



Variety | Personality | Companionship

And welcome again to Stars Over Surrey four April. And I'm Graham Laycock. And with me as usual is Rachel Dutton, a Fellow of the Royal Astronomical Society, and a member of the Guildford Astronomical Society. Good evening, Rachel. Hi Graham. How's it going? Very well, thank you. And you A lot going on isn't there At the moment there is.

We've got space news coming out the ears and I've got quite a few Astro images. Oh right. We look forward to that. But as usual, we'll start with astronomy before going on to the space news and we start with the comets, Swan song.

COMET F2 SWAN

Yes, so Comet F2 SWAN, graced our skies this month. It was first spotted by three astronomers at the end of March, and then they noticed it was visible in imagery from the Solar Wind Anisotropies (SWAN) camera, which images the sky in Lyman-a, on the Solar and Heliospheric Observatory (SOHO), starting from the 22nd of March. And the magnitude was reported to be around magnitude 11 and brightening and magnitude scale. For anyone who's not familiar with it, the lower the number, the brighter it is. So the sun is eight negative number now in early April.

The comment was located in the. Great square of Pegasus and the east northeastern horizon before dawn, and it was moving towards Andromeda, um, passing the bright star alpheratz on the 13th of April. And after the 14th of April, give or take, it was going to disappear into the early morning twilight, only to be visible in the Southern hemisphere.

And so to image it, you would. Have to be up in the early hours of the morning waiting for it to rise in the sky, waiting for the sky that it's in to rise. But then you, you are then racing the sunrise as well, which is following up behind it. But in the second half of April, the comet painted slightly and appeared to a disintegrated leaving behind a dust cloud.

So disintegration probably started during the outburst that was, um, observed shortly after the discovery, and the



COMET F2 SWAN Credit: Rachel Dutton FRAS

nucleus had completely disappeared by the 22nd of April. So. Its fragments have started to brighten from magnitude 10.6 to 9.3, but luckily I did manage to capture some images. So if you take a look.

Yes. Now Paul, those who are listening, if you want to see my images, if you go to the Stars Over, Surrey, page on the Brooklands Radio website, all our, transcripts of past programs are there with previous images. And you can take a look at these on there. So first image. You can hopefully see the bright green comet.



COMET F2 SWAN Credit: Rachel Dutton FRAS

I certainly can with its pink tail. Yep. So the pink is actually just sort of an artifact of the sensor in my camera, but you can see it has quite a spectacular tail. And I've also got the second image on the right where you can see a green smear across the sky. Yes, it's, it's quite a darker picture.

This one. Yes. So. The reason I've got these two images is standard stacking software stacks all the stars in the sky, but the comet is moving across that starry background. So you just get a me across this background, and that was about half an hour's worth of data. However, I have a friend at Guilford Astronomical Society who can stack both the stars and the comet and then get the software to put it back together again. So they did that for me and that gives us this much better picture where you can see the comet itself and the starry background. Oh, very clever. Yes,

it is incredibly clever indeed. Marvels of modern technology.

Yes. And having friends that have that technology. Yes, indeed. Absolutely.

Shall we go on to the April Aurora?

So there was some Aurora on the 16th of April the IMF was actually nearly twice that of the May storm from last year, which I thought was an interesting bookend. However, it started to fizzle out as it started to get dark, and it was only on the northern horizon.

So I took this image, um, facing North and it was really hard to see. Anything because Woking kept their lights on. So, oh dear. You know, if, if Woking could have turned their lights off, the light pollution would have, not been such a problem. Yes. So, Woking, if you could turn off your lights during Aurora, that would be amazing.



April Aurora seen from Guildford Credit: Rachel Dutton FRAS

Um, but anyway, what I did with this was I played around with the contrast settings

on my phone so you could see it a bit more. So you could just about make it out on the original exposure. Right. And for anyone taking a look at it, we talk about gradients which is a light gradient that can be caused by sunrise, sunset, light pollution in the moon, and you get sort of all this excess light.

So it was properly dark, but it looks like it's daylight at the bottom of the picture and that's the gradient getting darker towards the top, from the light pollution from Woking. So you can see that quite clearly in the picture there indeed. But I was indeed happy that I got to see something. Jolly good.

Tatooine Planet in a Polar Orbit

Excellent. Now we've got a planet discovery. Yes. So we have a Tatooine planet. These are planets that are found to be orbiting two stars. So when we think about planets orbiting stars, we

have to think about how. The solar system is formed, or the stellar system, if it's not our solar system, and you have this cloud of dust and gas, some of it collapses, ignites fusion, creates a star, and you've got this whole dust cloud.

