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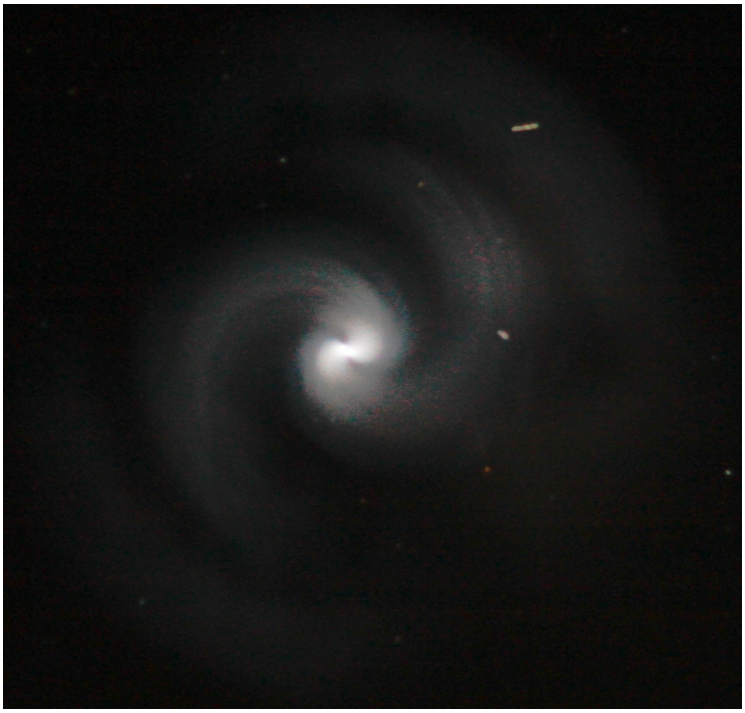
Stars over Surrey. A monthly guide to astronomy and developments in space with Graham Laycock and Rachel Dutton of Guilford Astronomical Society.

And welcome to this month's Stars Over Surrey. I'm Graham Cock, and with me is Rachel Dutton from the Guildford Astronomical Society and a fellow of the Royal Astronomical Society. Hello, Rachel. I. Hi, Graham. How are you? Very well. It's been a busy month, hasn't it? It's been a very action packed month of the space missions.

Strange Spiral In The Sky

Yeah, absolutely. Now we're gonna be talking about space later on. First section's about astronomy, but uh, we must begin by talking about this strange swirl in the sky last night. What was that all about? Last night, myself and a number of observers across the UK and Europe were treated to an unusual site in the sky.

This giant swirling pattern in the atmosphere could be mistakenly identified as a giant galaxy coming towards us, but in fact, it was not that at all. We did wonder whether it could be some kind of satellite or unusual plane that had lit up the atmosphere and there was a lot of turbulence in the atmosphere last night, adding to the kind of spooky effect that it had.



The Sky Spiral Taken by Mary McIntyre FRAS in Oxford

Now, if you didn't get to see it. There are images all over the internet. You can see some taken in the Guilford astronomical. Society, Facebook group. And also I recommend checking out Mary McIntyre's Instagram page and website 'cause she's got some excellent pictures showing the progression of this as it moves through different shapes.

Now, some key researchers worked out that this was in fact a Falcon Line Rocket launch that was launched from Florida at 1350 at local time, which was 1750 GMT on a classified

US government mission. SpaceX said on Twitter now known as X, that the launch was a US Government National Reconnaissance Office mission, and the Kennedy Space Center also said on X, that the launch was a classified mission from that office.

Now, the second stage was seen to have a gray band. At launch, and this is to absorb more solar heat, to keep more kerosene fuel from drilling up, which indicates that it was intended to perform a long, which means hour or more coast to a higher orbit before deploying the payload. And this may explain the somewhat long delay after the launch and the unusual location of being able to see this over Western Europe.

Well, what a unusual phenomenon. Thank you for explaining it all. Now let's move on to this lunar eclipse.

Meanwhile, there's been this lunar eclipse.

Yes. So,I went with some of my friends from Guildford Astronomical Society to the bridge over London Road Station, where we got to view the lunar eclipse. So lunar eclipses happen. When it's a full moon and in this case, because it was a full lunar eclipse, the moon goes completely into the earth's shadow and you get this red hue, and that's because the Earth's atmosphere bends light and that causes it to split out into the rainbow.

Just like with a prism. And it'll pass into like the red orange area and that makes it look red. So you hear the term blood moon. Now we didn't get that proper effect on the UK because unfortunately the moon was setting and sunrise was happening, just as that was happening. But I did get the first sort of stage of the eclipse.

Um, I shared the images here and we'll put them on the show notes from the Stars over Surrey page on Brooklyn's radio website. So if you wanna take a look at the images. Yes. I'm looking at them. Yes. Now. And you see the shadow coming over gradually until it gets darker and darker and it gets redder and redder.

