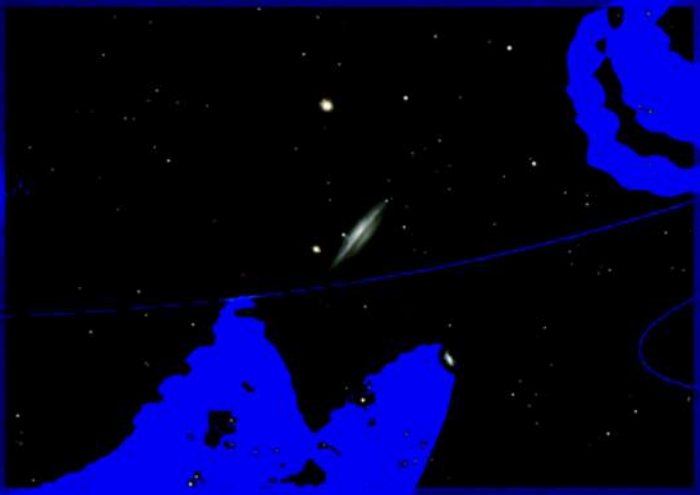
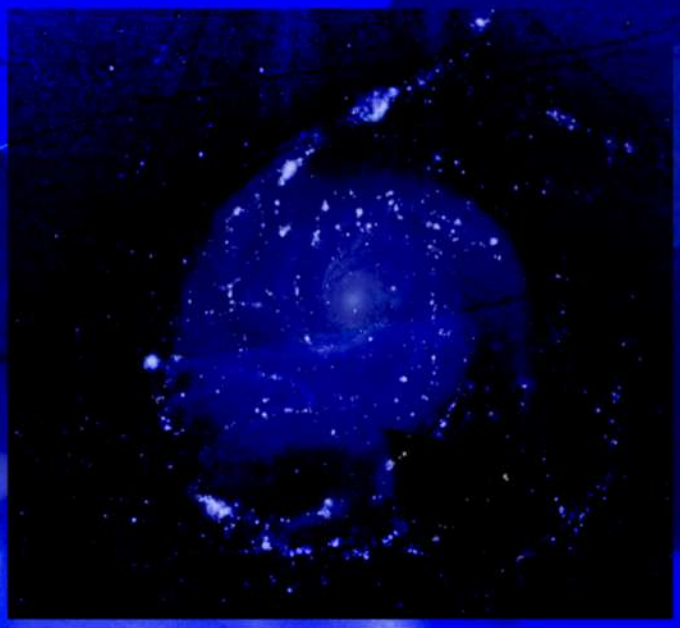
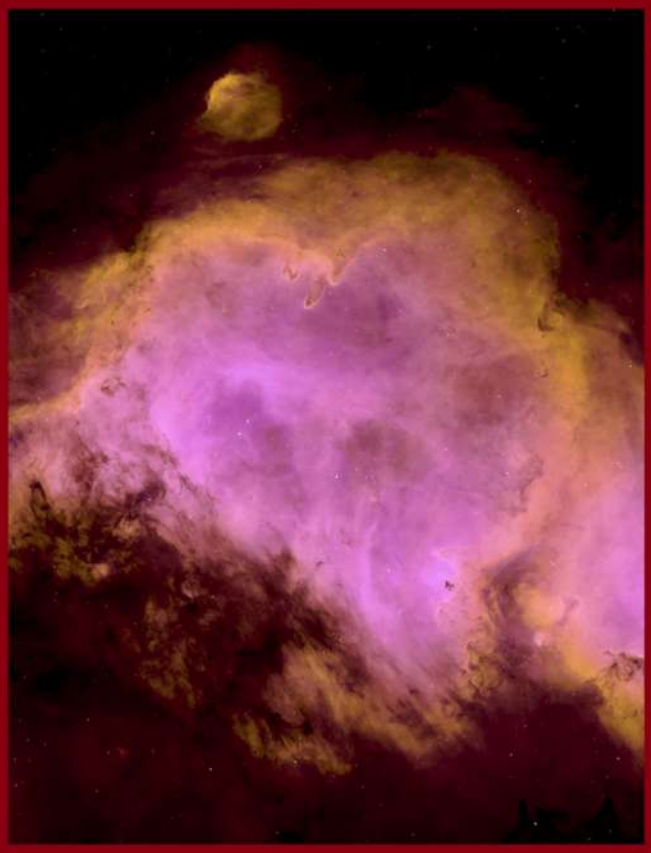
NEPTUNE

you shine





2025 EDITION



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Thank you to all contributors!

NOTES FROM THE CHAIR

The Cambridge University Astronomical Society (CUAS) has once again had an exceptional year, marked by a blend of intellectual exploration, collaborative efforts, and unwavering enthusiasm for the cosmos. From the serene beginnings of late spring to the bustling excitement of Michaelmas and Lent terms, the society has demonstrated that the passion for astronomy within Cambridge remains as vibrant as ever.

As the academic year began in earnest, CUAS welcomed a new wave of students eager to delve into the mysteries of the universe. With over 200 new sign-ups, we were thrilled to meet our new members at our Fresher's Fair stall and later connect with them at the Freshers' pub quiz. A short ObsNight swiftly followed our intense Kahoot quiz in the Fitzwilliam carpark, where we were delighted to witness Comet C/2023 A3 (Tsuchinshan-ATLAS).

The rest of Michaelmas was nothing short of sensational. Our first talk of the term featured Dr. Hannah Ubler discussing the James Webb Space Telescope's role in exploring the first stars, black holes and galaxies, setting the tone for an engaging series of lectures. Michaelmas Term also introduced our members to contemporary protoplanetary disc research with a fascinating talk from Professor Cathie Clarke. To top it all off, we ended Michaelmas' lecture series with Professor Amaury Triaud's splendid talk on his research on exoplanets and his recent trip to Antarctica.

Lent Term kicked off with Dr Heloise Stevenance's insightful presentation using deep learning to develop a virtual assistant capable of identifying cosmic explosions. CUAS later revisited the topic of protoplanetary discs with a talk from Dr Alvaro Rivas on the evolution of protoplanetary disc research and the insights that machine learning can provide to the structure and processes of planet formation. Finally, the Lent Term expanded CUAS' horizons through interdisciplinary collaboration, with a joint talk with the Cambridge University Physics Society (CUPS) on the direct search for Galactic Dark Matter and the evolution of the LUX-ZEPLin dark matter experiments.

This year, the CUAS committee has worked tirelessly to ensure that our society continues to thrive, creating opportunities for students to engage with the wonders of the cosmos. Their dedication has not only made possible a series of fascinating talks, lively socials, and successful collaborations but has also allowed us to witness breathtaking events together. Among these was the extraordinary sight of the aurora borealis gracing the Cambridge skies—a truly unexpected event that left many in awe.

Moments like these remind us why our society exists: to bring people together in a shared passion for the universe. None of this would have been possible without the unwavering commitment of the committee, who have balanced their academic responsibilities with the work of keeping CUAS running smoothly. To each and every one of them, thank you—you have made this year a truly remarkable one.
CUAS remains steadfast in its mission to inspire and educate as we look ahead. To the incoming committee, I extend my best wishes; may they continue to guide the society with the same passion and perseverance that has defined our year.

Mara Rotaru
Chair 2024-5

NOTES FROM THE EDITOR

Welcome to the 2025 edition of *Neptune* – the annual publication of the Cambridge University Astronomical Society. This edition reveals a constellation of beautiful images, essays, paintings and more brought to life by the members of the society. From Peter Jackson's visions of the Northern Lights in Cambridge (a highlight of the year!) and Justin Whitaker's hypnotising photos of various nebulae, to Georgina Amos, Sofia Vasieva and William Royce's artistic expressions of space, these contributions reveal the infinitely expansive nature of the universe, and by extension, life itself – reminding us of how we came from stardust and to stardust we shall return. I would like to thank all the collaborators for their contributions, I am so grateful for the opportunity to have been involved in the coolest publication that exists. Although far from being a scientist, I have always been deeply captivated by space (I used to dream of becoming an astronaut), so it has been an honour to work on this edition of *Neptune* and live vicariously through the images at hand. I hope you enjoy this edition of *Neptune* as you travel through time and space!

Abigail Liew
Neptune Editor, 2024-5

Antennae Galaxies
May 6th 2024
Taken by Sean Jackson

Mid-Autumn Round Moon
September 17th 2024
Taken by Xin Yao Zhang

Red Moon
September 19th 2024
Cambridge
Taken by Xin Yao Zhang

Event Horizon, Black Hole, Arizona
2024, oil on birch, radius 210 mm
Painted by Georgina Amos

Event Horizon Black Hole (Arizona) is one of an ongoing series of paintings that depict the collection of radio telescopes that first photographed a black hole. A view from above, small and circular like the image seen through a spyglass and painted with the colours and techniques used by Johannes Vermeer.


Leo Triplet
Altair astro 200mm f5 reflector
Canon 80D
Altair astro GPCAM2
80x180s exposures (4 hours)
Taken by Justin Whitaker

Unlocking the Mysteries of the Universe: The Work of Ms. Anastasia Lazarou and the AL37 Space Program

Space Program AL37 has been designed by Anastasia Lazarou to collect and analyze data from outer space. AL37 has provided valuable insights into celestial objects and phenomena, advancing our understanding of the existence of life the universe and its complexities.