It's spinning around. And if you imagine you've got like pizza dough and you are spinning it around on your, fist, like you see in the big pizzerias, it starts spreading out into that disc shape. So when you have. Planets orbiting stars, they are usually orbiting within that disc. And yes, they sometimes get knocked around a bit, so some of them have slight sort of wobbles to that, but in general, they are orbiting in the direction of that original clouds spin.

And what astronomers found here was they had a binary pair of brown dwarf stars. This is only the second pair of eclipsing binary brown dwarfs that we know. So you've got two together and one goes in front of the other, creating an eclipse from our point of view. And Brown dwarfs are an unusual star in themselves.

They are in this odd place between stars and planets. So they are essentially massive gas planets. Imagine something 200 times the mass of Jupiter and they don't quite get there in terms of turning on ignition to become fusion factories. They do have some lithium fusion going on, but really not much going on at all.

But they are so faint that we call them brown dwarfs and we can barely see them. So astronomers were studying this pair of brown dwarfs and they were using the European Southern Observatory's Very Large Telescope in Chile. Don't you love how we name our telescopes?

Originally they detected this in 2018 using the search for (Search for habitable Planets EClipsing ULtra-cOOI Stars) program.

And the brown dwarf pair known as 2M510 showed unexpected orbital perturbations that could not be explained by, um, their interaction alone. So something else had to be there interacting with this pair. And after running through all the different mathematical models, the only thing that they could come up with that would match the perturbations would be if this planet is not going around them, sort of around the equator of the stars as they're spinning, but instead going around them at a complete 90 degree angle.

So if you imagine where the stars' North and South Poles are, it's going around sort of going over their North poles and then down under their South poles. Right. That's rather unusual, I would've thought. Yes. And we dunno how that could happen. So it's a really strange scenario to imagine, let alone observe.

So hopefully we'll get more data explaining more soon. Yeah. That's the exciting thing with this, isn't it? You find things, then you've gotta delve into the data. Yes. And it's really odd to find things that you couldn't even imagine would exist.

So, and now we move on to radioactive space plankton?

So we did a special on the K2-18b, is it Aliens Edition 2.0 story. indeed. Last week, and there has been some updates, so we'll go into the story in a bit more detail today. And I'll talk about the updates a bit more. So, Madhusadhan and collaborators at the University of Cambridge published a paper claimed they had detected dimethyl disulphide on planet K2-18b, which is an exoplanet orbiting in red dwarf K2-18, located 124 light years, or 38 Parsecs away from Earth.

And this planet is a sub Neptune, which means it's about 2.6 times the radius of Earth. And they believe that this world has an ocean and an atmosphere of hydrogen. So they've called it a high sea or hydrogen world because it's a portmanteau of hydrogen and ocean. And there's a lot of debate online, whether we say high-see-en or high-shun.

So that's a whole other side story. I would've no idea what's right. I know you say ocean, so should it be High-shun? Mm. Yeah. It sounds a bit odd.

Anyway, back in 2023, there was a lot of excitement with the detection of methane and carbon dioxide in the atmosphere, and there was a tentative hint of dimethyl sulphide, which I'm just gonna call, DMS mentioned back then.

And we're excited about methane, carbon dioxide also found. These are ingredients that we need for life. So it's always exciting when we find them on other planets and they took a look again using a different instrument on the JWST and they have a slightly stronger DMS signal, and we are saying that they have a three Sigma confidence level.

That's about 97% certainty, which sounds really good, but in reality it's just a tiny bit more of a signal than noise or sort of background noise. And they want five sigma certainty, which is 99.9999% I think, something along those lines. They need it to be a lot stronger certainty before they definitely say they have DMS.

Now, a lot of people are excited because the only chemistry that we know of so far that produces DMS is algae or plankton on earth. Until today when a new paper was announced by a team led by Gabriel De Genova from the University of Grenoble and. Because DMS lacks significant geological sources. A lot of people are really keen on this sort of signature that they saw because it's less prone to false positives.

But their study says that the recent findings might be DMS can be found in non-biological environments, such as comets in molecular clouds, and it might also form apically. So possibly through reactions of icy dust grains in um, gases. And as such, we can't really say that it's a bio signature. So they identified three pathways that could cause this to form.