Lunar Eclipse 14th March 2025
Credit: Rachel Dutton FRAS

Yeah. Yeah. Some great shots there, Rachel. Thank you. And what did people think of you there? About four in the morning. Then in London Road Station. We did get a funny look from the first passenger of the day. Right.but if you're into trains, we did get to see the first stock movements of the day as they were moving trains around, so, right.

As well as, but the moon was more interesting I think. For me personally, but a lot of astronomy enthusiasts are also sort of transport enthusiasts. So we did have a few amongst our group who are taking pictures of the trains and having a whale of a time.

Right. **Let's move on now to the here emission images of Deimos.**

Yes. So the Hera Mission was launched last year on the 7th of October, and it's on its way to the asteroid. You may remember there was an asteroid called Dimorphus that we sort of gave a nudge with a dart mission back in 2022. And the reason for that was to see if we could deflect an asteroid and change its trajectory in orbit.

And if that worked and it was successful, then any potential asteroid coming towards Earth, then maybe we could deflect that as well. So the next stage, having had dart happen, and we've got lots and lots of images from that.was sending out a mission. To that asteroid to see what changes have occurred since then and what the long term effects are on that area around that asteroid.

So that mission is called the Hera Mission. And to get out to there, it's using a load of flyby manouvres, also known as gravity assists. And one of the flybys on the 12th of March was by Mars. So here mission came within 5,000 km from Mars, and one of Mars' moons is Deimos. It's got two moons, Phobos and Deimos.

They are Mars' sons in Greek mythology and these are to what I call rocky space potatoes. They're captured asteroids, they've got too close to Mars, and then they end up in its orbit as moons. And at some point, because they're falling closer and closer towards Mars, they will end up smashing into each other or breaking apart and turning into rings.

But we don't have many good images of them. So here I was able to image Deimos from as close as 1000 km away. Surveying the less seen opposite side of the moon. And the moon is tidaly locked to the planet. So it's always got one side facing on one side, face out, just like how Moon does to the earth.

And this is a tiny little moon. It's only 12.4 km across and it does have a little bit of dust covering that might be left over from a giant impact on Mars or from another captured asteroid somewhere. So that was imaged and it was imaged by three different instruments. And what was particularly fun to watch was the team in Germany also had Brian May there.

So he was, sticking videos on Instagram of them watching as these images came in and he later, put a stereoscopic image on Instagram. So, I don’t know if you know what stereoscopy is. No, I don’t know what stereoscopy is. So he’s a member of the, I think it's the London Stereoscopic Society. What it is, is you make two images.

One is sort of left eye, one is sort of right eye, and they put them next to each other and you get a 3D image because your eyes do the work. Ah, right. Okay. Gotcha. And he's produced a book of stereoscopic images as well, so he did that with Deimos. So it was quite fun to see him there, sort of in the control room, getting the data and then later on providing, you know, a different view of that data again.

Right. Gotcha. Wow. This is a good title.

Here's looking at Euclid.

Yeah. So ESA's Euclid Telescope launched in June, 2023 has now given us its first three deep field images. So I don't know if you recall the Hubble Deep Field images at all. No. No. Okay. So, Hubble, when it was first launched, obviously it had the problems with the mirrors and things, and they essentially put glasses on it and fixed it.

It then had specific targets. The director has discretionary time so they can choose, some time what they want to focus Hubble on, and most telescopes have some kind of discretionary time for people that are involved or for the director. So it might be that your proposal fails through the main board, but the director goes, actually, I see something in that, so I'm gonna use my time to overwrite that.

Or they could even just pick a target themselves if they really wanted to.it's one of the perks of the job. So the Hubble director decided he wanted to point Hubble at the darkest patch of the sky, because originally we thought there was nothing there. It literally just pointed at this patch. It was so when they looked at the data, they realized that this image that we now call the Hubble Deep Field had.

A load of galaxies in there.so this empty patch of sky was absolutely teaming with stars and galaxies. So after that, lots of different scopes now do deep fields, and Euclid has done three. So Euclid's main job is to probe the history of the expansion of the universe, and this requires many images to be stitched together into this large map.

And it'll do that by imaging billions of galaxies right out to about 10 billion light years away, covering more than a third of the sky. So this data release has given us 26 million galaxies, some of which are 10.5 billion light years away. And. It's already given us 500 gravitational lenses. Now, I've mentioned gravitational lensing before, but essentially it's a way of seeing further away through another object that acts as a lens.

So if you imagine having a candle flame, and then if you imagine you've just finished a glass of wine, and if you look through the bottom of the wine glass, you can make the flame of the candle go round in a circle at the bottom of the stem. Oh, right. So if you imagine playing around with the light in that way, that creates a lens so you can play around at home.
Make sure you've got a responsible adult to drink the wine for you first. So it's found 500 gravitational lenses, which means it's found things further away that have been lensed in that way. Now there are parallels between E's Euclid mission and the mission. GA created an extraordinarily precise map of the Milky Way by observing more than 2 billion stars in other subjects.

