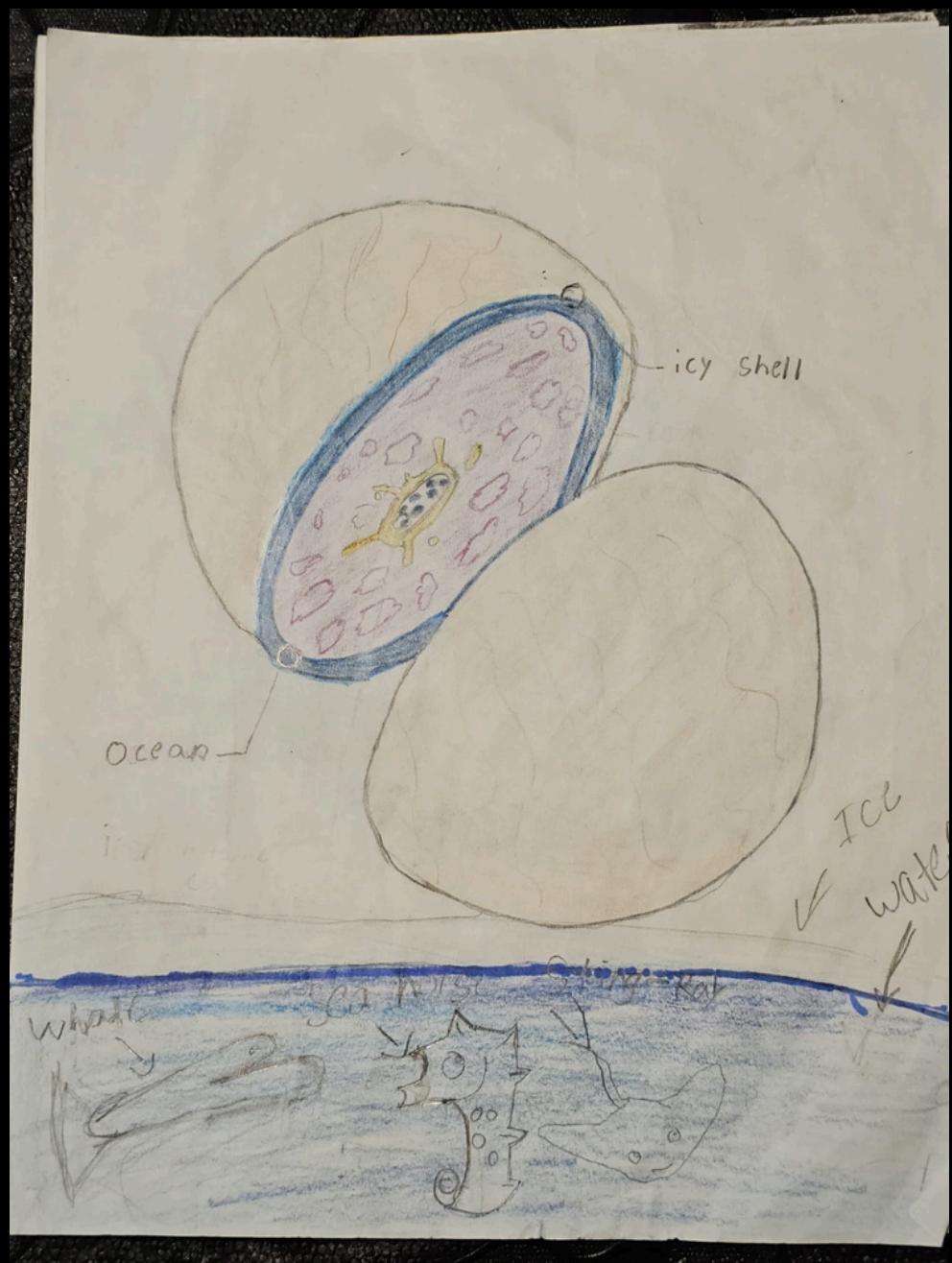
The Europa Clipper is a space probe being developed by NASA to study Europa, one of the most intriguing moons in the Solar System, hosted by the planet Jupiter. It is planned for launch on October 10, 2024, and is the biggest spacecraft ever launched by NASA for planetary science.

Students have been learning about the Europa Clipper mission. We present what they think the mission will be like, and what they think might lurk beneath the icy crust of the icy, mysterious moon...