And as a result, it could be that this is something that is made in space and somehow gets into planets, especially if they've got a lot of gas. So we'll have to wait and see for more data. Oh boy. Yeah. So, uh, those headlines are calming down now. Yes, but that is literally hot off the press. So yeah. At the time we're recording this, I'm not sure if people have even read that paper yet.

Right, right. Indeed.

Well, it's 35th Happy Birthday to Hubble.

Yeah. Oh goodness. As long as that, it's amazing, isn't it? 35 years. I'm feeling old. So Hubble was, uh, launched upon. Onboard the shuttle discovery on 24th of April, 1990. And astronaut. Chris Hadfield was one of the astronauts that worked on Hubble. Um, so I dunno if you recall, when it was first launched, there was a lot of press around it.



Mars near opposition. Image: NASA, ESA, STScI; Image Processing: Joseph DePasquale (STScI)

It was the first sort of big test space telescope and everyone was really keen

to see the pictures and the pictures came back. Awful. Yes. And it turned out whilst they had grounds the mirrors to absolute perfect precision, it was perfect precision on Earth, not in space. So they essentially had to go back and put eyeglasses on the Hubble, which they did manage to do.



Planetary nebula NGC 2899. Image: NASA, ESA, STScl; Processing: Joseph DePasquale (STScl)

want to image them as well, that completely changes your setup.

But Hubble can do a lot of that, so they release some lovely pictures of Mars that were taken in December. They also released a picture that kind of looks like a butterfly, and it's a planetary nebula, so you've got a white dwarf in the middle and it's shedding its outer layers, seeding the interstellar medium with lots of different, uh, elements.



Clouds in the Rosette Nebula. Image: NASA, ESA, STScl; Processing: Joseph DePasquale (STScl)

They produce beautiful barred spiral And now we have 35 years of glorious images from Hubble. So as per other anniversaries, they have released a load of pictures to show the versatility and flexibility of the Hubble Space Telescope and for anyone with their own telescope. First of all, I don't know, anyone with their own personal space telescope.

But if you are into astronomy, you all know that we have to pick the telescope depending on what kind of astronomy we want to do. So people who specialise in planetary will have, particular setups versus people who focus on like deep sky nebulas and things like that. They'll have very different telescopes and very different optics, and depending whether you



Spiral galaxy NGC 5335. Image: NASA, ESA, STScl; Image Processing: Alyssa Pagan (STScl)

galaxy. And finally there is a well-known nebula in astrophotography called the The Rosette Nebula. It's a constellation called Monoceros. So if you know where Orion is in the sky and you look to the left of that, you are in the area of Monoceros. And this is a zoomed in region of the Rosette nebula.

So it's got these inky gas clouds. These inky clouds are actually dust, which cools the area down until the point where it's cool enough that the dust can collapse in and start making a star. So there's going to be hidden cellar nurseries in that region. So those are four stunning images.

DePasquale (STSCI) You can go onto any of the Hubble websites, the NASA or the Issa one, and again, I'll put the images in the show notes. They are rather spectacular, aren't they? They are. They're gorgeous.

Yeah. Lovely. Right. Well, let's, move on now to clues about Mars's atmospherics went

Right. So there are two widely accepted views of Mars's past.

One is that it had water at some point on the surface that was liquid, and two, that there was a carbon dioxide atmosphere. And usually I talk a lot about water, but today I'm going to talk about in the atmosphere. But the problem with this atmosphere theory was one big problem. Where should the rocks have formed from?

The interactions between carbon and dioxide and water because no one had found them. So carbon dioxide and water can react together to form carbonates, which is type of mineral that contains an iron made up of carbon oxygen. And this process is relatively common on earth and even in some manufacturing processes.

But the results have never been seen on Mars, or at least not in any quantity that we found. So, Curiosity has a number of drill sites that it's created, and it created three different drill sites around an area called Mount Sharp. And it found evidence of mineral called siderite, which is a carbonate material formed with iron.

So curiosity can drill down three or four centimeters into the surface of rock and analyze the resulting drill powder with X-rays and. It's estimated that the amount of siderite and other carbonates based on this new, newest data isn't quite enough to explain where all of Mars's atmosphere went. But it could be that there is more in different hiding places.

And we also think that the atmosphere slowly eroded over time thanks to solar wind. So maybe we have a clue as to what happened to Mars' atmosphere. That would be interesting, wouldn't it? It would.

Let's look on now to the target of the month.

So funnily enough, we were discussing a bit earlier about, favourite constellations, and you didn't know I'd picked this one as my target of the month.