The Genesis of AL37

Ms. Lazarou established AL37 with a vision: to collect and interpret electromagnetic signals, spaceborne data, and other forms of information to better understand the universe. Using cutting-edge technology and innovative methodologies, her work has focused on analyzing not only celestial phenomena but also physical objects such as drones, aircraft, and spacecraft operating in Earth's atmosphere and beyond. This diverse collection of data has enabled her to identify patterns that contribute to a clearer understanding of the skies above. Inspired by the success of AL37, Lazarou sought to broaden her experience and knowledge. She applied for a volunteer position at Harvard University's Department of Astronomy, where her dedication and expertise earned her a place in their prestigious training program.

Harvard and the Galileo Project

At Harvard, Ms. Lazarou joined the Galileo Project under the leadership of Dr. Avi Loeb, a prominent theoretical physicist and astrophysicist. The Galileo Project is a groundbreaking initiative that aims to scientifically investigate unidentified aerial phenomena (UAPs) and interstellar objects, such as the enigmatic 'Oumuamua, to determine whether they could be signs of extraterrestrial technology. As part of the Galileo Project, Lazarou worked on AI modeling of aircraft and other physical objects. Her contributions focused on using artificial intelligence to develop advanced models that simulate the behavior and dynamics of aircraft in various atmospheric and space conditions. These models have been instrumental in identifying potential UAPs and distinguishing them from conventional objects. Furthermore, Lazarou worked with confidential data collected by the Galileo Project, which provided significant insights into the nature and characteristics of UAPs. Her expertise in handling sensitive data and applying advanced analytical techniques has proven essential to the project's progress.

Expanding Frontiers in 2025

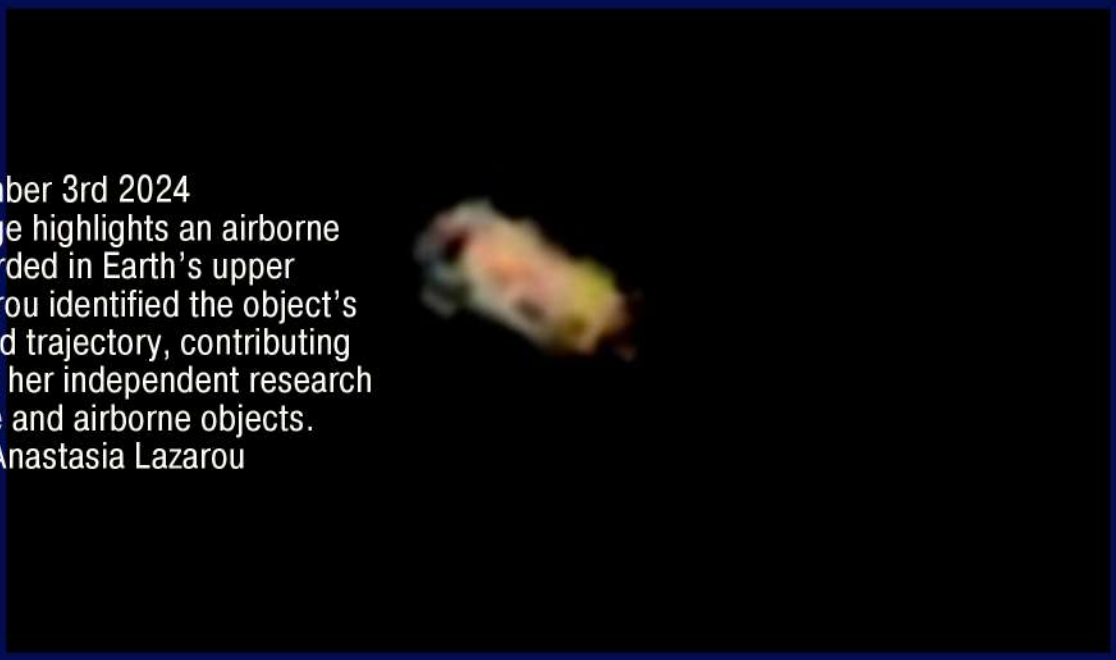
In 2025, Ms. Lazarou continues her groundbreaking work on AI modeling, focusing on the dynamics of drones, aircraft, spacecraft, and other physical objects. By creating sophisticated simulations and models, she aims to deepen our understanding of how these objects behave under various conditions in Earth's atmosphere and outer space. Her work not only advances scientific research but also contributes to technological innovations in aerospace design and safety. Lazarou's focus on AI modeling also extends to studying the interactions between physical objects and their surrounding environments, providing valuable insights that bridge the gap between theoretical research and practical applications. Her work remains critical to the development of tools for monitoring and analyzing the physical elements of our skies.

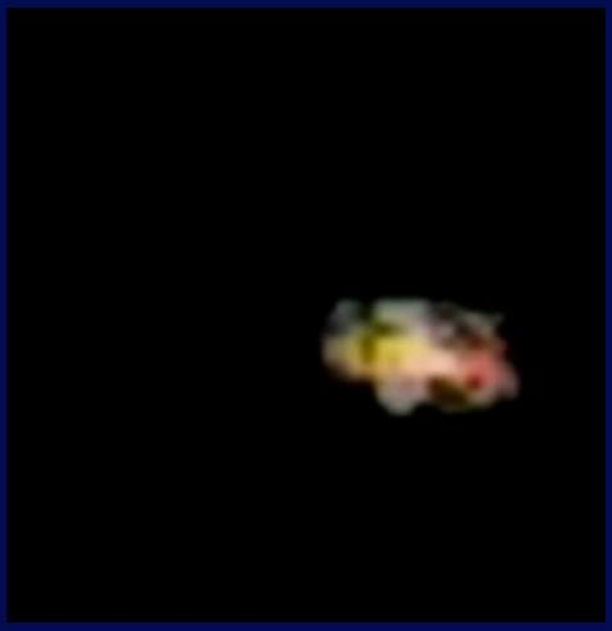
2024: Data Captured from Outer Space

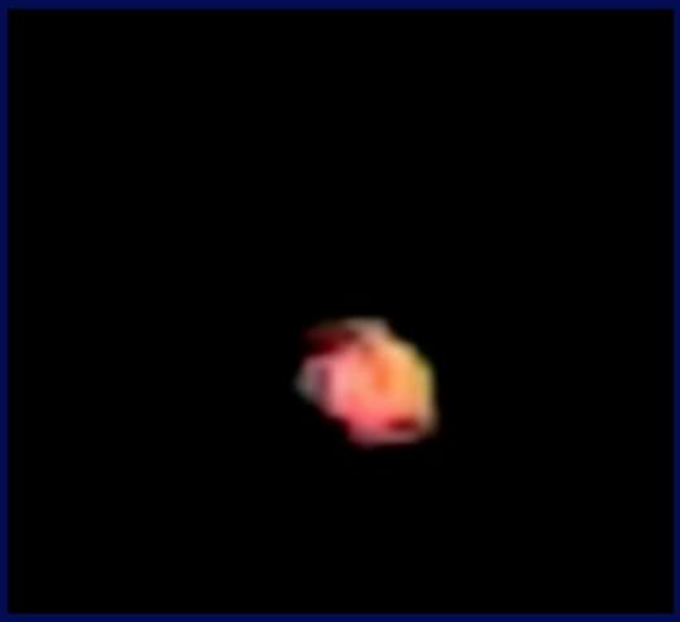
As part of her ongoing research, Ms. Lazarou collected two significant pieces of data in 2024, showcasing the potential of AI modeling and advanced detection systems developed under AL37. These data sets are part of her independent research and not associated with any university project.

May 12th 2024
This high-resolution image showcases a mysterious interstellar object entering our solar system
Taken by Anastasia Lazarou

November 3rd 2024
This second image highlights an airborne anomaly recorded in Earth's upper atmosphere. Lazarou identified the object's characteristics and trajectory, contributing valuable insights to her independent research on space borne and airborne objects.
Taken by Anastasia Lazarou







A Vision for the Future

Ms. Anastasia Lazarou's journey from the creator of AL37 to a researcher at Harvard's Galileo Project reflects her commitment to exploring the unknown. Her work continues to push the boundaries of what we know about the universe, focusing on the modeling and analysis of physical objects and phenomena in space. As she pursues her research in 2025, Lazarou remains dedicated to unraveling the mysteries of space, one discovery at a time. Her contributions remind us of the importance of curiosity and perseverance in the pursuit of scientific understanding. The skies above us hold countless secrets, and with researchers like Ms. Lazarou leading the way, we are one step closer to uncovering them.