And Gaia's data has already become absolutely foundational in modern astronomy, leading to many new understandings of the Milky Way’s history, structure and movement. But it's also discovered objects such as asteroids and even potential a moons and. We've covered some of the things that, Gaia data has, has sort of hidden in there, these jewels like a nearby black hole that we didn't know about.

So Gaia, it's a nearby mission as it's partly looked after by a team, over near Dorking. It's mission ended in January, 2025, and it's being passivated this month. But Euclid will be conducting a deep survey of galaxies, and it will likely also become foundational in our understanding of things like the cosmic web, dark matter, dark energy.

And this is the first major milestone in its effort because it's this beautifully detailed catalog of 380,000 galaxies.which, and this is something quite exciting, has been classified to, to look at different features that all these galaxies have. By citizen scientists using the Galaxy Zoo platform.

So this is human volunteers going in and looking at and classifying images and training and algorithm essentially, or machine learning. So. If you are an interested citizen scientist, you can log into a platform like that and become involved in people powered research and actually take part in active astronomy and scientific research.

So that was particularly exciting as well. And it's good that people can take part, isn't it? It is, it's one of my favourite platforms actually for that because a lot of the projects are very accessible and it's not just astronomy or those are the ones I gravitate to. But yeah, I really like it when you hear about citizen scientists getting involved in things.

Right now, were Mary Shelley and Dr. Frankenstein, right?

Yeah. So. There are a couple of ways you can get life started on earth.the first one is panspermia, where life came across on asteroids and comets and then seeded the earth. The second one is a abiogenesis, and this is where life just started sort of on its own.

And the best theory for how that could happen is if there was a spark that turned complex chemistry into biochemistry. So thinking of all the film adaptions of the book where Dr. Frankenstein creates his monster and then tries to make it come alive with lightning. Funnily enough in the book, the method of bringing the monster alive is not actually described.

That's a film adaption, but it's a very iconic thing that I think of whenever I read these. So there were experiments back in the fifties called the Miller Yuri experiments and. They tried to do something similar. So they got methane, ammonia, hydrogen, and water, put them in a glass vessel and then applied electricity to simulate lightning.

And the idea was that you are mimicking these conditions of early earth. And the result was, was they got amino acids, which aren't life, but they're the building block blocks to proteins. So some people posited that it could be these. Little warm ponds that Darwin had explained and described, which are small bodies, awards containing lifeless molecules.

Um, they could be heated by volcanic activity, but if struck by lightning could have sparked the first life on earth. So. That's quite exciting. But other people have said, well, maybe those experiments were done in a glass container, and it could be the borrow silicates in the glass that played a part in creating these amino acids.

And others have said, well, actually lightning, you know, how much lightning would you have to hit all these small little ponds? Would there be enough lightning strikes? Lightning doesn't always hit the same place and multiple times. Sometimes it does. It's very unlikely that that caused it. However, some scientists decided to have a go with extending these experiments.

Now they were looking at the electrical charges in water spray, which could be enough of an electrical kick on H to do its things. So. Water is actually pretty fascinating. It sounds quite boring to a lot of people, but it's polar in nature. So the hydrogen parts are sort of

bent towards each other with a slightly positive end, and then the oxygen has a slightly negative end and that gives water many interesting properties.

So it affects the way it aligns itself and its inherent stickiness and surface tension. And that's thought to help create cell compartments within different cells. So. Other ingredients for life include things like hydrogen and carbon and nitrogen to make things such as ammonia and methane. So these are more ingredients for life.

And scientists. Were looking at the carbon nitrogen bond, which is also polar. So similar to the, um. Uri Miller experiments, the researchers placed nitrogen, methane, carbon dioxide and ammonia gases into another vessel, and then sent in sprays of warm water into this mixture, and that created, a number of organic molecules that had the important C-N bond, such as hydrogen, cyanide, uracil, and glycine.

Is pretty exciting, and it could be that that spray of water was just enough micro lightning as it were or luminescence to kick off that process. Interesting, isn't it? Are they carrying on with all this? I don't know. Hmm. And while there's been such a gap before trying it again, I wonder, well, I imagine saying, I want to have a go at recreating the Frankenstein experiment.

Why not get as much funding but astrobiology is a relatively new field that only sort of came into being properly in the last 20 years because we didn't even know, until the, the nineties that we would find another exoplanet out there. So another planet in a different, solar system or different star system.

Mm. And now we've got. Thousands of exoplanets. So we've gone from that. We've also gone from thinking that the earth is the only place with life to potentially, there could have been microbes in the Venetian atmosphere. There could be something going on on some of the moons around Jupiter or Saturn. So our understanding of life and where it could be and whether conditions for life are, is dramatically changing since then.

Right now Earth has passed through the Orion Nebula.

