NWASNEWS

Volume22, Issue 1

September 2016

Newsletter for the Wiltshire, Swindon, Beckington Astronomical Societies and Salisbury Plain

Is Privatisation in Space Going to Work?

Thankyou to Nick Howes and Peter Chappell sorting out our speaker problem for the first meeting of the season. Nick is standing in and giving us a talk he has delivered before the North West Astronomy Show with some tweaks.

Nick has been deeply involved with shows involving the Apollo mission astronauts and technicians, and has been keenly gathering some of the Apollo bits and pieces that have come up for sale. I am still waiting for him to stop the traffic on Cherhill as he brings home a full Saturn V rocket.

The summer was reasonably favourable for big sky views, and we even got a reasonable showing for the Perseid Meteor shower watch.

We also ran some open invite evenings to sessions on Hackpen Hill, where we had great sunsets and views of Venus and Jupiter in the western sky, and also good views of the Saturn and Mars close pass as the went near Antares in Scorpio.

We had to turn down our visit to Nibley Music Festival due to too many other commitments.

I have noticed a big drop of in our requests from schools to do outreach work. Puzzled I have contacted some of the schools who were regulars in our outreach programme. It appears the big changes have been in the science curriculum and the advice given to schools on how they present astronomy topics. So much for Tim Peake's ambassadorial role in Space.

Over the summer we ended with a couple of launch site disasters, with the Space X falcon failing whilst on the testing rig, and the following day the failed launch at the Chinese Long March rocket launch.

What is noticeable is how under the private banner the law suits for compensation are piling up where they otherwise were quickly stifled. I hope this is not a reflection of how private launches are going to have to watch their backs. A big shame as the reuse of some of the returned Falcon launch rockets was being slated in for 'live' missions.

Thursday is the launch of an asteroid collect and return mission that could start another splurge of privateers in space. Already decisions have been made giving private companies access to the Moon over the summer holidays.

Also late news that the have examined Rosetta images of the potential Philae resting site has been found, with the unfortunate probe landing upside down in a shaded ditch, preventing and communication to collect data from the probe. Were ESA right to hang on to their hires images from public scrutiny that MAY have found the probe earlier? Or was the potential loss of data privacy for the people who paid for the missions to rich to risk?

Over shadowing any ESA or NASA collaboration could be the consequences of the vote leave the European Union. Funding and student up take at the Universities is already being affected. Lets hope it all calms down soon and we get to do sharp end science regardless of nation.

Clear skies

Andy Burns

The Milky Way from Hackpen Hill august. Swindon lights are on the left and the horizon on the right. 3 images combined. Andy Burns Nikon D810a on Star Adenturer mount, ISO 1000, 14mm Sanyang lens at f3.5.

Wiltshire Society Page

Wiltshire Astronomical Society
Web site: www.wasnet.org.uk
Meetings 2015/2016Season.
NEW VENUE the Pavilion, Rusty Lane, Seend
Meet 7.30 for 8.00pm start

2016

June 7th *The Current State of SETI : Martin Griffiths*
NEW SEASON

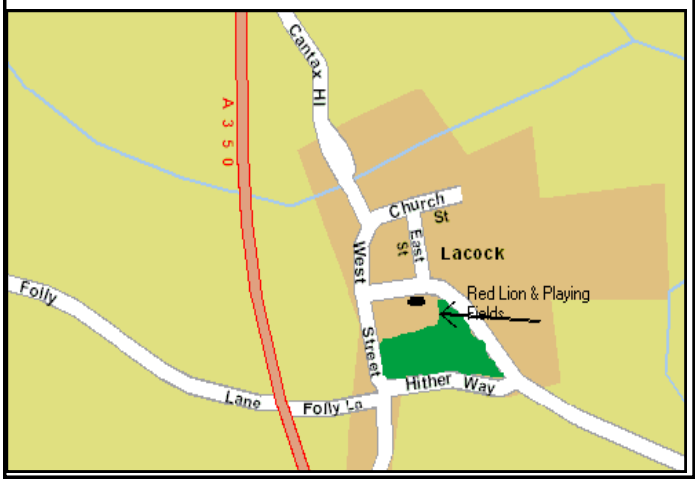
6 Sep	Nick Howes, The legacy of Apollo
4 Oct	Paul Money, Images of the Universe
1 Nov	Philip Perkins, Imaging the Cosmos
6 Dec	Andrew Lound, Saturn – Lord of the Rings
3 Jan	TBA (Probable beginners set up session)
7 Feb	Professor david Southwood, 10 Years of Space Science at the European Space Agency
7 Mar	Steve Tonkin, And yet it Moves!
4 Apr	Dr Chris North, Telescopes through the Ages
2 May	Martin Griffiths, Planetary Nebulae Marathon
6 Jun	Mark Radice, Observing from the Caribbean + AGM