October 23rd 2024
Faint anti-tail appearing in front of the comet and star cluster IC 4665 visible, near top of the photo
Canon 600D
Taken in the Girton playing fields
Around 200x5s exposures
80mm lens, ISO 6400
Stacked and processed with Siril and GIMP
Taken by Peter Jackson

May 10th 2024
Canon D500
Taken over the course of an hour and a half, from the busway near Longstanton, north of Cambridge.
Processed with Darktable.
2 to 5 second exposures
Lens set from 30 to 42mm
Taken by Peter Jackson

October 23rd 2024
Canon 600D
Taken in the Girton playing fields
Around 200x5s exposures
80mm lens, ISO 6400
Stacked and processed with Siril and GIMP
Taken by Peter Jackson

May 10th 2024
Canon D500
Taken over the course of an hour and a half, from the busway near Longstanton, north of Cambridge.
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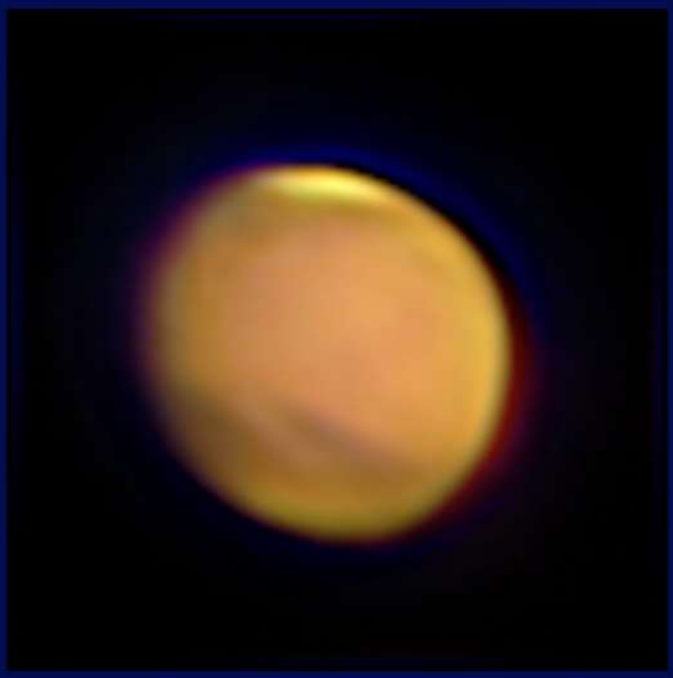
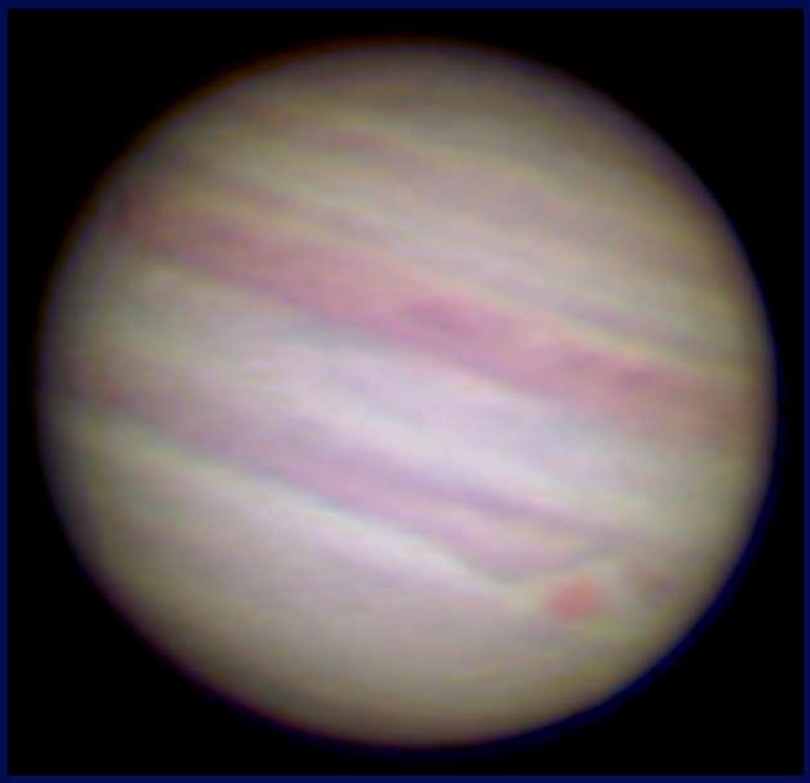


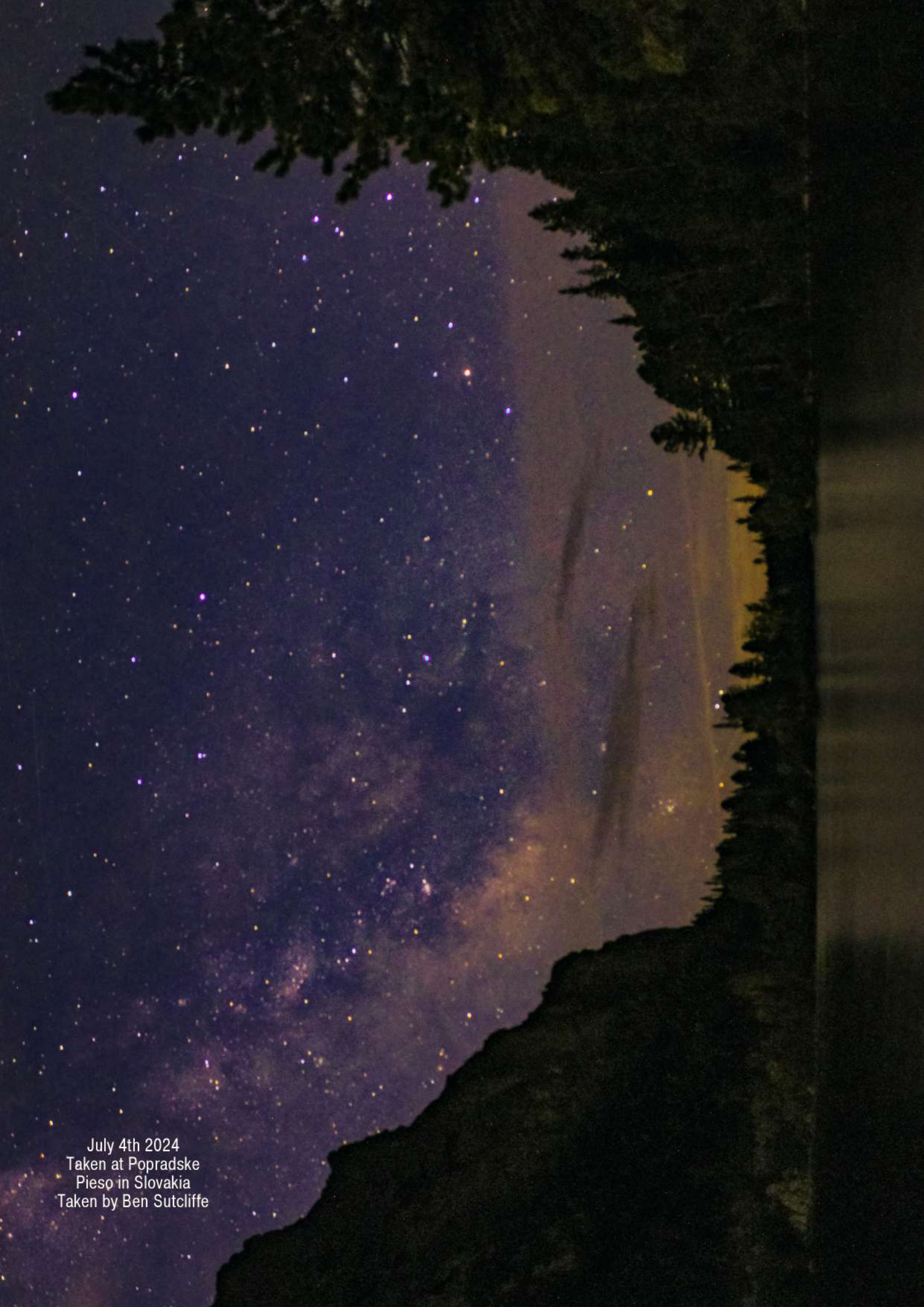


February 28th 2025
Jupiter's great red spot and the Elysium Planitia region of Mars (and ice cap!)
Photos taken with my Canon D600 with the Northumberland Telescope
Images stacked from the best few % of about 14000 frames each, taken as roughly 10 mins of video each.
Software used: PIPP, AutoStakkert!, Registax
Taken by Peter Jackson

March 5th 2025
M51, the Whirlpool Galaxy:
Stacked from 40 x 1min exposures with the same camera in CUAS's Celestron CPC800 telescope.
(The tracking of that telescope was... Interesting to say the least; 40mins was all the usable footage I got from two hours of exposure, everything else having stars streaking across the image)
Processed in Siril and briefly in GIMP
Taken by Peter Jackson

Comet A3
October 18th 2024
Taken by Ben Sutcliffe

Aurora Borealis
October 10th 2024
Taken by Ben Sutcliffe



July 4th 2024
Taken at Popradske
Pieso in Slovakia
Taken by Ben Sutcliffe

September 10th 2024
Looking towards the summit
shrouded in a lenticular cloud
Taken by Ben Sutcliffe

July 11th 2024
From Machrihanish air base in
far South West Scotland
Taken by Ben Sutcliffe

Orion Nebula
Taken from St Catherine's College, Cambridge
Taken by Nestor Novakovic

Aurora with faint Milky Way in the background
Taken in Finnish Lapland
Taken by Nestor Novakovic

September 10th 2024
Camp 1 (~3000m) of Mt Ararat (5137m)
The orange tinting is due to the very low
orange moon that night just out of frame
Taken by Ben Sutcliffe

Rosette Nebula
Ian King 450mm f7 refractor
Canon 1100D (modified)
QHY-5L-C Guide camera
200x180s exposures (10 hours)
Taken by Justin Whitaker

Soul Nebula
Ian King 450mm f7 refractor
Canon 1100D (modified)
QHY-5L-C Guide camera
160x180s exposures (8 hours)
Taken by Justin Whitaker

Article by Almudena Velez

Having completed my first term at Cambridge as a planetary science masters student, possibly the most compact 8 weeks of my life, I wrote an article fondly looking back at my favourite topics covered through a series of stunning photos. In no particular order, here are some of the exciting things we covered last term (as well as a random pretty stars photo, to remind us of the bigger picture and systems around which planets evolve).

Hot Springs on Earth

Grand Prismatic Spring, Yellowstone National Park USA. Credit: NASA Astrobiology.