Yes. So anyone who has spoken to me about practical astronomy will know that the Orion Constellation is my favourite and. Part of the Orion constellation is this massive cloud complex. Now, I've included a reference picture for you, Graham. Ah. because most people, when they're looking at the Constellation, they're focusing on big stars like Beetlejuice and Bellatrix and Rigel, and the three stars of the belt and the three stars.

I say stars of the sword. But the stars of the sword are actually nebulas and there's this massive red arc called Barnard's Loop.there are lots of nebulas around Alnitak, such as the Horsehead and Flame Nebula.you've got the Running Man nebula at the top of the sword. The middle one is the Orion Nebula.

So you've got a lot. And this is known as the Orion Molecular Cloud Complex. And the red clouds, are areas that are being heated up, not heated up, ionized by the UV light from new stars that are forming. So it's. Quite a busy area with a lot of stuff going on there. And recently discovered was this large structure that this Orion Cloud complex or molecular cloud complex is part of called the Radcliffe Wave.

And researchers used data from the ESA Gaia mission along with spectroscopic observations to accurately determine when our solar system passed through this region.

By tracing the movement of 56 open star clusters within the Radcliffe wave. So an open star cluster is a cluster of stars that haven't yet come together under gravity.

Unlike a globular cluster, which isn't named because it looks kind of globby and they are quite old. So the stars are coming close to each other. So researchers were basically tracing the motion and movement backwards, and their work shows that. We probably passed through anywhere between,11.5 and 18 million years ago with the closest approach probably being around 12.4 or 14.8 million years ago.

Now, the environment in this area is more complex, more dense, so as the solar system passed through it. It's likely that the greater density compressed the sun's heliosphere, which would allow more interstellar dust to enter the solar system and reach at the Earth. And according to new research, this could have affected Earth's climate and left its mark on geological records.

So, when we look back roughly 14 million years ago, earth was in the middle myosin, epoch or epic. I never know how to say that word.so several notable events happened during this. So we had mountains forming.we had. Afro Arabia colliding with Eurasia.we also had the me salinity crisis of me Mediterranean Sea, but overall the Myoscene is known for the middle Myoscene, climatic optimum, or MMCO.

Because the climate was warm and the tropics expanded. But it's also known for the middle Myoscene disruption or the MMD, which followed as through a wave of extinctions, happened across the earth. Obviously wiping out a considerable amount of life, and this kind of appears to have happened within that same timeframe.

So obviously it's not a direct cause and effect, but it is interesting that those two, two timeframes overlap. And it could be that that was the cause of this disruption. Yeah. Fascinating, isn't it? Yeah. So there was also, and funnily enough, a 2005 paper that I found that showed that the earth passes through these dense molecular cloud areas roughly every 100 million years.

So it might be, if we started looking back at records, we could find something sort of every a hundred million years or so.

Right, Saturn's rings disappear.

Yes. So this one was my. Flick bait for the month. I had lots of people asking me about Saturn's rings disappearing. Are they breaking up? Where are they going?

The rings aren't disappearing. Essentially what it is, is when you look at Saturn, it's got its ring system around it in a plane, and if you imagine having a paper plate, make a hole in it, stick a tennis ball in the middle, you can tilt that tennis ball around so that the plate changes its tilt as well.

And that's essentially what's happening with Saturn as we change our position around the sun. And Saturn changed its position around the sun. We are looking at it from all sorts of different angles and what happened is these rings become completely edge on on the 23rd of March. So it looked like those rings just disappeared because that was when they were at the sort of thinnest and edge on most edge on for us to see.

My goodness me. It makes sense though. It does. It's sort of thinking in 3D and obviously we see that 3D within a 2D surface. Indeed.

And Saturn has 128 moons, 128 new moons.

Discovered on top of the ones that were just there. So last month we did a planetary parade event at Newland's Corner and I just printed off posters that I made saying that Saturn had 146 moons.

And then I put a question mark after the the 146 because I knew that we would likely find a couple of new moons and. Eventually add to that tally. I did not expect it to be 128 and certainly not within a couple of weeks of me goodness mate, printing this poster. So a team of astronomers in Taiwan and Canada and US and France discovered these 128 extra moons back in 2023 using the Canada, France wide telescope or CFHT.

And at the time, these moons were not officially recognised until the 11th of March. This. So these moons are all irregular and tiny and just a few miles across. They're thought to be broken up, captured asteroids, and they can be broken apart due to collisions with other bodies or even title forces. And by comparison, our moon is 2,159 miles or 3,475 km and these are like tiny little ones that are maybe just a few miles across, but they do have, orbits that go around Saturn.

So they are moons. And the team, how they discovered this was back in 2019 and 2021, they discovered 62 moons. And they were like, well, we've just discovered these ones using better optics and better techniques.

Let's go and have a look to see if we can find more. And they came back with a whole treasure trove of new moons for Saturn. Right. Well, if they keep on banging into one another and there's gotta be more of them, isn't there? Possibly, yes. They keep on doing that. Splitting and dividing.