So the target of this month is the constellation of Leo. It's a nice, easy one to find in the sky now. I can sort of see when I look at it that maybe the sort of curve up to the right is maybe the lion's head and main. But, um, a number of people have called it different things. So some people say it looks like a little mouse.

Some people says it looks like an iron. I think it looks a bit like a dodgem car. But whatever you think it looks like, you can use an app to help you find it. And for anyone with telescopes or imaging setups, there are some nice galaxies within Leo that are quite good for imaging. So it's a nice, fun one to find.

It's a good one to find it in the sky, and it's a good one to have a go at renaming, depending on what you think it should be called. There we go. I think it does look like an iron. That's my money. There you are. Yes.

And it's time now for astronomy tip of the month.

Yes. So I have been showing quite a few people how to do this recently, so I thought it was good to mention it.

Now, when people try and use binoculars, a lot of people sort of pick them up at the eye pieces and put them on the eye and then move them up or down, trying to find whatever they're trying to look at. So let's just say they're trying to look at the moon. And this is really hard to do because essentially it's like zooming in on a picture and then trying to find something whilst zoomed right in.

And you could end up going all the way across the picture, not finding it easily. So the trick is one hold, not by the eyepiece, but the very end by the actual full lenses. Look at the object to say you want to look at the moon, keep your eyes. Locked onto that object and then pick up the

binoculars and put them in front of your eyes whilst you're looking at the moon, and you should then get it come into view very quickly.

Ah, what a good tip. All right, well that's our look at astronomical events and we'll be going on to Space News after the break.

Space News

First All Female Space Flight - The Actual Story

And welcome back to Stars Over Surrey. And now Rachel, we are going into the Space news and we are better to start than Blue Origin Flight. On the 14th of April, 2025, STEM advocate, former NASA aerospace engineer, AKA rocket scientist and entrepreneur for Aisha Bowe and Bio Astronautics researcher, civil rights activist, and Nobel Peace Prize nominee, Amanda Nguyen took some experiments on an 11 minute suborbital flight in which they experienced around two minutes of microgravity or weightlessness.

New one Now. The first Vietnamese person in space conducted two microgravity experiments in space on her blue origin flight. One focused on women's health, specifically studying fluid absorption in space with materials like bamboo based sanitary pads.

The other experiment involves Southeast Asian brassica wrap seeds investigating the effects of microgravity on plant pathology. Additionally, she tested materials for next generation spacesuits and wearable ultrasound patch, both engineered by research at MIT. Aisha Bowe. Now the first Bahamian in space took experiments including those researching on how crops such as sweet potatoes and chickpeas are affected in microgravity and bio serves fluid process apparatus to fly, qualify new hardware for future missions.

One experiment was to provide data to better understand how women's bodies are affected by space flight. The flight was on a reusable hydrogen and oxygen fueled rocket that was suborbital, and it went to just above the calm line and imaginary line that we draw at around a hundred kilometres or 62 miles above the earth.

This means that there was no need for brush suits or helmets, but the passengers would experience weightlessness. The other passengers on board were Katie Perry, journalist and author Lauren Sanchez, journalist and presenter, Gail King, and filmmaker Carrie Ann Flynn. At this point, I'm unable to find information as to whether they paid for their own tickets and whether that would've likely subsidised new and those flights, or it's possible that they could have been paid as a way of sponsoring, lack of a better word, an all female crew.

This flight was the first all male crew to fly in space since Valentina Tereshkova flight in 1963. There were debates as to whether we can call everyone on this flight astronauts as the definitions change. So, for example, some will only include orbital flights and others will say anyone who has gone above 80 kilometers or 50 miles above the earth is an astronaut.

Some people will say that you have to go up with an official space agency or their direct agent, such as a SpaceX dragon or a military vehicle. And finally, whether they are a mission critical member of the crew. For some this means that they take part in any scientific experiments on board, and for others, this means carrying out tasks critical to the safety of flight for some reason, despite 10 other flights that took passengers such as William Shatner, the actor known as Captain Kirk in the original Star Trek series, this mission has received a lot of controversy.

Yeah. So the all female flight that's hit the news, potentially for all the wrong reasons, it was a screaming success, wasn't it? Yes, I've heard, saw all sorts from Katie Perry. She kissed the earth and she liked it. Yeah, well, she could have stayed on Earth to do that, but nevermind. Yes. The, the first all female SP space flight was actually back in 1963, but that was a single crew mission.