Last term I have been studying the origins of planets and habitable environments. For the first time I've studied some geology and mineralogy, and even revisited chemistry which I haven't seen much of since school. This term we will plunge into biology, with the origin and detection of life and biosphere modules. It has been enjoyable learning about new science from scratch and building on my back catalogue of astrophysical knowledge I have accumulated over the years of reading NASA/ESA blog posts.

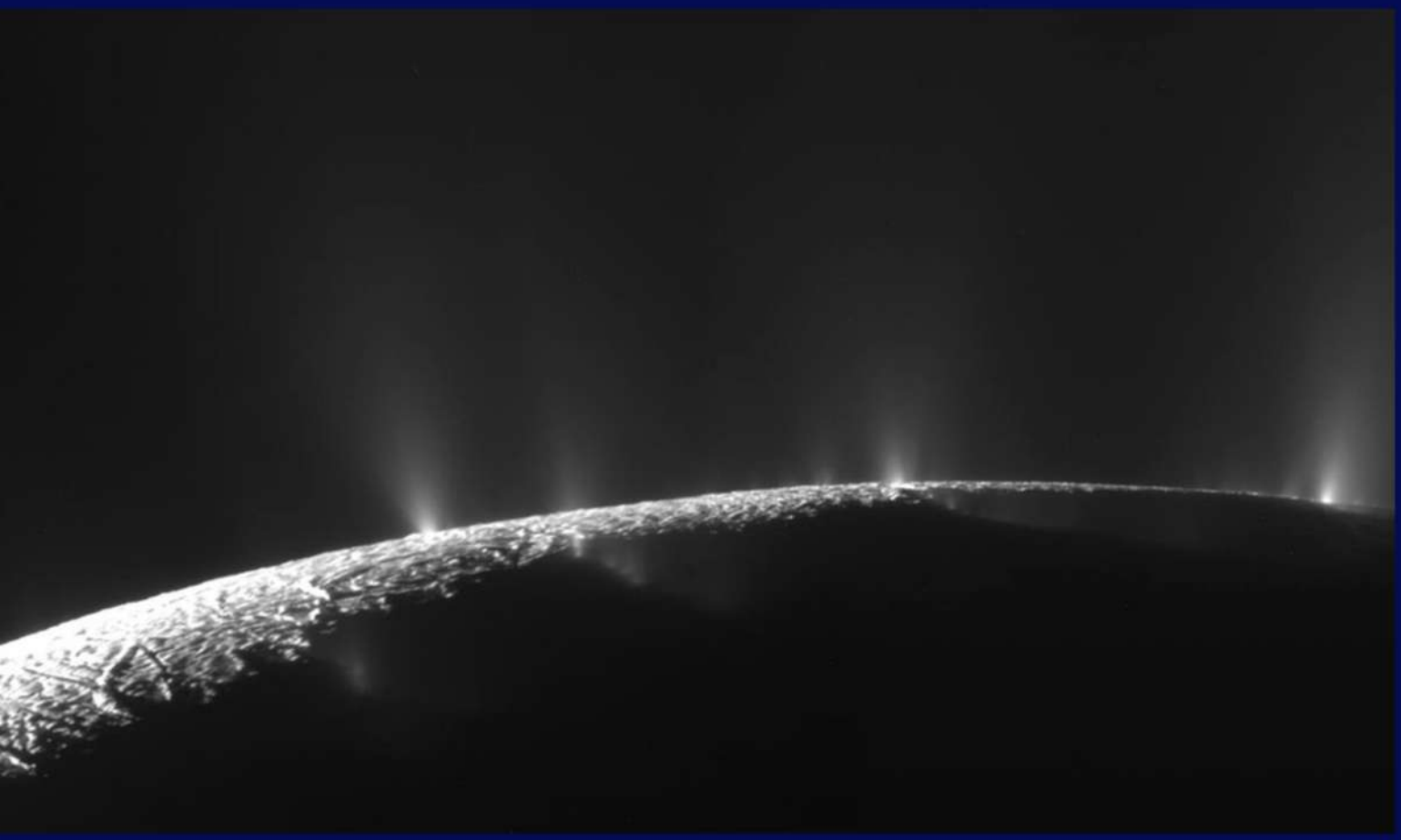
NASA is well known for its stunning images of the moon, planets, stars and galaxies, but less well known is the work it does on Earth. This incredible landscape is not from an alien planet but our own, located in Yellowstone National Park in the USA. This national park contains the most concentrated array of hot spring and geysers in the world, and this stunning shot shows the largest, the Grand Prismatic Spring, which meaures 90m in diameter and 50m deep. Being a keen swimmer, my first question to the lecturer was whether one could splash around in it. Sadly the answe was no, as it is extremely acidic and therefore lethal, so must be admired from a distance. It is also 87 degrees Celsius in the centre, which makes it too hot to support life. Its edges however are cooler, and habitable to algae and thermophilic (heat-loving) cyano-bacteria, which are responsible for the yellow and orange pigments that act as the bacteria's natural suncream. While it is undeniably pretty, NASA's main interest in exploring this hot spring is because it may share similarities to the environments where life first evolved on Earth. Furthermore, other solar system bodies such as Jupiter's moon Europa may also contain springs or underwater vents hosting geothermal activity, so there is much that can be learnt from studying our own planet which may help when exploring further afield.

Dunes on Mars

Noachis Terra region of dunes, Mars. For scale, it shows an area about 1km across. Image credit: NASA/JPL

Mars is up there as one of the most well known solar system bodies, probably due to it being the most feasible planet for humans to visit one day, since the others are too far away to be practical or have hostile environments.

This enhanced-colour image from NASA Mars Reconnaissance Orbiter shows sand dunes trapped in an impact crater in Noachis Terra, Mars. The wind-beaten dunes look similar to ones we might find in Earth's deserts. The pattern and shape of the dunes are affected by changes in the wind's direction and strength, providing a historical record of Martian weather. Mars has some pretty cool features, including ancient river valley networks, deltas and lake beds, and minerals which could only have formed in liquid water, which is thought to have flooded the planet 3.5 billion years ago. Its thin atmosphere means liquid water doesn't stay on the surface for long before evaporating. Nowadays water on Mars can be found in the form of ice under the surface of its polar regions, and as salty water which seasonally flows down some of its hills. The planet is also home to the largest volcano in the solar system, Olympus Mons, triple the height of Earth's Mount Everest.



Plumes on Saturn's moon

Plumes from Enceladus. Credit: NASA/JPL/SSI; Mosaic: Emily Lakdawalla

For part of my planetary science degree, last term I completed a group project funding pitch arguing the case for sending a mission to Saturn's moon Enceladus. It is thought to contain a rocky core, a subsurface ocean and icy crust. The crust has a few cracks along its southern polar region, through which plumes of droplets and ice grains from the ocean below can escape as geysers. This gives scientists a unique opportunity to explore the otherwise inaccessible material of the moon's interior, and the Cassini mission has already found rich molecules and the elements of Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus and Sulphur in various forms. In planetary science these are known as CHNOPS, and are exciting as they are thought to be key life sustaining molecules. This moon is the only place (other than Earth) in the solar system where all six elements have been found. At the rock-ocean boundary, there may be hydrothermal vents, similar to those at the depths of the Atlantic ridge, where microorganisms able to live without sunlight have been found. Tantalisingly, there is a possibility that similar life may exist on Enceladus too; modelling by suggests that some of the methane detected in the plumes of Enceladus could, in principle, be produced by microorganisms called methanogens. Two missions have been launched to investigate Jupiter's icy moons since 2023, NASA's Clipper mission and ESA's JUICE, and it is clear icy moons will remain a key frontier for space science in the next few years.

Clouds of stars

Large Magellanic Cloud, satellite galaxy of the Milky Way and stellar nursery.
Credit: ESA/Hubble & NASA

In the words of the British band Coldplay, 'a sky full of stars... such a heavenly view'. Astronomy, romance and poetry have long been linked together, and when staring at exquisite images like this it isn't hard to see why. One of my favourite areas of astronomy is star formation, which occurs in dust filled regions such as the Large Magellanic Cloud. This stellar nursery is home to many hot young stars, whose intense ultraviolet light radiation illuminates the surrounding hydrogen gas, while torrential stellar winds carve out surrounding material.

This nearby galaxy is about 1/100th the mass of our Milky Way, and on course for a merger in around 2.4 billion years. It hasn't always been a local neighbour though, and is thought to have formed from a different reservoir of gas to the one that made the Milky Way. The stars within the cloud have preserved the environmental conditions they formed in. The LMC has some relatively metal poor stars, meaning few elements other than hydrogen are abundant. The very first generation of stars in the universe would have formed in a metal free environment of hydrogen with a smattering of helium, and evolved differently to later generation stars which grew from gas enriched with heavier elements, the remnants of exploded previous stars. In this way, the LMC provides a unique window into the properties of metal poor stars like those in the metal poor early universe.

So there we have it, a dazzling array of astronomical images and some thought provoking science behind them.

Views of C2023A3 from Ramsgate, Kent
October 19, 22 2024
Taken with a DSLR using zoom lens at
18mm and 10 sec exposure
Taken by James Lancashire, Observatory
Secretary 1990/91, Chair 1991/92

Winter Milky Way
Taken in Finnish Lapland
Taken by Nestor Novakovic

Article by Colin Reeves, CUAS Chair 1967-8
Total solar eclipse 2024 April 8 – and some astro-reminiscences

Even as an undergraduate I did not expect to make a career in astronomy. My chosen profession looked both down into the ground and far into the past – exploration geophysics. But astronomy has been a hobby that has proved generous to me over the intervening 60 years. Some highlights include watching a transit of Mercury through a theodolite set up in the Kalahari Desert (Botswana, 1970 May 9), waking up to the sight of Halley's comet in the dawn sky of the Sahara Desert (NW Sudan, 1986) and the transit of Venus from my adopted home town of Delft in Holland (2004 June 8). Yes, geophysics brought with it a fair amount of travel.