Anyway, let's move on to the astronomy tip of the month.

Yes. So because we are going out a bit before the end of the month on the 29th of March is a partial solar eclipse. We are going to be at Newland's Corner, sort of from 10 o'clock in the morning. But I've had lots of people asking about solar observing, and how to observe the eclipse and how to look at sun spots and all sorts.

So first of all, we never look directly at the sun. I did have someone ask me the other day actually, why it's more dangerous during the eclipse. It's not more dangerous. We should never look directly at the sun. It's just more people actively do it during eclipses, which is why you get those warnings it will burn your retina and if you try and use a camera or a telescope, it'll burn the, sensor of the camera.

You can set fire to things or melt things through your telescope if you don't have it properly adapted. So if you want fun alternative ways of viewing solar eclipse one, you can get the eclipse glasses. Make sure they are ISO 12312-2 accredited. I love how I know that number. Now off by hook.

Before you use any kind of eclipse glasses or filters, if you're using optics, make sure you check the scratches and holes before every single use. So if you take those glasses off

your face, turn away from the Sun, hold them up to the light, and check for holes and scratches, you do not want that sort of mirror image or not mirror image.

That same shape, hole or scratch, permanently damaged into your retina. Some fun ways of observing solar eclipse. You can make pinhole cameras. You can even buy them online, so they have that little pinhole and they project the shadow. You can use a colander. You'll see lots of eclipses through the colander.

You can also, little kids like this, disco balls, they project lots of little eclipses. Oh, right around as well. Yeah. So they're quite good fun to use. Clever, yeah. So I quite enjoy that. But other things, if you are interested in getting into solo, observing one, contact your local astronomical society or speak with someone who's experienced.

But there are a number of things that you can do. So my little smart telescope, sea star comes with a solar filter. So I can take images of the sun and I can see the sun spots on that. It's actually quite good fun to have a go at sketching the sun spots and getting the shape. Because you have the Umbra, the darker patch, and then the penumbra, the, lighter patch around them and getting a feel for the, the funny little shapes they make.

And funnily enough, there's also a citizen science, sun sports project on the universe platform as well. So. If you want to look at other people's drawings or sun spots and help classify them for research, you can take a look there. So my tip for safely looking at the sun. Get proper protection. Do not look directly at the sun.

You can look at the eclipse in different ways.if you do want to get a relatively cheap telescope, you can do and get a proper solar filter for it and check that every time before you use it too. It's becoming a lot more accessible and affordable now to do solar imaging. Right. Good advice there, Rachel.

Well, that completes our round off of astronomy This month after the break, we'll be into the space News Stars over Surrey. Your monthly Guide to Astronomy and developments in space on Brooklyn's radio.

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And welcome back to Stars Over Surrey and we now head into Space News and what Excitement.

Sunny and Butch splashed down with dolphins.

Yes, they've been rescued. Yes. You saw this one, didn't you? I did. I saw it live on television as they splashed down, I think at three minutes to 10. Yes, precisely. That's what impressed me was the, with the accuracy of the estimate, I.

Yeah, it was pretty impressive. And I take it you saw the dolphins as well? I did, yeah. Swing me around and I just, a disappointed, took them about an hour to get them actually onto the, onto the, vessel to get them out of the capsule. Yeah. So they have to wait for all the checks to make sure that it's clear or hypergaulic gases before humans can approach.

And then, when the humans approach, they sort of check the capsule and things and then get it hooked up to crane and then it translates on. But you, you can't have the initial sort of approach until they've got various different scanning instruments that look for those guests because obviously they are very dangerous to humans.

Indeed, yes. I saw them with long, long prods. I think they were, yes. Aiming out of the rubber dinghies at, at the capsule. Yeah, so they wait for that first and they know that they're safe in there. As long as the capsule's not sinking because it's got a leak or anything, they're safe in there. They can stay in there for a couple of hours if, if they need to, so that that happens.

And then they sort of translate them onto the boat. So let's go back in time with it.they went up. Last year in June originally the mission people are saying it was planned to be eight days. It could have been anything up to 45 days based on the battery life and the testing they wanted to do. Then they tested the batteries and discovered they could last it for another 90 days.

They have various different problems like helium leaks and, brush issues and things like that. So then it was agreed that. The next crew up, two of the people who'd spent years, and it would've been their life goals to go to space, had to stay behind, and two went up, and then Sonny and Butch took over the other two's past the mission.

They did over 900 experiments. Whilst they're up there, Sunny broke a new record as the longest base walk done by a woman with 62 hours and nine minutes overtaking Peggy Whitson's previous record of 60 hours and 21 minutes. we heard Sunny talk to the ham radio ISS, at Brooklyn's with the brownies.

So they have been incredibly busy, but they finally got back after further delays because the upgraded dragon wasn't ready on time. They were supposed to come back in February, but the dragon wasn't ready and now they're back. So they had a 17 hour return. Did you spot them looking a bit wobbly when they were being helped out?