Observing Sessions

The Wiltshire Astronomical Society's observing sessions are open, and we welcome visitors from other societies as well as members of the public to join us.
We will help you set up equipment (as often as you need this help), and let you test anything we have to help you in your choice of future astronomy purchases.

Please treat the lights and return to full working order before leaving. With enough care shown we may get the National Trust to do something with them!

PLEASE see our proposed changes to the observing sessions, contacting and other details. Back Page



Membership Meeting nights £1.00 for members £3 for visitors

Wiltshire AS Contacts

Andy Burns (Chairman, and Editor) Tel: 01249 654541, email: anglesburns@hotmail.com

Vice chair: Keith Bruton

Bob Johnston (Treasurer)

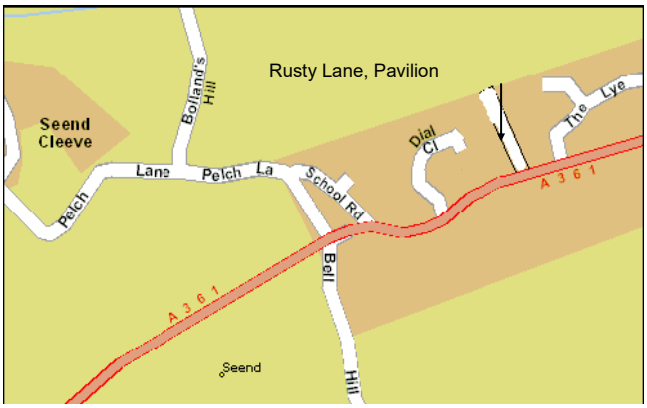
Philip Proven (Hall coordinator)

Peter Chappell (Speaker secretary)

Nick Howes (Technical Guru)

Observing Sessions coordinators: Jon Gale, Tony Vale

Contact via the web site details. This is to protect individuals from unsolicited mailings.



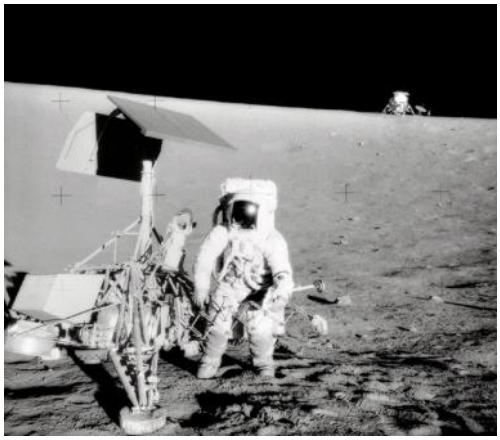
Nick Howes

Nick studied astronomy at university and after many side shoots a forays into software still puts so much time into out reach promoting astronomy around the world.

This has brought into contact with many of the big names in astronomy, both on stage and interviewing them for magazines.

His forays in recent years has brought him into contact with the television meteor men and he is European representative for their company.

Also contacting in USA put him on the trail of Apollo memorabilia and the astronauts and background technicians that made the Apollo missions so successful. He will be sharing many of these with us this evening, along with Gemini and Mercury mission hardware.



I dare anyone to ask… Did they really go to the Moon.

Swindon Stargazers

Swindon's own astronomy group

The club meets once a month at Liddington Hall, Church Road, Liddington, Swindon, SN4 0HB at 7.30pm. See programme below.