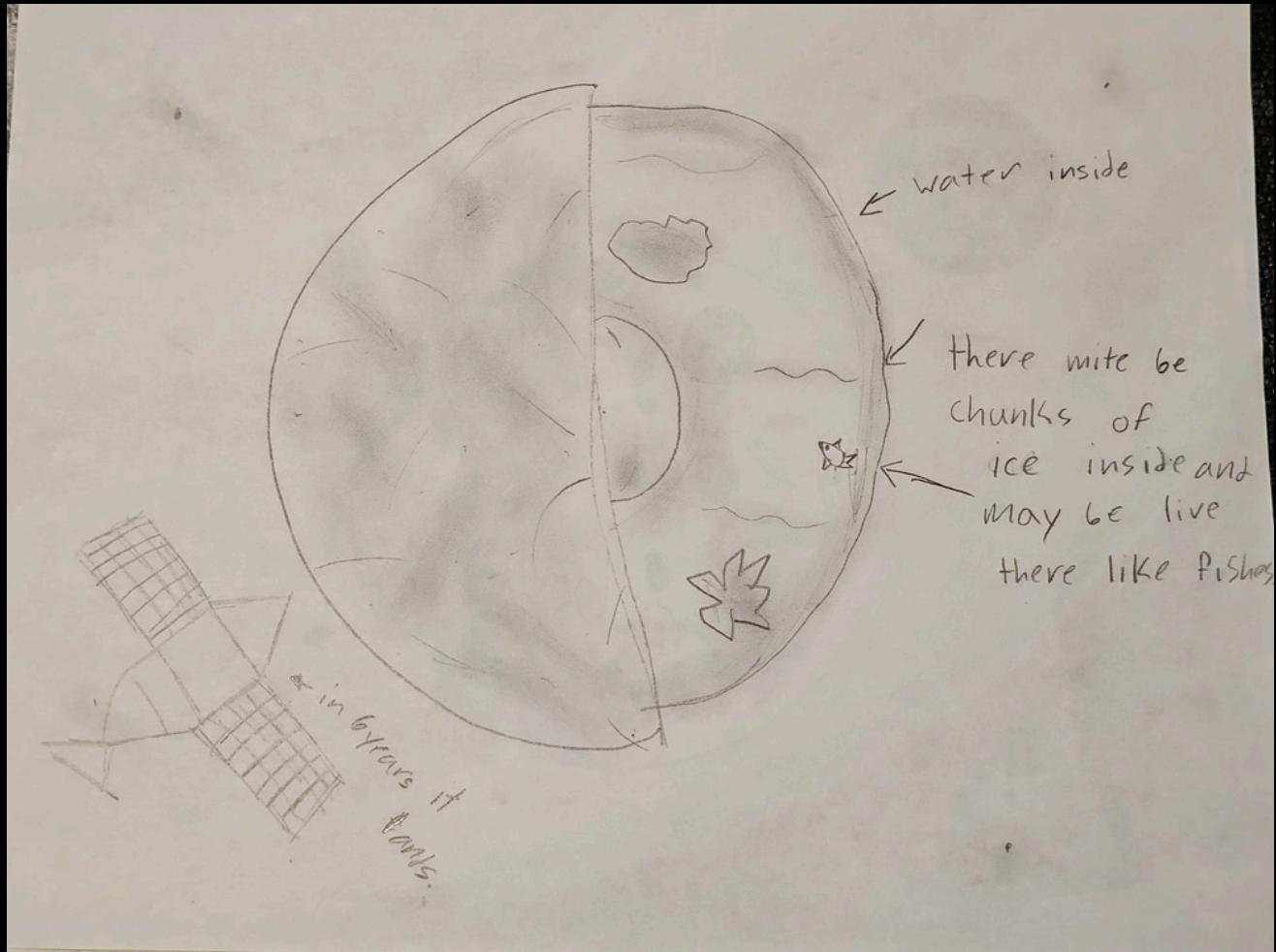




Aaron (5th Grade)