Yes. Did indeed. They did need some help, didn't they? Yes, but it's, but as I understand, as it's explained, it's about the bones and the muscles wasting while you're in zero gravity. I. So they do do a few hours of exercise every day to keep that muscle mass and bone mass up as much as they can. But there's also things like space sickness.

So a bit like travel sickness. When you go up to space, all your fluids sort of spread out throughout your body rather than, gravity sort of pulling downwards and. Blood vessels, moving things upwards. So like your eyes expand and the fluids around your ears, collect a bit more and things like that.

And the same happens when some people come back to earth. They feel space sickness as well. Apparently it goes after about two days.but they are a lot weaker because they're getting used to gravity again and everything's a bit floppy. So they're helped out because you don't want someone to say, yes, yes, I'm absolutely fine, then fall over and hurt themselves and then maybe break their bone on the fall.

because it's a bit weaker than it normally is. They're all put on these stretches, but within a couple of days, they usually find often within a couple of hours. So there's been lots of images of all four of them being welcomed, but in particular Butch and Sunny, due to their

unexpected stay. One interesting thing I found is that their overtime pay is $4 a day because they're public servants.

Ah, right, yes. Right.now. I don't know if you're aware of all the sort of talk going on. Why weren't they returned earlier and things like that. Mm, so actually there were only four dragon capsules available at the time, and they were either being refurbished or currently in use. Now, Musk has said that they could have sped up the refurbishments, but equally the fifth capsule they were creating, the upgrade was late.

So I don't know, about the timelines there. Also, the cost of launching a Falcon alone is about $30 million US dollars with the Dragon attached. That's about $148 million US dollars. So $30 million to $148 million. He did also say that, they weren't even asked about costs and things like that. But if you think about where NASA was just before the current administration came in, the previous administration, you had a lot of people taking over the other sort of houses, political houses in the US who were just not interested in space research.

Their constituents were interested in other issues, so. I can't imagine it would've been easy for NASA to go and ask for an extra $148 million, from the government when they were already looking at cost cutting at that time before the current stuff going in. So it doesn't look like it would be that feasible to return them any earlier.

But it would be interesting to know about other alternatives, and funnily enough, there are talks about whether Starliner is going to continue with any further development. So we'll have to wait and see. Yeah, I wondered about that. Given Boeing's position at the moment. Yeah. Also with their aircraft.

Yeah. Now onto Moon landings.

Yeah. So this is intuitive machines. You might remember last year, the intuitive machines, or IM-1, they had an sort of land. It landed on the moon in February last year where they had a successful soft landing, but not completely 100% successful because it landed on its side. And one of the legs broke off and some experience deployed, but there was an art installation that didn't deploy.

So I'm hoping that's kind of sounding a bit familiar. Yes, it is. It is. I do remember that. Yes. So on the 27th of February this year, I am two launched and it had the land module, Athena, which also sort of soft landed on the moon on the sixth March. It did lose contact with us, just as it was approaching the landing and then it re-established contact, and then they finally got images from some of the instruments on board and it appeared to be on its side after they did a little more imaging and resolution of those images.

You could see another leg had broken off this mission as well. Oh no. Yeah, so it's a bit disappointing. And this time it landed so that its solar panels couldn't collect any light, so it's essentially non-functional and it's not able to properly deploy any of the experiments as well, which is a huge shame.

Interestingly, looking at images from things like the lunar reconnaissance orbiter, you can see this white line where it landed and it's this white streak across the regolith that wasn't there in the previous image. So it looks like it could have traveled on its side for a few hundred meters on the ground.

But what is pretty cool is they've got an image of the Earth. From there and you can match the cloud patterns in that image to the cloud patterns taken by satellites in geostationary, but at the same time, so we know it definitely took pictures of the Earth. So it's a huge shame becausel don't know if it's going to impact, that's a private company.

It's part of the NASA commercial Luna Landing program. So I don't know if it's going to affect future missions if people are losing sort of confidence in them, but I hope they do figure out what was going on with the legs. Yes, they do. Obviously have to look at that, don't they?

Yes. Now Blue Ghost landing, right?

Blue Ghost sees the Sun being Eclipsed by the Earth from the Moon Credit: Firefly Aerospace

So this one was a successful one. Hooray. Good. Yes. This was the first 100% successful commercial landing on the moon. So a massive well done to the Firefly Aerospace team. This was the Blue Ghost mission, one robotic lunar landing mission.

It launched in January the 15th and successfully launched on the moon on 2nd of March.

And mission objective was to deliver small payloads to the surface of the moon and conduct various different scientific experiments. And they basically.

Tested all the equipment they had and made up lots of different scenarios that they could, mimic and go through for future missions basically.

So these experiments include investigating lunar regular length and drilling down and measuring heat flow from the moon's interior and testing technologies and potential, future experiments.