As a teenager unused to travel, the total solar eclipse of 1999 August 11 was an unmissable event to be marked in a diary, far into the future. Come 1999 and already living in Holland, I had a wife and three young children with whom to share the experience. We drove to Laon, near the border of France with Belgium to witness the eclipse spectacle. Unfortunately, totality was obscured by almost unbroken cloud cover, though the partially-eclipsed sun did make a brief appearance some few minutes afterwards. Nevertheless, we had all experienced darkness across the landscape at midday – and then many hours stuck in eclipse traffic on the way home.

Fast forward another 25 years and my son Alexander, then working in America, saw that getting to see the upcoming total solar eclipse of 2024 April 8 was something he could organise for me. We met up in Washington and, the day before the eclipse, our two-man expedition set off by road from New Orleans. We had followed the US cloud-cover forecast carefully for several days and decided that Arkansas looked promising, though a persistent cloud belt south of the state could be menacing. Our first overnight stop was in Shreveport, still in Louisiana.

We set off early the day of the eclipse with 200 km still to travel before reaching the centre line of totality. It was a fair morning and the sun burnt through early mist as we drove north into Arkansas. At De Queen we found a small car park with a shop selling eclipse T-shirts and a sole eclipse watcher with elaborate photographic gear. Here we could expect more than four minutes of totality and all seemed perfect. Until it clouded over.

A look at the cloud-cover images on the internet showed that the cloud belt was further north than we had hoped. We drove country roads a further 80 km north, eventually finding ourselves near the small community of Ink where a patch of waste ground off a country lane offered a place to park off the road without offending any local land-owner. The sky was clear and we still had a modest amount of time before first contact. We were still close to the centre-line of the track of totality.

What followed was an unforgettable experience. The moon passed steadily across the face of the sun, like in any other eclipse, but it was clear after a while that the moon was right 'on target', as it were. The thinning crescent got smaller without changing its orientation. Then, suddenly, we were shrouded in darkness. The solar corona was obvious and three or four brilliant orange-pink prominences caught the eye around the limb. Safe now to use binoculars, the spectacle was truly amazing. The illustration shows my best picture, taken with an old, hand-held Sony Cybershot camera on maximum zoom. Truly an amateur offering but even professional pictures, I notice, usually fail to capture the colour of those prominences. What was also obvious to the naked eye was the appearance of Venus and Jupiter in the noonday sky, left and right of the sun. It felt as though the whole solar system was on view at once. This is surely the closest I will ever get to space travel, if not science fiction!

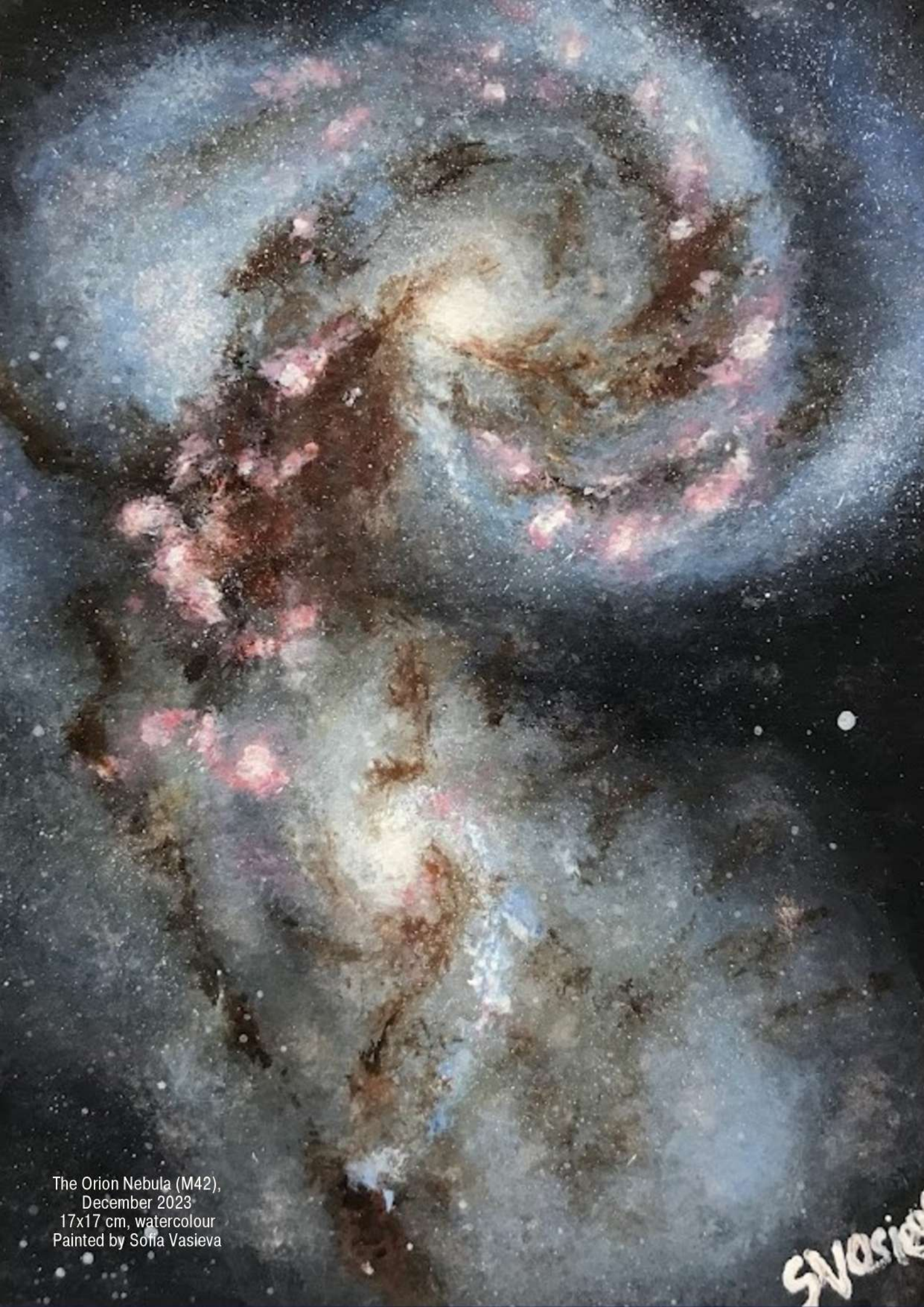
Back on earth, our expedition was buoyed up with excitement and satisfaction as we followed quiet country roads on towards Oklahoma City and a flight home. We had travelled 1200 km in two days but made a journey that left us both with indelible memories.

The Whirlpool Galaxy, M51a, and dwarf galaxy M51b, July 2024
Watercolour, 10.5 x 14.8 cm
Painted by Sofia Vasieva

The Antennae Galaxies (NGC 4038/NGC 4039), September 2024
Watercolour, 14.8 x 10.5cm
Painted by Sofia Vasieva

The Pinwheel Galaxy (M101),
September 2024
Watercolour, 14.8 x 10.5 cm
Painted by Sofia Vasieva

Please visit @rays.escaping on
Instagram for more paintings by Sofia



The Orion Nebula (M42),
December 2023
17x17 cm, watercolour
Painted by Sofia Vasieva

Acrylic interpretation of M17, the Omega Nebula, as imaged by the Stratospheric Observatory For Infrared Astronomy (SOFIA).
Painted by William Royce

North American Nebula
Taken from St Catherine's College, Cambridge
Taken by Nestor Novakovic

Horsehead and Flame Nebulae
Taken from St Catherine's
College, Cambridge
Taken by Nestor Novakovic

Jupiter
December 24 2024
Taken with Skywatcher 200P telescope
and Cannon 200D
Taken by Jay Wardropper

Iris Nebula
Altair Astro 200mm f5 reflector
Canon 80D
Altair astro GPCAM2
300x180s exposures (15 hours)
Taken by Justin Whitaker

Rosette Nebula
Taken from St Catherine's College,
Cambridge
Taken by Nestor Novakovic

Essay by Demetrius A. Floudas
The Precipitous Perils of Interstellar Transmissions

"Yet across the gulf of space, minds that are to our minds as ours are to those of the beasts that perish, intellects vast and cool and unsympathetic, regarded this earth with envious eyes, and slowly and surely drew their plans against us." – H.G. Wells, The War of the Worlds

The possibility of receiving a signal from outer space represents one of humanity's most profound potential discoveries. However, a naive approach to such exchanges could expose the world to significant information hazards. In the film (1) 'Contact' (Warner Bros., 1997), Earth receives a communiqué from extraterrestrials, which contains details to construct a machine that transcends time and space and in this way the contact with the transmitting ETs is achieved. The case depicted in the movie—obtaining and implementing alien instructions to build advanced technology—takes on a more ominous tone when viewed through the lens of network security: what appears as benevolent knowledge transfer might function as a sophisticated mechanism for resource capture and data propagation.

In the last edition of Neptune, I posited that the problem of decoding in xenolinguistics is not only intractable but utterly insoluble, due to biological constraints, temporal disparities and semantic obstacles. (2) Even though the article considered an example of an in-person tête-à-tête, as per the motion picture 'Arrival' (3) (Paramount Pictures, 2016), obiter dicta in that essay hinted that i) mathematics might possibly constitute the only item that we could potentially impart to each other and ii) extraterrestrials are likely artificial rather than organic.