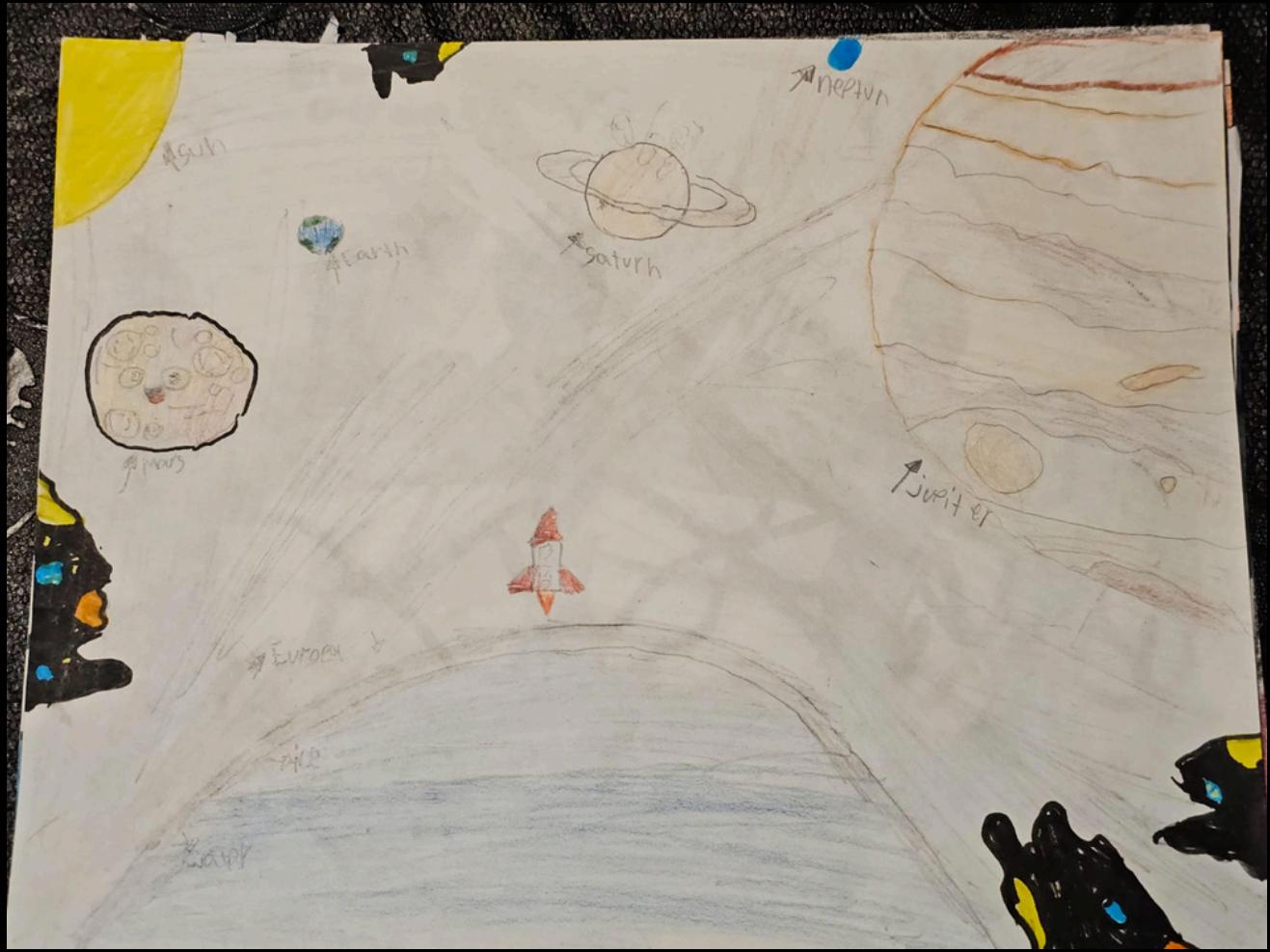
Francisco (5th Grade)



Ruby (5th Grade)