Now, one thing I did particularly enjoy is the, camera on board. Imaged what to us was a full lunar eclipse. But if you take a look indeed there it’s from the Moon's point of view. And you've got that diamond ring effect. I know the diamond ring. I was just gonna say, it's a spectacular shot, isn't it?

Yeah. So it's the first ever eclipse taken from another Yes. world. Other than the Wow. Wow. It's a big first, isn't it? Yeah. So two big first one, the completely first 100% successful landing of commercial mission. Two, this beautiful eclipse image. Mm-hmm. So, and then as that happened as well, it hit lunar night.

For a short period of time, so it would've cool down very quickly, which wouldn't have been great for the instruments on board.but as with a few other missions, they had a really poetic final missions message. So the mission ended on the 16th of March, and I'm gonna read you its final transmission. It made me a bit sad actually.

So its final message was. “Mission mode change detected now in monument mode. Goodnight, friends. After exchanging our final bits of data, I will hold vigil on the spot in Mare Chrisium to watch humanity's continued journey to the stars. Here I'll outlast your mightiest rivers, your tallest mountains, and perhaps even your species as we know it.

But it's remarkable that a species might be outlasted by its own ingenuity. Here lies Blue Ghost, a testament to the team who, with the loving support of their families and friends, built and operated this machine and its payloads to push the capabilities and knowledge of humanity. One small step further, Per Aspera Ad Astra love Blue Ghost.”

Oh, isn't that marvelous? Yes, I know. I'll be honest with you, I got a little bit teary when I read that. Yeah, I can understand that. That's lovely, isn't it? Yeah. And a robot writes better poetry than I do.

And with that, we move on to Starship explosion.

The next Starship flight, flight eight was on the 6th of March at 11:30 PM. The original launch was scrubbed from the 3rd of March due to undisclosed issues with the first and second stage.

So Booster 15 was successfully caught, which is great. So that's the second time. Now the Mechazilla arms have caught at booster. Yeah, so we're happy about that. But Starship blew up again, also over The Bahamas, Florida, Jamaica, and the Hooks and Cocoa Islands again. So back in February, SpaceX confirmed that they had investigated what caused Flight seven to explode or experience the rapid unscheduled disassemble as we are calling them now, or Rudd.

But unfortunately something happened this time, too.it was supposed to also deploy some s Starlink simulators of the next generation Starlink devices to test payload deployment. But obviously that didn't happen, and the failure they believe happened due to a fire in the after section, like clicks by leak.

A tank containing super chilled liquid oxygen, which led to multiple engine shutdowns, loss of control, triggering the autonomous flight termination system. And if you're thinking this sounds familiar, that's because Flight seven experienced a rapid unscheduled disassembly, likely due to a fire in the F section, possibly caused by a propellant link in the attic above the engine firewall leading to a loss of engines and control.

So. When you get two things that are pretty similar happening in a row, that kind of indicates there may be a problem with the design or the bills or something systematic rather than a one off. So I hope they take some time to figure out what's going on there before Flight nine goes off. Absolutely.

Now Musk wants to send a robot to Mars.

Yeah, so he said he'd like to send a Starship rocket assuming they can deal with all the other issues to Mars in 2026. Carrying Tesla's optimist, humanoid robot aboard. So. There are some pros and cons of this. So one, sending a robot, that's great. You wouldn't want to send humans to an environment when you can send robots and probes and things because you don't want to risk human lives.

Until you've found a way to mitigate most of the risks, it's never gonna be completely safe. It's still gonna be one of the most dangerous things that humans ever do, but you want to, you know. Get it a safety camp, we send humans. So if we were ever invaded by aliens, it's likely we'd get robes sent to us first.

Hmm, so I see the logic in that. If it's a humanoid robot, maybe it can carry out experiments. But there are various issues that the rovers had that, I don't know how you would solve those for a robot yet, but I'm sure there are people far cleverer than me who can figure it out. So some of those issues are the martian re lift that gets in between all the joints and things, and it covers up the solar panels on the rovers.

The whole planet is radioactive. Which isn't great. You do get dust storms, but they're not as bad as they were on the Martian film. But you may notice if you look at the rover tire tracks, the rovers are, tires are corroded and worn down, and some of that is wearing and tear. But some of it could be due to the perchlorate layer, under the top layer of regolith, which is corrosive.

So just the pressure of stepping on it could corrodes through things we're not entirely sure. So I don't know how long that robot would last, but I'm sure they've got some very clever people working on that. Indeed, of course the journey to Mars is so long as well, isn't it for anybody? A human attempting it?

Yeah. It's better. It's now sort of eight to nine months for the approach that we send. Yeah. It's, I know everyone thinks it's two to three years. We can get a row there in eight to nine months if you get the, yeah. If you plan to send it for where, what Mars would be at the closest point, because you've got to send it where Mars will be when it arrives.

Yes. Sure, sure. But you also want to get the shortest point between there.

Now let's move on to, Spherex mission launches, right?