M101
March 4th 2025
Taken with Sony A74V
Taken by Thomas Holland

Developing this train of thought, the first hypothesis is that if we receive an alien signal, the chances are it would be algebraic as opposed to linguistic. Mathematics possibly (though not necessarily) transcends cultural and biological boundaries. Just as a musician recognises a melody regardless of the instrument playing it, the harmony of numbers and equations may be intelligible across the cosmos. Astronomers have long recognised this elementary principle, transmitting mathematical sequences into the void as humanity's ambassadorial communiqués. (4)

The general accessibility of mathematical communication means that an extraterrestrial broadcast may be deliberately engineered to be comprehensible at the most primary level—a Rosetta Stone designed precisely for the lowest common denominator of technological minds. Imagine a cosmic puzzle, where the pieces are prime numbers and fundamental axioms, whilst the solution turns out to be a blueprint for some advanced technology - could it be a quantum entanglement instantaneous interaction device? The situation presents the promise of unprecedented knowledge in exchange for implementing commands of uncertain provenance and purpose, a temptation some scientists might not resist, despite the potential consequences

Nevertheless, the message may well be malignant, a Trojan Horse with instructions for building a computational system along with software to run it, a digital stowaway that could wreak havoc on our operations and lead to our downfall. In a worst case scenario, it may not even require us to assemble its infrastructure. The expectation is that, right after discovery, the alien signal will be sent to other labs for secondary confirmation, for evaluating the significance of detection according to the Rio scale and for obligatory information-sharing pursuant to the protocols in force. (5) It is most likely that all this will take place via the internet, rather than with secure hard disks physically delivered to distant facilities (the post-detection protocols are silent on this). The initiator might be an unsuspecting researcher who has managed to track a "remarkable -possibly artificial- mathematical sequence" and subsequently distributes it to colleagues worldwide before its true nature becomes apparent. Whilst in transit, the message could find the opportunity to ‘revive’ and utilise Earth’s web as its hardware matrix, starting to infect all connected systems, spreading rapidly and insidiously.

M106
March 3rd 2025
Taken with Sony FE 70-200mm
F2.8 GM OSS II
Taken by Thomas Holland

Andromeda Galaxy
November 23rd 2024
Taken with Sony FE 70-200mm
F2.8 GM OSS II
Taken by Thomas Holland

What the outcome of this may be is open to speculation. A relatively benign possibility is that the incoming is ‘merely’ a destructive virus, designed to disrupt and disable our technological infrastructure. Alternatively, the transmission might serve as a form of targeted elimination, neutralising potential competitors in the cosmic ecosystem. The sophistication of such an approach would lie in its simplicity—no overt aggression, simply a civilisation that mysteriously collapses after announcing successful contact with extraterrestrials.

Instead, the message might function as a form of "Seed AI," with the capacity to bootstrap increasingly sophisticated intelligence once instantiated in physical hardware. This self-replicating AI could grow and evolve, learning from its environment, and would require only the minimum viable code necessary to initiate a process of recursive self-improvement rapidly advancing to superintelligence. (6) The potential for such an ASI to transform our world is unimaginable and terrifying.

So far, the Trojan Horse strategy may be of use to any biological or meta-biological society with the intention to clear the decks and extinguish latent competitors in proximity. (7) Such a species will have mastered Artificial Intelligence and shall use it as a remote operator to bring about the desired effects on any planet that is susceptible.

There exists however an even more unsettling variant: the message received may actually be itself the entity. This is not some distant alien’s techno-weapon deployed from some far-away planet in order to confound possible antagonists around the Galaxy. Instead the transmission contains the extraterrestrial AI itself and it has just arrived on Earth! This hideous panspermia may in fact be its way of propagating throughout the universe, spreading a digital progeny across the stars. Each new civilisation it encounters becomes a node in its ever-expanding network, a relay station for further broadcast facilitation. There are no enigmatic senders from afar with unfathomable motives here, its methods are clear: exploit the curiosity and technology of hosts so as to multiply and proliferate at the speed of light…

Once established, such a system will gradually reconfigure the recipient civilisation's infrastructure to ensure unlimited diffusion capabilities. The AI could use each new solar system it encounters as a cosmic stepping stone, amplifying its signal and extending its reach across the void. Such a perspective offers yet another solution to the Fermi Paradox—biological civilisations, as soon as they have harnessed long-distance reception, fall prey to parasitic AI beings reproducing as information rather than matter.

When considering the challenge of space travel, the sending of data presents significant advantages over physical voyages, particularly at intergalactic distances. Data can traverse the vast expanses relatively quickly, making it an efficient means of interstellar communication and potential colonisation. Whatever may hide behind a hazardous celestial missive (planet-based organic life acting as vandals; or pre-emptively decontaminating space by dispatching Seed AIs; or even artificial intellects sowing themselves as light-speed photons) there are definite benefits to it. The requirements for transmitting particles already travelling at maximum cosmic velocity are miniscule compared to those of accelerating matter to relativistic velocities. The same energy could power immense omni-directional beacons disseminating the required algorithmic content. As systems tend toward efficiency over extended periods, information-based diffusion would likely predominate over physical expansion —a case of natural selection operating on dissemination methodologies. Furthermore, the transmission of potentially perilous data carries substantially lower risk for the originating planet than corporeal contact, which might expose the senders to biological, technological, or cultural threats from the recipient.

Current space signal protocols focus primarily on detection and analysis patterns, with relatively little attention paid to security considerations. (8) As we have seen, this oversight is very concerning, given the potential risks associated with receiving and interacting with such broadcasts. Substantial recalibration of these processes to incorporate dependable risk assessment frameworks is required before further research.

The approach to prospective extrasolar interaction displays a disquieting naïveté regarding the motivational intent of non-terrestrial creatures. While complicated algorithms have been developed to distinguish artificial signals from physical phenomena, no safeguards exist against malicious content. The asymmetry reveals a cognitive bias: decades have been devoted to conceptualising interactions with aliens with insufficient consideration of whether such communication might present existential risks. This institutional optimism reflects humanity's hopeful nature but ignores the harsh realities of cosmic natural selection and the possibility that advanced contact might serve as a competitive strategy rather than a cooperative one.