Ad-hoc viewing sessions

Regular stargazing evenings are being organised near Swindon. To join these events please visit our website for further information.

Lately we have been stargazing at Blakehill Farm Nature Reserve near Cricklade, a very good spot with no distractions from car headlights.

We often meet regularly at a lay-by just outside the village of Uffcott, near Wroughton. Directions are also shown on the website link below.

When we use East Kennett, we meet at the public car park just below The Red Lion pub at Avebury; we usually hang on for 10 minutes and then move on to our viewing spot at East Kennett. Information about our evenings and viewing spots can be found here:

http://www.swindonstargazers.com/noticeboard/noticeboard06.htm

If you think you might be interested email the organiser Robin Wilkey (see website). With this you will then be emailed regarding the event, whether it is going ahead or whether it will be cancelled because of cloud etc.

We are a small keen group and I would ask you to note that you DO NOT have to own a telescope to take part, just turn up and have a great evening looking through other people's scopes. We are out there to share an interest and the hobby. There's nothing better than practical astronomy in the great cold British winter! And hot drinks are often available, you can also bring your own.

Enjoy astronomy at it's best!

Members of the Wiltshire Astronomical Society always welcome!

Meetings for 2016

At Liddington Village Hall, Church Road, Liddington, SN4 0HB – 7.30pm onwards
The hall has easy access from Junction 15 of the M4, a map and directions can be found on our website at:

http://www.swindonstargazers.com/clubdiary/directions01.htm

Friday 16 Sep 2016

Programme: Guy Hurst: Star Clusters

Friday 21 Oct 2016

Programme: Paul Roche: Robotic Astronomy

Friday 18 Nov 2016

Programme: Mike Leggett: Exploration of Mars

Friday 16 Dec 2016

Programme: Christmas Social

Meeting Dates for 2017:

Friday 20 January 2017
Programme: Sally Russell - Astronomical Sketching

Friday 17 February 2017

Programme: David Boyd - Spectroscopy

Friday 17 March 2017

Programme: AGM plus Dr Bob Gatten - Using the Faulkes Telescope Project's remote telescopes, results so far

Friday 24 April 2017

Programme: Dr Pauline Norris - The Ancient Egyptians and their Astronomy

Friday 19 May 2017

Programme: Martin Griffiths - Contact with extraterrestrials, how will it affect us

Website:

http://www.swindonstargazers.com

Chairman: Peter Struve

Tel No: 01793 481547
Email: peter.struve@sky.com
Address: 3 Monkton Close, Park South, Swindon, SN3 2EU

Secretary: Dr Bob Gatten (PhD)
Tel Number: 07913 335475

Email: bob.gatten@ntlworld.com
Address: 17, Euclid Street,

Swindon, SN1 2JW

BECKINGTON ASTRONOMICAL SOCIETY

We also have a new website www.beckingtonas.org where details of our programme and other useful information can be found. General enquiries about the society can be emailed to chairman@beckingtonas.org

So our committee is now:

Steve Hill, Chairman/Imaging 01761 435663
John Ball, Vice Chairman 01373 830419
Alan Aked, Treasurer 01373 830232
Rosie Wilks, Secretary 01225445814
Mike Witt, Membership 01373 303784
John Dolton, Telescope Hardware 01225335832

Meetings take place in Beckington Baptist Church Hall (see the location page for details of how to get to us) and start at 7:30pm.

2016		
Sept 16th:	*Four Short Talks*	James Fradgley
Oct 21st:	*Spectroscopy*	Hugh Allen
Nov 18th:	*TBD*	Dick Cardy
2017		
Jan 20th:	*Tales from the Dark Side (Pt. 2)*	Mike Witt
Feb 17th:	*John Herschel: A man of his time*	Andy Burns
Mar 17th:	*The Sun*	Ron Westmaas
Apr 21st:	*Observing the Solar System*	Mark Radice
May 19th:	*Imaging Colloquium*	Steve Hill

SALISBURY PLAIN OBSERVING GROUP

Where do you meet?