So this is another fun one, the NASA SphereX mission. The spectrophotometer for the history of the universe, epoch of re-ionization, and ices explorer. It's a space telescope that launched in the 11th of March, and it is designed to map the entire sky in near infrared light, searching for the origins of the universe, the history of galaxies and the ingredients of life in our gala.

So it launched from Vandenberg. Space Force space in California, it will go into an orbit of roughly 650 km, which I think is about 400 miles above the earth. And you might be thinking, well, isn't JWST so near infrared scope? You are correct. But JWST is allocated time to look at various different things, whereas SphereX is going to be a survey telescope, so it's constantly surveying the sky and building up a map.

Right. Okay, now it's time for AstroCast.

1st	Pleiades 0.5 degrees of the Moon
3rd	Jupiter 5.5 degrees of the Moon
5th	First Quarter Moon
5th	Pollux 2 degrees of the Moon
5th	Pollux degrees of the Moon
8th	Mars 2 degrees of the Moon
10th	Regulus 2 degrees of the Moon
13th	Full Moon
13th	Spica 0.3 degrees of the Moon
13th	Moon at Apogee - 406295 km
16th	Mars at Aphelion 1.67 AU
16th	Anatres at 0.4 degrees of the Moon
21st	Last quarter
21st	Mercury at greatest Western Elongation
25th	Venus 2.4 degrees of the Moon
25th	Saturn 2.3 degrees of the Moon
26th	Mercury 4.4 degrees of the Moon
27th	New Moon
27th	Moon at Perigee - 357119km
28th	Venus 3.7 degrees North of Saturn
29th	Pleiades 0.5 degrees of /Moon
30th	Jupiter 5.4 degrees of Moon

Orion will be leaving our skies, which leaves me feeling a bit gutted.but Leo will be prominent and we are welcoming the start of Galaxy season. Very good.

Events

29th March	GAS Newlands Corner Partial Solar Eclipse	
3rd April	GAS Dr Nicola Baresi from Surrey Space Centre	Orbital Mechanics and Interplanetary Missions
8th April	Farnham	Narrowband Imaging in Astrophotography, Simon Watts (FAS)
11th April	Ewell	Martin Howe – Formation of planetary systems

And, any events going on this coming month? There's a few events. Yes. So on the 29th of March, we have,Guild Astronomical Society, including myself at Newland's Corner on.

At about 10 o'clock in the morning, we are going to be observing the partial solar eclipse. We will have some spare solar glasses with us, but you can have a look through our telescopes,that especially adapted to observe the sun and the eclipse. I'll be imaging it. I'll also be giving a talk, so make sure that you are on the G email list or join the Facebook group to find out more on the 3rd of April.

Um. We have the talk from. Dr. Nicola ESI from Surrey Space Center. He'll be talking about orbital mechanics and interplanetary missions, which is super exciting. On the 8th of April, Farham Astronomical Society, we'll have a talk from Simon Watts talking about NAR Band imaging and astrophotography. On the 11th of April, your astronomical society will have Martin Howe talking about the formation of planetary systems.

Good stuff. And finally we've got news of a book Reaching Out for the Sky. Yes. Yeah. So surprisingly, I was featured in a book along with 76 other women who are in stem, particularly in astronomy.and it talks about everyone's different story. It includes the astronomer, Royal for Scotland, Helen Sharman.

Britain's first astronaut it's also got a few other US astronauts such as Nicole Stott and Dr. Sean Proctor, who's a commercial astronaut.so there's quite a few bigger names in there.great way to get imposter syndrome. For me, it's going into a crowdfunding stage this month.so it's called, we Reach for the Sky.

https://www.kickstarter.com/projects/astronomywithclaire/we-reach-for-the-sky-the-book

You can find it on Kickstarter and we'll put the link in the show notes as well if you're interested. Rachel. Well thank you so much for taking us through this month's, stars over Surrey, and we look forward to another edition next month. Yes, so wishing everyone clear skies and reminding you all not to look directly at the sun during the eclipse.

Indeed, we'll be back next month on Tuesday the 29th of April at 8:00 PM on Brooklyn's Radio. And as usual, you can listen again if you go to the Stars Over, sorry page at Brooklandsradio.co.uk. I've been Graham Laycock and with me is Rachel Dutton. Fellow of the Royal Astronomical Society and a member of the Guilford Astronomical Society.

Stars Over Surrey. Your Monthly Guide to Astronomy and developments in Space on Brooklyn's Radio.

About

Rachel Dutton FRAS is an astronomer and cellist and she looks after outreach at the Guildford Astronomical Society. She presents Stars Over Surrey bringing a monthly review of space news, astronomical matters including a review of the past month's discoveries, events and space missions, Astrocast what to look for in the night sky over the coming month, forthcoming talks and events.

If you want a reminder of when the show is on, and links to the images discussed, you can sign up here for notifications from Rachel.

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Stars Over Surrey Previous Episodes