Yes. So this is the first time there's been a group of female astronauts. And actually there was one slated by Virgin Galactic for 2026 for a research flight. With three researchers working in women's

health who have done one flight before, and that was announced years ago. So they've actually sort of trumped that piece of news, right?

Now this one has obviously had a lot of controversy and I've got a lot of. Pieces of misinformation to sort of go through. So first of all, a lot of people talking about space tourism, that they're not real astronauts, et cetera. But actually this is the 11th Blue Origin flight, and no one had a problem with people like William Shatner going up into orbit.

And there have been 10 other flights of either all male or mixed crews. So it's not a big deal that they're a space tourist. Rich people will do rich things, and people are also talking about the carbon footprint. It uses a hydrogen fuel. So yes, we can talk about, okay, you're pumping hydrogen and water vapoUr into different parts of the atmosphere that they wouldn't normally be in, but actually the biggest carbon emissions.

Are actually mostly from airplanes and the increase of SpaceX, launches that are launching star links into space Before Starlink started being launched, the sort of carbon footprint from rockets going up onto the ISS and things like that and launching satellites into space was pretty immaterial. It wasn't nothing, but it was, it was not much in the grand scheme of things.

So I'm not sure why this particular flight and this particular rocket has upset people. People have said that it was fake because the door was open, but it opens from the inside. A lot of people have talked about people being rich, paying for facility flights, aside from the fact that rich people do rich things.

They paid for two scientists to be on the flight, and these scientists took on payloads, which included a women's health experiment and some plant seeds. So these were seeds from various different plants, such as tomato plants, and they wanted to see the effect of short exposure to radiation on these seeds.

So there was some important data. To come out of that flight, and these two scientists that went up were Aisha, who's a former NASA engineer, and she, she's a massive STEM advocate, so. All the rich people paying for their Sikhs also paid for these two Sikhs as well. Um, she's also now the first Bahamian woman in space, which is really exciting for her and for her family and for her culture.

And then there's also Amanda Newan who has an incredible story. So Amanda Newan is a second generation Vietnamese immigrant, and her parents literally rode across from Vietnam. Um. To the United States in a rowboat navigating by the stars. And I think at one point they even had to swim. Good to say. So that's incredible on its own.

Mm. So she's the first Vietnamese woman in space, and her dream was to become an astronaut and she studied, I think it was aeronautical engineering or something similar at Harvard. And a month before graduation, and this is a bit of a trigger warning story, she was brutally assaulted and ended up in hospital due to the assault, and she was charged \$5,000 for the test kit and the police.

Threw that kit away after six months because they don't hold onto it for longer than six months, even if the case is still waiting to go to court. And she then took time out away from her career and her dream of being an astronaut to work at activism to change the law in the us which she did. She then went to the United Nations and got some, um, amendments passed, and therefore survivors of serious assault.

She's been campaigning for better rights for assault survivors. She's been awarded, well, she was a Nobel Peace Prize nominee. She wasn't given the final award, but she was recognised in that she's met the Pope. Um, I. She's been doing so much for the rights of survivors and now she's going back to try and achieve her astronaut dreams.

She was on that and no one is talking about her incredible story. And she also took some payloads on herself. What? Amazing woman. Yes. And no one's talking about these two. Fantastic women who would never have been able to afford that. They are being paid for by, for

example, Katie Perry's ticket price. so if you've got a problem with that, um, with the emissions, then you might want to think about whether you're using Starlink.

And now Amazon are launching Project Kuiper, which is going to be their own internet constellation of satellites, which will again be causing much more harmful emissions into the atmosphere. Right. So I'm gonna come off my high horse. Okay. Thank you Rachel, and say there's been a lot of misinformation.

Let's celebrate the two incredible scientists that were on there. Indeed. Indeed, yes, indeed. Stick with that. Absolutely.

Now we move on to Don Petit Returns to Earth.

Yes. So on the 20th of April, a Sawyers MS. 26 space capsule carrying Don Petit and his Russian crewmates, Alexey Ovchinin and Ivan Vagner made a parachute assisted landing in Kazakhstan's.

So at 06:20 local time, or 01:20 GMT on Sunday. He is off to Houston for medical checks, but he landed on his 70th birthday making him the oldest current serving astronaut, returning from his fourth space flight on board the ISS. He has now spent a total of 590 days in space, which is 1.6 years if anyone was trying to do the maths, and his latest mission was 220 days on the.