We meet at a variety of sites, including Pewsey Downs, Everleigh, Bratton Camp, Redhorn Hill and Whitesheet Hill. The sites are cold in winter so you will need warm clothing and a flask. We are always looking for good sites around the edge of the Plain.

Do I join?

No. We are not a club. We meet informally, so aside from contacting our friends to give a yes or no to meeting up, that's it.

I am a beginner—am I welcome?

Of course you are — whether you have a telescope, binoculars or just your eyes, there will be someone to observe with. We have a variety of equipment and are always happy for newcomers to look through.

So I just turn up?

Essentially yes, but please drop us an email as parking can be an issue at some of the meeting areas or at the pubs.

I am more experienced—what's in it for me?

If you have observing experience we prepare a monthly observing list chosen in rotation by the group. We pick some easy objects, some moderate and some tough ones. If you are experienced, why not share what you know?

Any ground rules for a session?

Common sense applies in the group; red light is essential to preserve night vision; we park cars so you can leave when you wish and not disturb others with your headlights.

Contact Details

Our Website

www.spogastro.co.uk

Our Email

spogastro@googlemail.com

Twitter

http://twitter.com/SPOGAstro

Facebook

http://www.facebook.com/group.php?gid=119305144780224

This article is provided by NASA Space Place.

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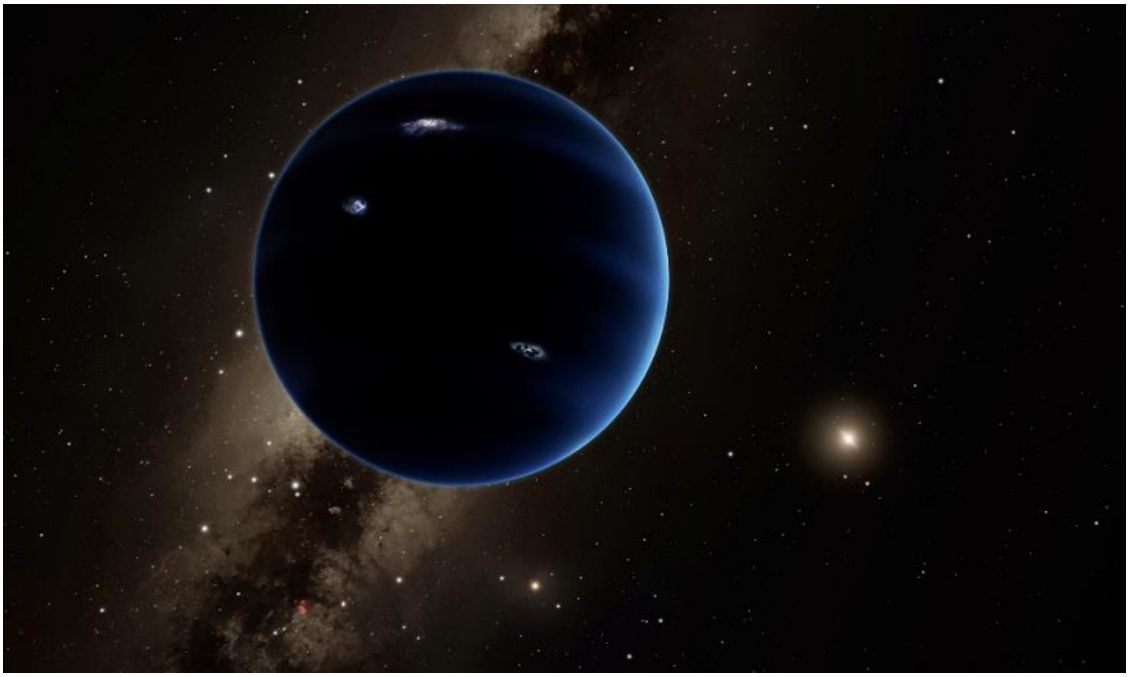
Is there a super-Earth in the Solar System out beyond Neptune?