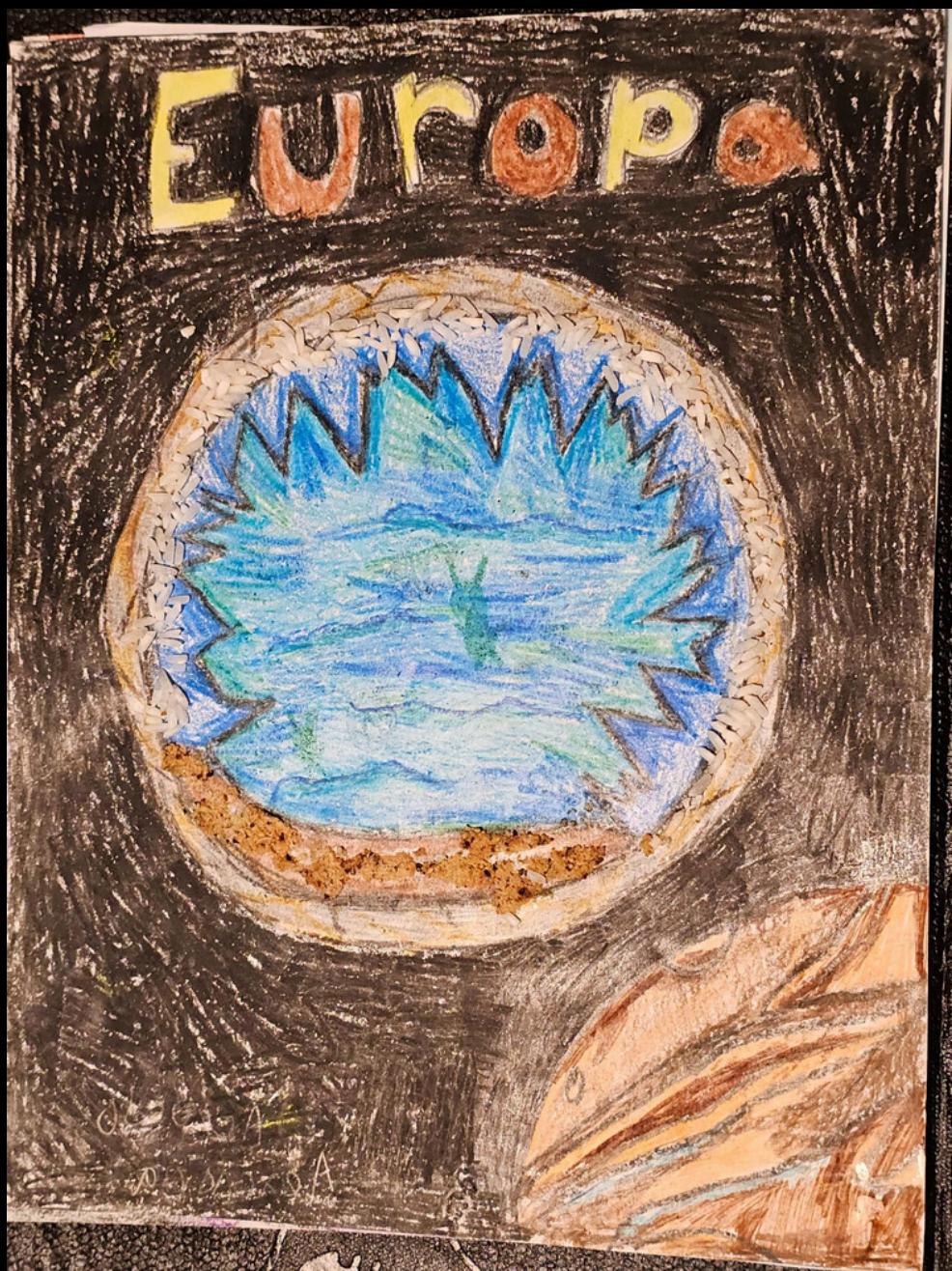
Valeria (5th Grade)