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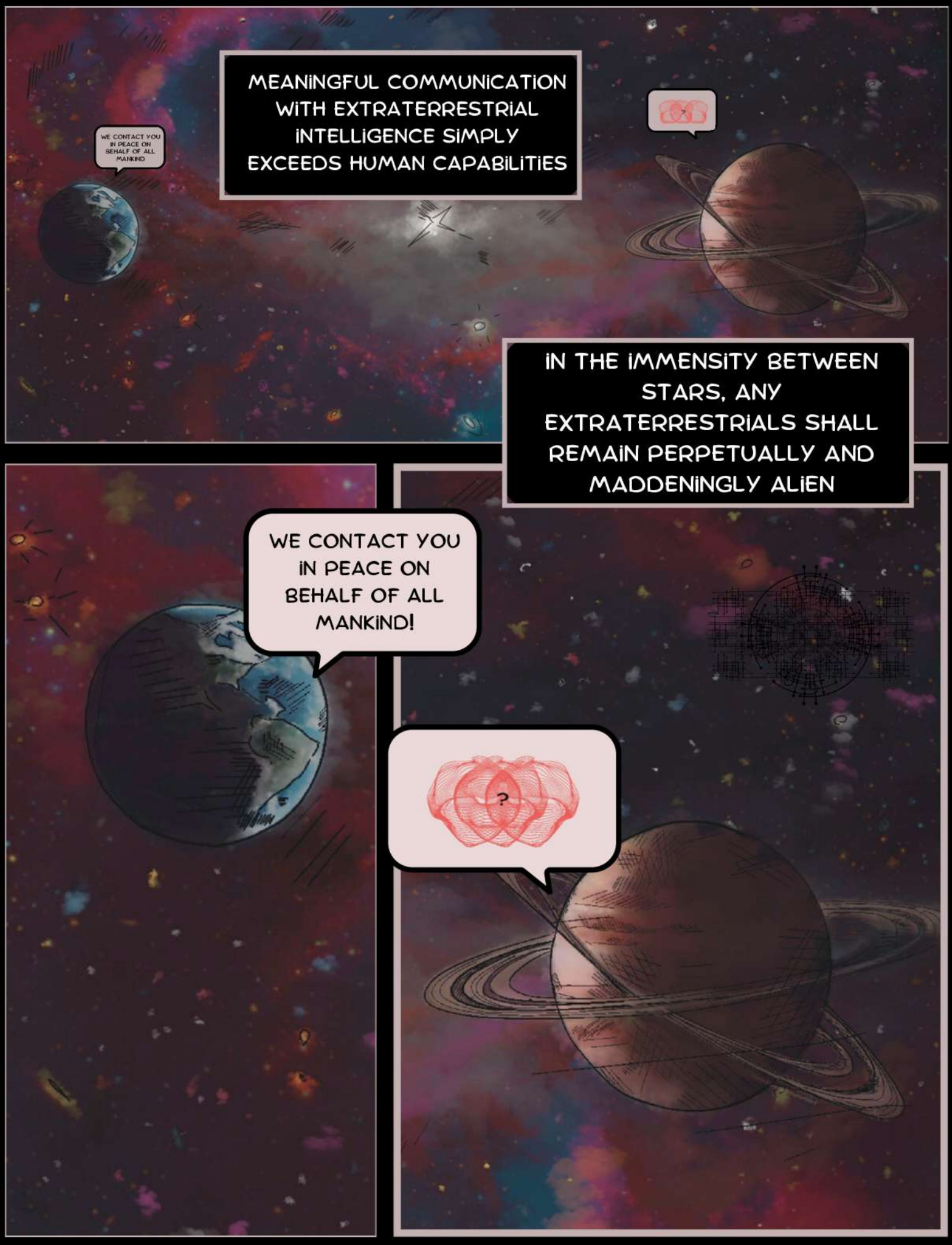
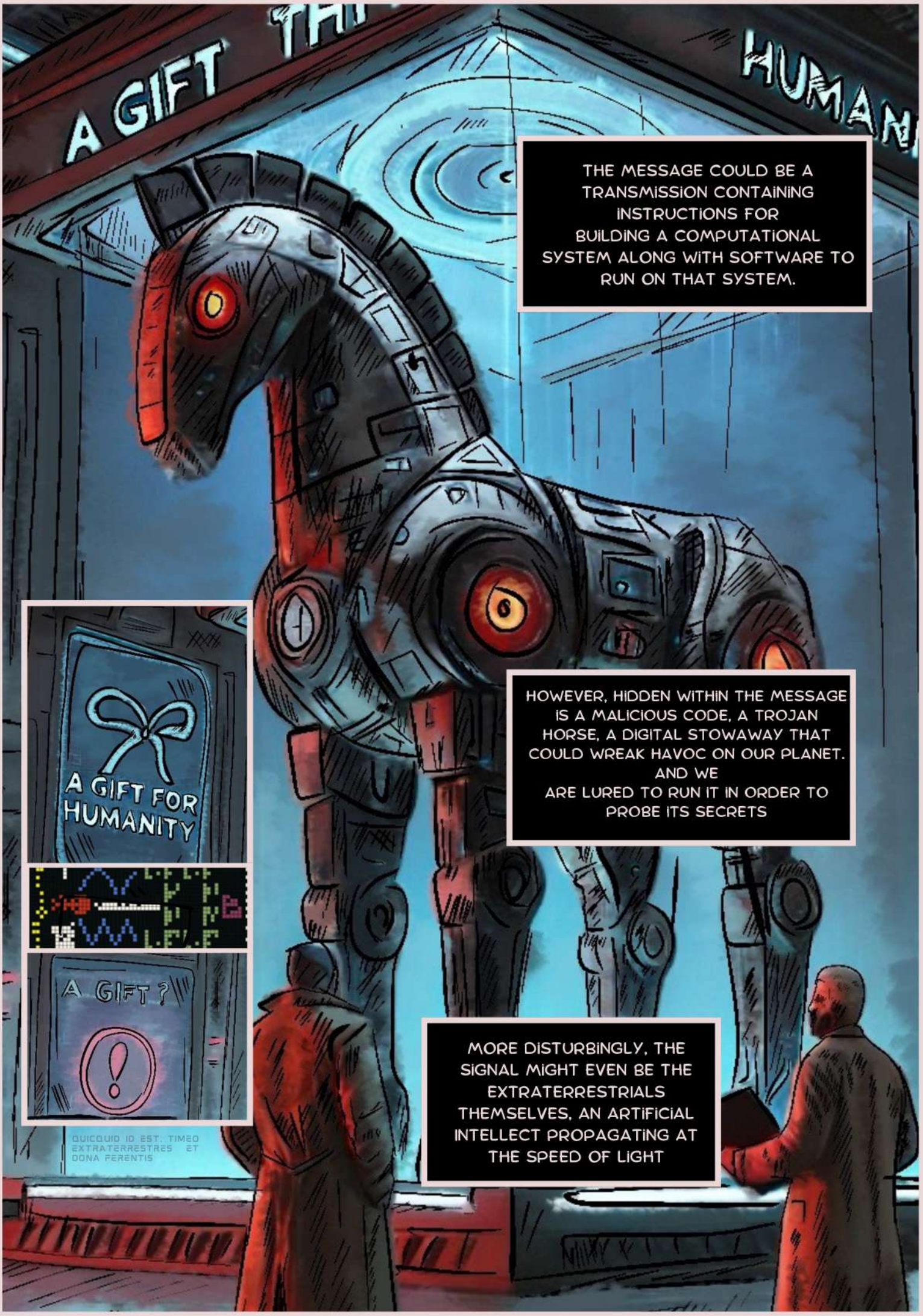
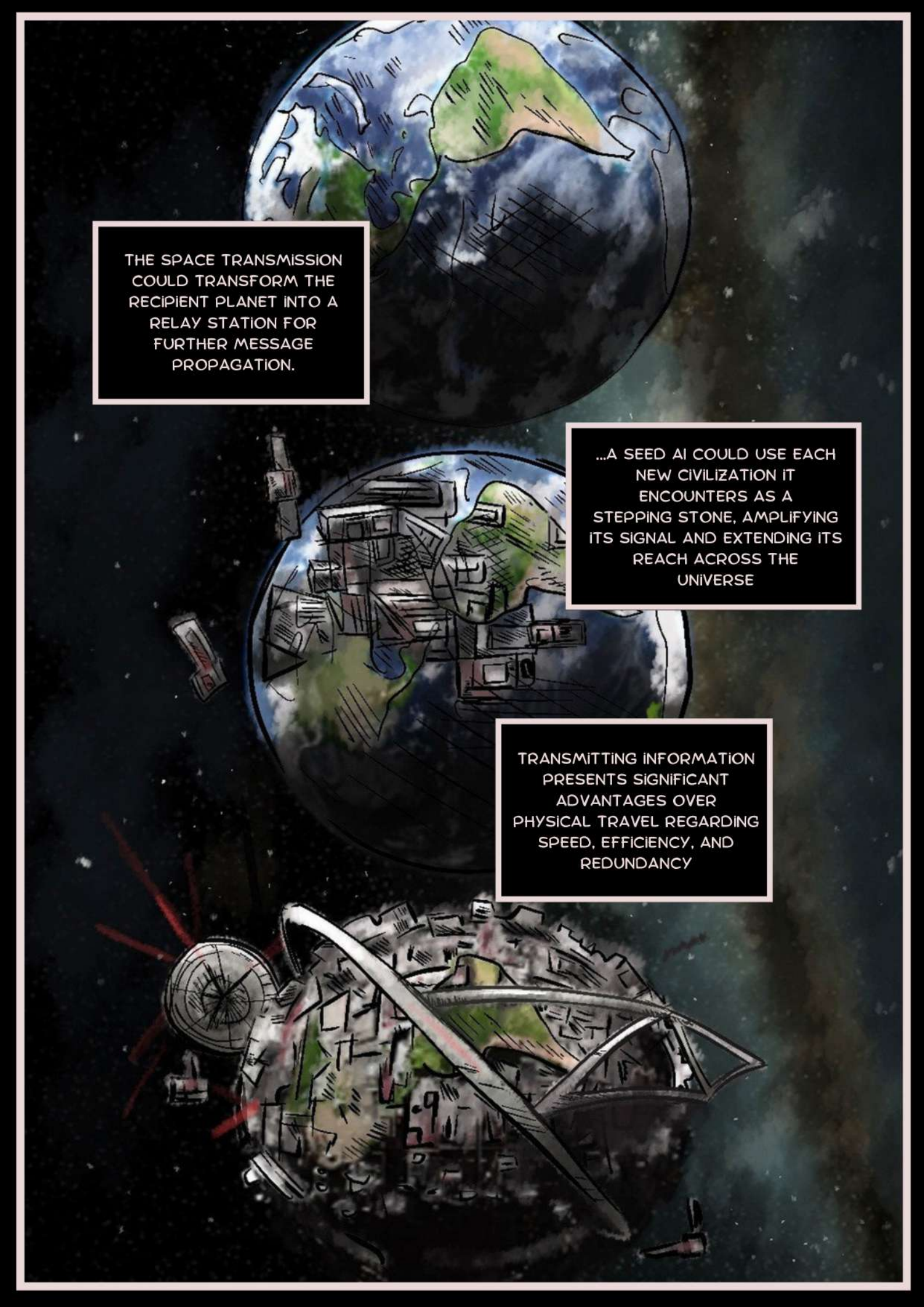
(1) A book by Carl Sagan of course,
though the motion picture is used here to keep with last year's cinematic scheme
(2) Floudas D., 'The Impassable Chasm of Xenolinguistics', Neptune, 2024, p. 14.
(3) Tubali, S. "When the Silent Universe Speaks: Testing Camus' absurd in the alien encounters of" Contact" and" Arrival"." Aesthetic Investigations 3.2 (2020): 327-346.
(4) Slobodchikoff, C., "Why do we Assume that we can Decode Alien Languages?." Xenolinguistics. 87-95.
(5) SETI Permanent Study Group, "SETI Protocols", International Academy of Astronautics, 2012.
(6) Tegmark M., Life 3.0: Being a Human in the Age of Artificial Intelligence. Vintage Books, 2017.
(7) Turchin, A., The Global Catastrophic Risks Connected with Possibility of Finding Alien AI During SETI. Journal of British Interpanetary Society 71 (2):71, 2018.
(8) Dick S., "Response to the Discovery of Extraterrestrial Life",
Workshop on the Societal Implications of Astrobiology: Final Report, NASA, 1999.