International Space Station. So he posted regularly to various different social media sites, with all sorts of astrophotography. And he also answered people's questions, not through organised things, but, I remember seeing on a space Reddit, someone was saying, I'm trying to get hold of NASA I'm a high school student and I would really love to get two or three questions answered by astronauts, and he answers "what were the questions?" Lots of people saying, you've got an astronaut here willing to answer your questions. So he's really good at doing outreach and trying to make space accessible for people.

He actually isn't the oldest person to fly in orbit because that record belongs to John Glenn, who was 77 when he flew on a NASA mission in 1998, and he passed away in 2016. But it's good to see a good variety of people still going up into space. It is, you know, I'm always thinks of people younger than this, don't you?

Mm-hmm. Yeah. And actually if they're older, this is going to sound, a bit harsh bit. One of the things that you worry about is the radiation exposure and the long-term effects. Yes. Because obviously you've got things like cancers that can kick in in later life due to radiation exposure in earlier life.

But if you're a bit older, then as bad as it sounds, you're likely to pass before the effects of radiation hit. Right. So actually it's, it is kind of beneficial in an odd way. Now we move on to,

Jared Isaacman Confirmation hearing.

Yeah. So. After Trump was elected, he announced that he wanted Jared Isaacman, and that was his nomination of the next NASA Chief.

And then the next stage of that was the confirmation hearing that went ahead on the 9th of April. And that is where he is questioned and gives testimony before various different people in the US. So he was talking more about his. Sort of view of NASA and plans for NASA. He confirmed he wanted to focus on human space flight, in particular getting to Mars, and he then later said that science cuts were unfortunate.

He would prioritise Artemis missions. So a lot of people have, were questioning him because the view and the impression that people get from Musk and Trump's talks is that they want to scrap the Artemis and the Moon program completely to focus on Mars. But you kind of need the Artemis in the Moon program for the steps of getting to Mars anyway, because you need the technology to create lunar bases and things.

You can do a lot of the practice in a lot more safer and a much more known environment on the surface of the moon, that you can then take the technologies and the learnings and the lessons from that and take them to travel to Mars. So a lot of people have been talking about it like it's a binary choice, and he was saying he doesn't think it's a binary choice because to get to Mars you kind of have to focus on the moon.

So it's interesting that some people are assuming that going to Mars means scrapping the moon, and that's certainly the impression that Musk and Trump have given. But then the more nuanced take is that you have to get to the moon to get to Mars. And he's not looking at cutting that at the moment. A lot of people were keen to find out more about his conflicts of interest because he has personally paid SpaceX a lot of money for his inspiration for in Polaris Dawn missions and for future missions.

And we saw that first commercial space walk where it looked like they were doing the Macarena in space. Yeah. Yeah. So. He paid for that, and for other people to go up with him again, no one complained about this rich person paying for their own private space walk. He also said he has no plans to debit the ISS early, like Musk suggests that they should do or to cancel the near Rectolinear Halo Gateway project, which is the next space station to go around the moon.

So he said that he doesn't have any plans to do that yet. We don't know if that would change. He, he's also said he's not discussed any NASA plans with Musk directly, so it's a bit of a mixed bag. Some people are really excited because this is someone who, yes, he's a billionaire, but, he is really excited and passionate about human space flight and has done a lot to get, different people including artists into space.

But then equally, is he going to wipe out science missions in order to fund that. There is a lot of sort of back and forth on the pros and cons. Mm-hmm. We're just going to have to wait and see. Indeed.

And, moving on now then to those proposed NASA cuts.

Yes, so Eric Berger from Ars Technica has been reporting on the proposed NASA cuts.

So they're looking at cutting the budget from around 25 billion to 20 billion, which is less. 25 billion, is less than half a percent of total public spending in the us. Um, so it's a tiny portion of their overall budget. So they're looking at cutting astrophysics budget by 66%. The Heliophysics budget.

They're looking at cutting by around 50% the earth science budget, which is really important to understand in climate change. They're looking at cutting that by 50%. They're looking at cutting the planetary science budget, so think missions to other planets and rovers and things. They're looking at cutting that by 30%.

We have the Nancy Grace Roman telescope due to launch next year. That would potentially disappear. Mar sample return mission gone, the DaVinci mission looking to go to Venus would be gone. And they're looking at just keeping Hubble and the Jane Webb Space telescope. So this isn't confirmed. These are proposed cuts.

I really hope, that the, I'm not sure if it's congress or Senate that it goes to. I'm not great on American politics. I really hope someone sticks up for science missions. Yes. because it would be be a shame because Hubble is sort of on its last legs, or technically it's on its last gyroscope. Mm. Its last legs, its last gyroscope.