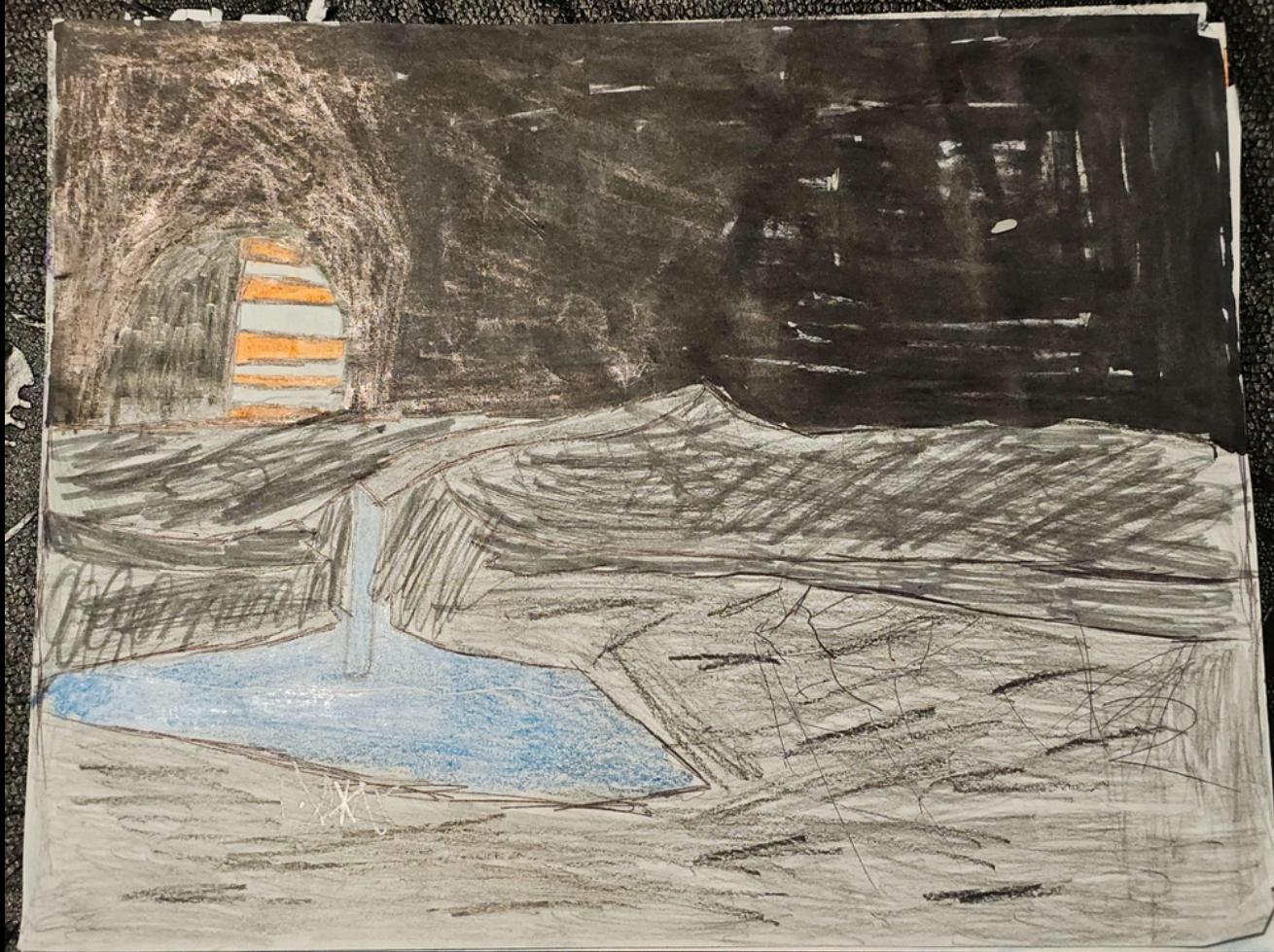
Emiliano (5th Grade)



Brandon (5th Grade)



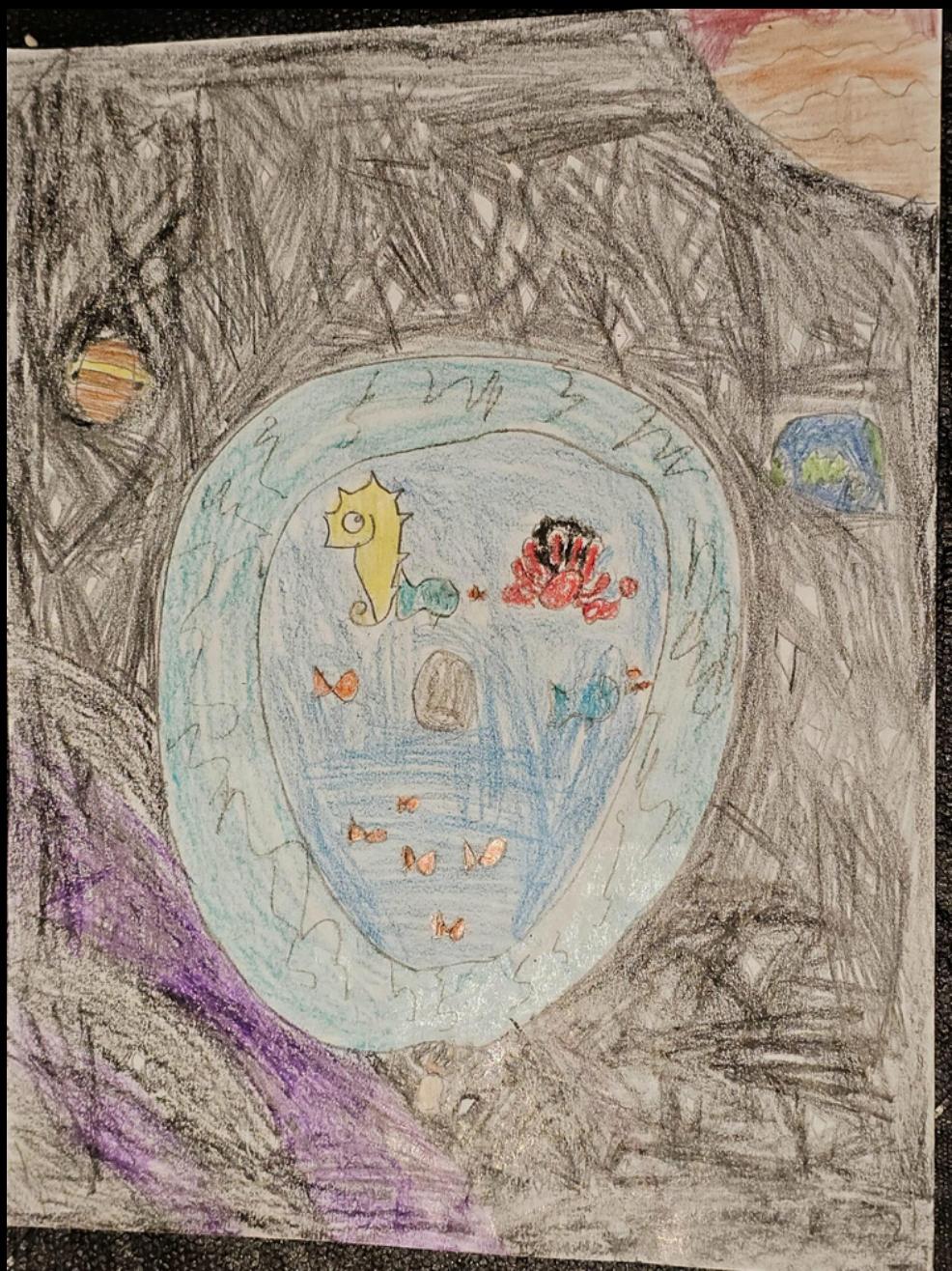
Alexandria (5th Grade)