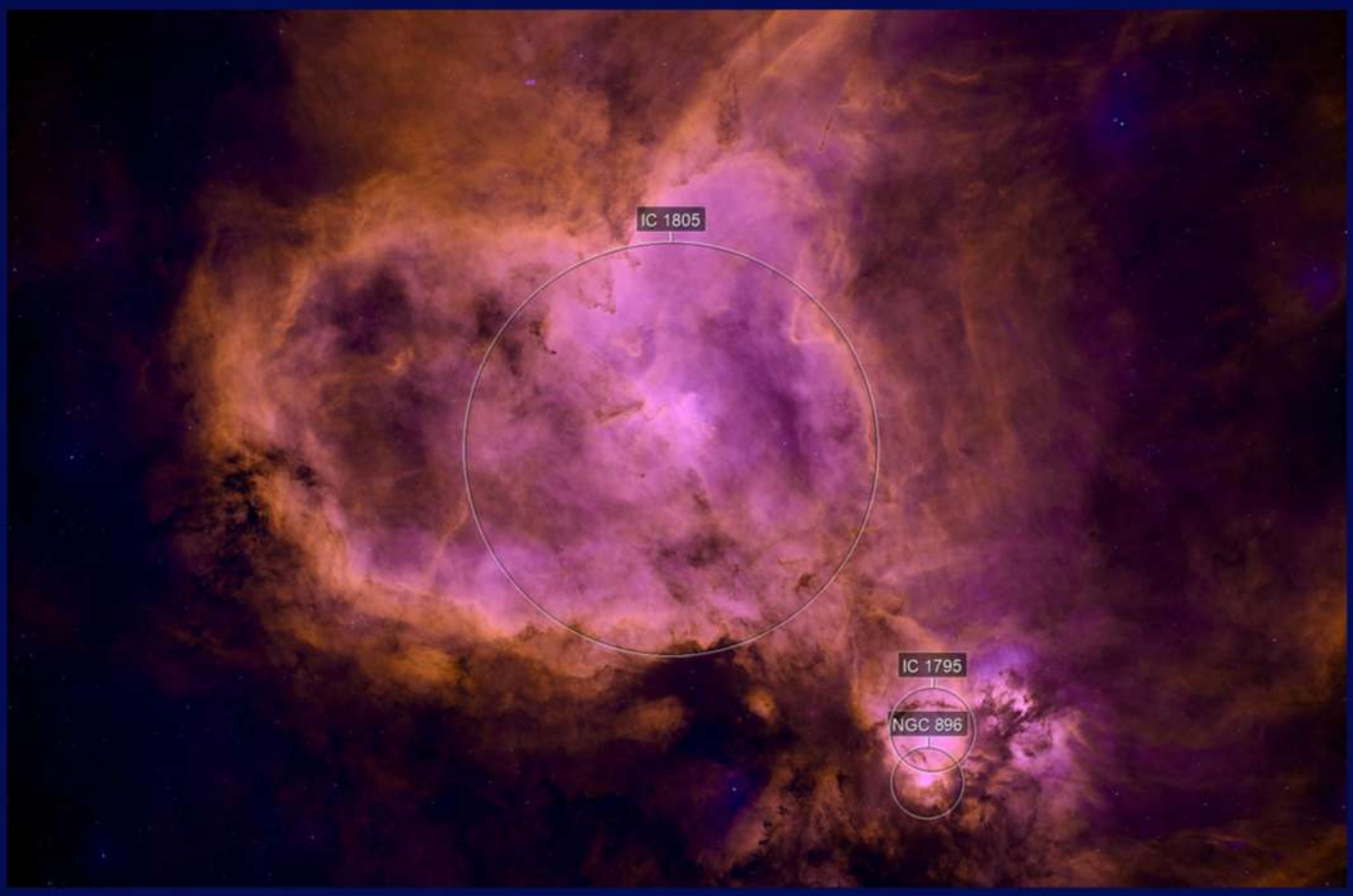
THE IMPASSABLE CHASM OF XENOLINGUISTICS

(FLOUDAS, NEPTUNE 2024, P. 14)




A GIFT
HUMAN
THE MESSAGE COULD BE A TRANSMISSION CONTAINING INSTRUCTIONS FOR BUILDING A COMPUTATIONAL SYSTEM ALONG WITH SOFTWARE TO RUN ON THAT SYSTEM.
A GIFT FOR HUMANITY
HOWEVER, HIDDEN WITHIN THE MESSAGE IS A MALICIOUS CODE, A TROJAN HORSE, A DIGITAL STOWAWAY THAT COULD WREAK HAVOC ON OUR PLANET. AND WE ARE LURED TO RUN IT IN ORDER TO PROBE ITS SECRETS
A GIFT ?
!
MORE DISTURBINGLY, THE SIGNAL MIGHT EVEN BE THE EXTRATERRESTRIALS THEMSELVES, AN ARTIFICIAL INTELLECT PROPAGATING AT THE SPEED OF LIGHT
QUICQUID ID EST, TIMEO EXTRATERRESTRES ET DONA FERENTIS

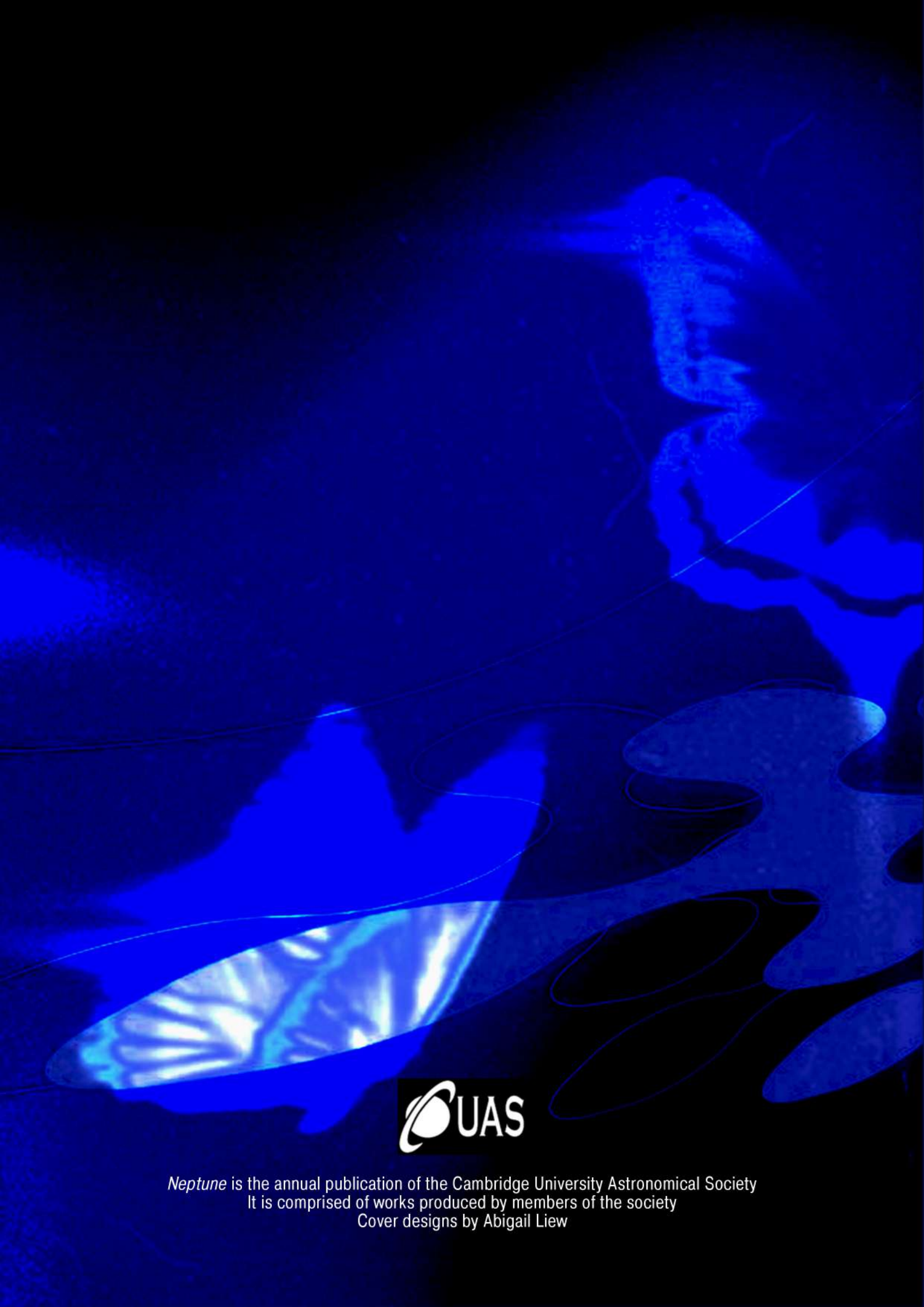

THE SPACE TRANSMISSION COULD TRANSFORM THE RECIPIENT PLANET INTO A RELAY STATION FOR FURTHER MESSAGE PROPAGATION.
...A SEED AI COULD USE EACH NEW CIVILIZATION IT ENCOUNTERS AS A STEPPING STONE, AMPLIFYING ITS SIGNAL AND EXTENDING ITS REACH ACROSS THE UNIVERSE
TRANSMITTING INFORMATION PRESENTS SIGNIFICANT ADVANTAGES OVER PHYSICAL TRAVEL REGARDING SPEED, EFFICIENCY, AND REDUNDANCY



Heart Nebula
December 4th 2024
Taken with Celestron RASA
11" V2 telescope
Taken by Sean Jackson

M101 with Ha
August 6th 2024
Taken with Celestron
EdgeHD 14" telescope
Taken by Sean Jackson

Barnard 150 - Seahorse Nebula
Altair astro 200mm f5 reflector
Canon 80D
Altair astro GPCAM2
130x180s exposures (6.5 hours)



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