I like that one. And we, yeah, we have JWST, but there were a number of other exciting missions and observatories that would all be scrapped. So please, if anyone has any sway, please do put pressure on in the right places. Indeed. And you would think the way places like India and China are now, working on, on, on doing things they could be catching up and taking over. Yeah. So maybe, the Americans will let their national pride kick in and do something about it that way, but the, the way forwards is going to be either other countries will take the lead or international consortia of countries or even, private companies. Yes, indeed.

Well, we move on now to China and China's one, two, three, a hundred twenty three day space rescue.

Yeah, this was actually pretty incredible and it hardly got any news about it at all. So China faced an unexpected challenge when a rocket launch failed in March, 2024. Leaving two satellites stranded in the wrong orbit and this seemed like a complete disastrous setback, but it turned into one of the most ambitious space record scheme missions ever attempted.

So on the 15th of March, China launched two satellites into space, and whilst the first and the second stages were successful, the upper stage failed leading two rocket stranded. And when they found the satellites, they were spinning like out control, discus, you know, discus that you do using athletics.

And they were far closer to earth than planned. And these satellites are part of new constellation designed to acts, beacons, and space. Enabling precise navigation far beyond the Earth's orbit with new cutting edge technology. And they were to pave the way for autonomous spacecraft piloting drastically reducing the need for human intervention and opening up possibilities for things like future lunar exploration.

Oh, interesting. Yeah. Yeah. So people don't realize you can be a pilot for space missions. So there are pilots for, say, for example, the Bepi Colombo mission that is going to Mercury whilst there's not someone like literally flying it manually from the earth remotely. You have people that are going in and looking at the trajectories and anything like if there's thrust of failure and whether it's doing a gravitational slingshot manoeuvre, whether it worked correctly, and then they have to sort of replan trajectory.

So all these missions have pilots. But obviously if you are looking at more long duration missions, you don't want to need the human intervention as much. It should be more just monitoring than everything is working correct. So it's quite a big deal with this technology. So it looked like they would have to deal with these satellites and let them burn up in the atmosphere, but they did come up with a clever solution.

So they divided into two teams, one team to remotely control the satellite's, thrusters to slow down the spinning. And the other team were trying to figure out how to get things back on track. So one of the big challenges was that the satellites were partly damaged during the launch and they could not absorb enough sunlight to power big turns.

That was huge limiting factor. And instead they managed to use the gravity of the Earth, the Moon and the Sun, like a slingshot to shoot the satellites into their destination. And they explained that it took 193 days because if you don't want to consume much energy, you've got to replace that with a different resource.

And in this case, they decided to consume more time. So now the two satellites named DRO-A and DRO-Bare to form this constellation covering roughly a hundred million kilometres in space between the earth and the moon to provide navigation services for spacecraft and they will act as lighthouse in space, hopefully reducing the time it takes to find spacecraft from two days or more to around three hours.

Because at the moment we have to use land-based methods to find spacecraft. So this could be a real game changer. Yeah, it sounds like it. A lot of potential there isn't there? Yeah. And now the punch mission has its first flight. We had so much space news last month that there were a few launches that I didn't get to talk about.

PUNCH & SPHEREx

On the 11th of March, NASA's Polarimeter to unify the Corona and Heliosphere Punch mission was launched. This two year mission consists of constellation of four small satellites in low earth orbit that will make global 3D observations of the Sun's Corona. To better understand how the mass and energy there becomes the solar wind that builds our solar system, coronal mass, ejections, or CMEs are the particles that are responsible for stunning auroras.

However, this space weather, as we call it, negatively impacts earth as well. From creating interference that prevents satellites from working and not just the ones in our satin abs and phones, but also things such as emergency broadcasts and search and rescue technology to creating more friction and slightly ding satellites, which includes the poor Hubble's space telescope.

It also causes issues for astronauts as well who have to go to the most shielded part of the space station when there are particularly bad storms. So this is a threat that the space sector is very familiar with. However, not many people realise that it has an impact for everyone else on Earth too.

Solar storms affect things such as agriculture. Solar storms can influence temperature, rainfall, and wind patterns, which in turn impact crop growth and soil conditions. Additionally, solar flares and geomagnetic storms can disrupt GPS signals used for precision agriculture, for example, unexpected temperature drops can affect crops such as potatoes and berries.