By Ethan Siegel

When the advent of large telescopes brought us the discoveries of Uranus and then Neptune, they also brought the great hope of a Solar System even richer in terms of large, massive worlds. While the asteroid belt and the Kuiper belt were each found to possess a large number of substantial icy-and-rocky worlds, none of them approached even Earth in size or mass, much less the true giant worlds. Meanwhile, all-sky infrared surveys, sensitive to red dwarfs, brown dwarfs and Jupiter-mass gas giants, were unable to detect anything new that was closer than Proxima Centauri. At the same time, Kepler taught us that super-Earths, planets between Earth and Neptune in size, were the galaxy's most common, despite our Solar System having none.



A possible super-Earth/mini-Neptune world hundreds of times more distant than Earth is from the Sun. Image credit: R. Hurt / Caltech (IPAC)

The discovery of Sedna in 2003 turned out to be even more groundbreaking than astronomers realized. Although many Trans-Neptunian Objects (TNOs) were discovered beginning in the 1990s, Sedna had properties all the others didn't. With an extremely eccentric orbit and an aphelion taking it farther from the Sun than any other world known at the time, it represented our first glimpse of the hypothetical Oort cloud: a spherical distribution of bodies ranging from hundreds to tens of thousands of A.U. from the Sun. Since the discovery of Sedna, five other long-period, very eccentric TNOs were found prior to 2016 as well. While you'd expect their orbital parameters to be randomly distributed if they occurred by chance, their orbital orientations with respect to the Sun are clustered extremely narrowly: with less than a 1-in-10,000 chance of such an effect appearing randomly.

Whenever we see a new phenomenon with a surprisingly non-random appearance, our scientific intuition calls out for a physical explanation. Astronomers Konstantin Batygin and Mike Brown provided a compelling possibility earlier this year: perhaps a massive perturbing body very distant from the Sun provided the gravitational "kick" to hurl these objects towards the Sun. A single addition to the Solar System would explain the orbits of all of these long-period TNOs, a planet about 10 times the mass of Earth approximately 200 A.U. from the Sun, referred to as **Planet Nine**. More Sedna-like TNOs with similarly aligned orbits are predicted, and since January of 2016, another was found, with its orbit aligning perfectly with these predictions.

Ten meter class telescopes like Keck and Subaru, plus NASA's NEOWISE mission, are currently searching for this hypothetical, massive world. If it exists, it invites the question of its origin: did it form along with our Solar System, or was it captured from another star's vicinity much more recently? Regardless, if Batygin and Brown are right and this object is real, our Solar System may contain a super-Earth after all.

SPACE NEWS

Spectacular Video Captures Catastrophic SpaceX Falcon 9 Rocket Explosion During Pre-launch Test

Article Updated: 3 Sep , 2016

by Ken Kremer

SpaceX Falcon 9 rocket moments after catastrophic explosion destroys the rocket and Amos-6 Israeli satellite payload at launch pad 40 at Cape Canaveral Air Force Station, FL, on Sept. 1, 2016. A static hot fire test was planned ahead of scheduled launch on Sept. 3, 2016. See the full video below. Credit: USLaunchReport

The SpaceX Falcon 9 rocket that suffered a catastrophic explosion this morning, Thursday, Sept. 1, at Cape Canaveral Air Force Station in Florida was captured in stunning detail in a spectacular video recorded by my space journalist colleague at USLaunchReport.

As seen in the still image above and the full video below, the rocket failure originated somewhere in the upper stage during fueling test operations at the launch pad, less than two days prior to its planned launch on Sept. 3. The rocket was swiftly consumed in a massive fireball and thunderous blasts accompanied by a vast plume of smoke rising from the wreckage visible for many miles.

Both the SpaceX rocket and the $200 million AMOS-6 Israeli commercial communications satellite payload were completely destroyed in the incident. Thankfully there were no injuries to anyone, because the pad is cleared during these types of operations.

This also marks the second time a Falcon 9 has exploded and will call into question the rocket's reliability. The first failure involved a catastrophic mid air explosion about two and a half minutes after liftoff, during a cargo resupply launch for NASA to the International Space Station on June 28, 2015 – and witnessed by this author.

It took place during this morning's prelaunch preparations for a static hot fire test of the nine Merlin 1 D engines powering the Falcon 9 first stage when engineers were loading the liquid oxygen (LOX) and RP-1 kerosene propellants for the test, according to SpaceX CEO Elon Musk.