Manuel (5th Grade)



Sophia (5th Grade)



Melanie (5th Grade)



This Fall 2024, we present to you...

COSMIC COMEDY

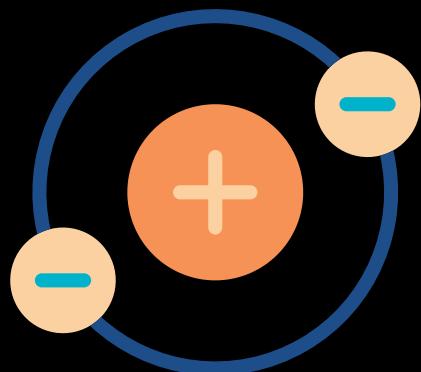


Don't space out on our jokes... you know they're
absolutely stellar.



Cosmic Comedy

Fall 2024



An atom walks into a bar. The bartender says, "You look awful!"

The atom replies, "I think I lost an electron."

"Are you sure?" asks the bartender.

"Yes," the atom responds, "I'm positive!"

Why didn't the Sun go to college?

Because it already has millions of degrees.



Colophon

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Submissions

We encourage submissions from anyone interested in contributing to our magazine. Any readers with ideas for submission, including their own articles, illustrations, or other content, or any corrections or comments, please contact the Editor-in-Chief at: rcamuccio {at} gmail {dot} com

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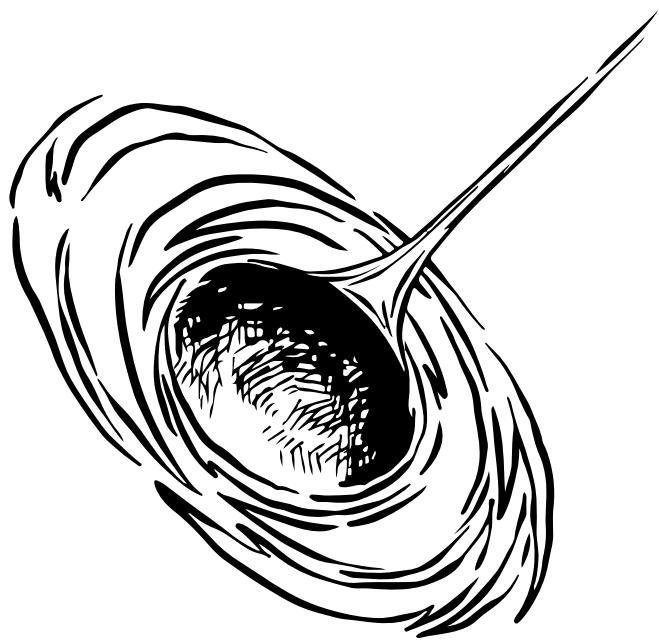
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