Solar storms can also impact livestock, particularly dairy and poultry farming because sudden shifts in the temperature or humidity can affect animal behaviour, feed consumption, overall productivity. And we haven't even looked at the impact on soil conditions. So whilst we can't put a monetary figure on it, solar storms can cause millions of pounds or dollars worth of damage to the agricultural industry alone.

And whilst we can't stop the sun producing storms, we can try and understand it better to see if we can forecast things to mitigate the risks where we can. And this is where the punch mission comes in. Each satellite weighing only 40 kilograms is carrying a sense and meant to capture images of the sun's Corona.

This is the out part of the sun that we see during full solar eclipses. Within the Corona, there are different dynamic shapes and structures and Punch will study these so we can see how they become solar. Wind punch has two different types of sensors, a near field imager, NFI carried on one of the satellites and the other three will carry wide field images.

WFI. The NFI acts as a standard coronagraph taking images directly of the Corona, but utilising an occulting disc to block some of the light. This is a technique used by the Parker Solar Probe, and I mentioned before that we can only see the Corona during a full solar eclipse. This occulting disc does the same job as the moon during a full eclipse.

It blocks out the main solar. Disc so that the Corona is detectable to the sensors rather than drowned out by all the light from the sun. The wild field images are heliospheric images with a broader field of view, allowing them to capture more of the area between the earth and the sun. The spacecraft containing the NFI also carried a student experiment, designed to do x-ray spectroscopy called the student thermal energetic Activity monitor or steam.

However, it failed integration testing when it loaded into the spacecraft, so it will remain unpowered, um, for the mission duration. On the 14th of April, two of the satellites opened their doors for the first time, and first light fell on the NFI and one of the WFI. This marks the beginning of the commissioning phase where the eventual goal is to remove 99% light.

The darker the image, the more scientists will be able to track the wispy structures of the material in the Corona as they are pushed throughout the rest of the solar system. As part of this commissioning or testing and calibration phase, the missions operates released several images of the sky behind the sun, highlighting the interesting features like constellations.

And also there's an asteroid called Iris, which was visible and we normally wouldn't be able to see them with the sun being in that field of view. So assuming all goes well, the punch mission is expected to start its science mission in June. Launched along with Punch was NASA's Spherex mission, the spectrophotometer for the history of the universe.

Epic of Reionization at ISIS. Explorer, also known as spherex, will provide an all sky spectral survey over a two year planned mission. The Spherex Observatory will collect data on more than 450 million galaxies, along with. Overall 100 million stars in Milky Way in order to explore the origins of the universe, the New Space Observatory will scan the entire sky every six months using spectroscopy to examine light from hundreds of millions of celestial objects across more wavelengths than any previous or Sky survey.

This mission should enable research on fundamental topics such as what happened at the beginning of the universe, galaxy formation, and could there be life elsewhere. In the Milky Way, the mission will search for water and organic molecules essentials for life in the form that we know it. And in stellar nurseries, it will search for regions where stars are born in dust and gas, as well as the discs around stars where new planets could be forming.

And on the 3rd of April, we got the first images of what, like wonderful star fields. The mission will create a map of the entire sky in 102 different colour bands. Identifying targets for more detailed study by future missions such as the James Web Space Telescope.

Astrocast	
2nd	Moon near Castor and Pollux
3rd	Moon near Mars and Praesepe
4th	First quarter moon, Mars very near Paeseppe
5th	Moon near Regulus, Mars near Praesepe
6th	Eta Aquarids (early morning)
9th	Moon near Spica
12th	Full Moon
14th	Moon near Antares
21st	Last Quarter Moon
22nd	Moon near Saturn
23rd	Moon between Venus and Saturn
24th	Moon near Venus
27th	New Moon
28th	Moon near Jupiter
31st	Moon near Mars

Now we go on to our astro cast section.

May Events		
8th May	GAS	Prof. Shaun Cole from Durham University - Computational Cosmology
9th	Ewell	Greg Smye-Rumsby – If Venus had a moon
13th	Farnham	Meteorites – Stones from Outer Space that made our world, Dr Tim Gregory via Zoom

Well, thank you so much for taking us through the news this month, uh, Rachel and what to, uh, look out for in the coming month.

And we'll be back again on Tuesday the 27th of May at eight o'clock on Brooklyn's radio for another edition of Stars Over Sury. So all it remains to me to say is goodbye. And to Rachel wishing you happy, star gazing and clear skies everybody. I was waiting for that. Clear skies.

About

<u>Rachel Dutton FRAS</u> 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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