"Loss of Falcon vehicle today during propellant fill operation," tweeted SpaceX CEO and founder Elon Musk this afternoon a few hours after the launch pad explosion.

"Originated around upper stage oxygen tank. Cause still unknown. More soon."

The Falcon 9 explosion occurred at approximately 9:07 a.m. EDT this morning at the SpaceX launch facilities at Space Launch Complex 40 on Cape Canaveral Air Force Station, according to statements from SpaceX and the USAF 45th Space Wing Public Affairs office.

All SpaceX launches will be placed on hold until a thorough investigation is conducted, the root cause is determined, and effective fixes and remedies are identified and instituted.

The planned engine test was being conducted as part of routine preparations for the scheduled liftoff of the Falcon 9 on Saturday, September 3, with an Israeli telecommunications satellite that would have also been used by Facebook.

During the static fire test, which is a full launch dress rehearsal, the rocket is loaded with propellants and is held down at pad 40 while the engines are typically fired for a few seconds.

Here is the full video from my space journalist friend and colleague Mike Wagner of USLaunchReport:

Video Caption: SpaceX – Static Fire Anomaly – AMOS-6 – 09-01-2016. Credit: USLaunchReport

The 229-foot-tall (70-meter) SpaceX Falcon 9 had been slated for an overnight blastoff on Saturday, September 3 at 3 a.m. from pad 40 with the 6 ton AMOS-6 telecommunications satellite valued at some $200 million.

In the video you can clearly see the intensely bright explosion flash near the top of the upper stage that quickly envelopes the entire rocket in a fireball, followed later by multiple loud bangs from the disaster echoing across and beyond the pad.

Seconds later the nose cone and payload break away violently, falling away and crashing into the ground and generating a new round of loud explosions and fires and a vast plume of smoke rising up.

At the end the rocket is quite visibly no longer standing. Only the strongback erector is still standing at pad 40. And both the strongback and the pad structure seems to have suffered significant damage.

This would have been the 9th Falcon 9 launch of 2016.

SpaceX Falcon 9 rocket moments after catastrophic explosion destroys the rocket and Amos-6 Israeli satellite payload at launch pad 40 at Cape Canaveral Air Force Station, FL, on Sept. 1, 2016. A static hot fire test was planned ahead of scheduled launch on Sept. 3, 2016. Credit: USLaunchReport

SpaceX media relations issued this updated statement:

"At approximately 9:07 am ET, during a standard pre-launch static fire test for the AMOS-6 mission, there was an anomaly at SpaceX's Cape Canaveral Space Launch Complex 40 resulting in loss of the vehicle."

“The anomaly originated around the upper stage oxygen tank and occurred during propellant loading of the vehicle. Per standard operating procedure, all personnel were clear of the pad and there were no injuries.”

“We are continuing to review the data to identify the root cause. Additional updates will be provided as they become available.”

Today’s explosion and the total loss of vehicle and payload will certainly have far reaching consequences for not just SpaceX and the commercial satellite provider and end users, but also NASA, the International Space Station, the US military, and every other customer under a launch contact with the fast growing aerospace firm.

The ISS is impacted because SpaceX is one of two NASA contracted firms launching cargo resupply missions to the ISS – along with Orbital ATK.

Continued operations of the ISS depends on a reliable and robust lifeline of periodic supply trains from SpaceX and Orbital ATK.

In fact the most recent SpaceX Drago cargo freighter launched on the CRS-9 mission to the ISS on July 18 as I witnessed and reported here. And just successfully returned to Earth with 3000 pounds of NASA science cargo and research samples last week on Aug. 26.

The SpaceX Dragon launches to the ISS will be put on hold as the investigation moves forward.

Furthermore SpaceX is manufacturing a Crew Dragon designed to launch astronauts to the ISS atop this same Falcon 9 rocket. So that will also have to be evaluated.

SpaceX is also trying to recover and recycle the Falcon 9 first stage.

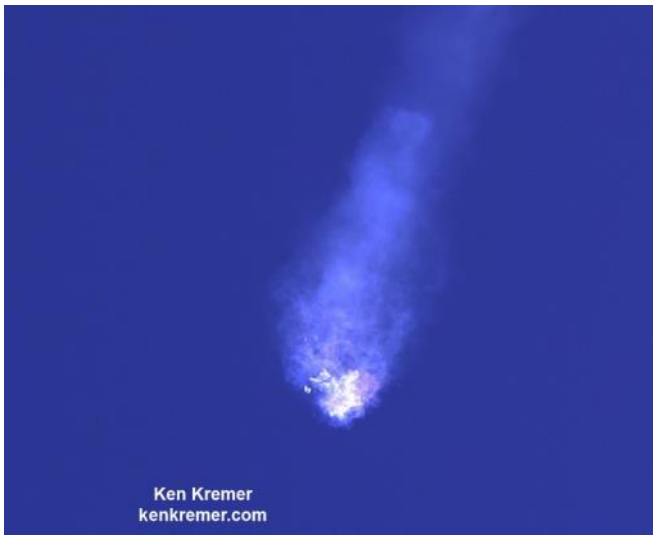
To date SpaceX has recovered 6 first stage Falcon 9 boosters by land and by sea.

SpaceX Falcon 9 launches and lands over Port Canaveral in this streak shot showing rockets midnight liftoff from Space Launch Complex 40 at Cape Canaveral Air Force Station in Florida at 12:45 a.m. EDT on July 18, 2016 carrying Dragon CRS-9 craft to the International Space Station (ISS) with almost 5,000 pounds of cargo and docking port. View from atop Exploration Tower in Port Canaveral. Credit: Ken Kremer/kenkremer.com

Indeed as I reported just 2 days ago, SpaceX announced a contract with SES to fly the SES-10 communications satellite on a recycled Falcon 9, before the end of the year and perhaps as soon as October.

But this explosion will set back that effort and force a halt to all SpaceX launches until the root cause of the disaster is determined.

Here’s one of my photos showing the prior SpaceX rocket failure in June 2015 during the CRS-7 cargo delivery mission to the ISS:



SpaceX Falcon 9 rocket and Dragon resupply spaceship explode about 2 minutes after liftoff from Cape Canaveral Air Force Station in Florida on June 28, 2015. Credit: Ken Kremer/kenkremer.com

Here’s the prior SpaceX Falcon 9 on pad 40 before the successful liftoff with the JCSAT-16 Japanese telecom satellite on Aug. 14, 2016:

SpaceX Falcon 9 set to deliver JCSAT-16 Japanese communications satellite to orbit on Aug. 14, 2016 from Space Launch Complex 40 at Cape Canaveral Air Force Station, Fl. Credit: Ken Kremer/kenkremer.com

The AMOS-6 communications satellite was built by Israel Aerospace Industries for Space Communication Ltd. It was planned to provide communication services including direct satellite home internet for Africa, the Middle East and Europe.

Cape Canaveral Air Force Station Emergency Management quickly provided initial on-scene response and set up roadblocks, said the Air Force in a statement.

“Days like today are difficult for many reasons,” said Brig. Gen. Wayne Monteith, 45th Space Wing commander.

“There was the potential for things to be a lot worse; however, due to our processes and procedures no one was injured as a

result of this incident. I am proud of our team and how we managed today's response and our goal moving forward will be to assist and provide support wherever needed. Space is inherently dangerous and because of that, the Air Force is always ready."

Stay tuned here for Ken's continuing Earth and Planetary science and human spaceflight news.

Ken Kremer

A SpaceX Falcon 9 rocket is destroyed during explosion at the pad on Sept. 1, 2016. Only the strongback remains. A static hot fire test was planned ahead of scheduled launch on Sept. 3, 2016 of Amos-6 comsat. Credit: NASA

This recovered 156-foot-tall (47-meter) SpaceX Falcon 9 first stage has arrived back into Port Canaveral, FL after successfully launching JCSAT-16 Japanese communications satellite to orbit on Aug. 14, 2016 from Space Launch Complex 40 at Cape Canaveral Air Force Station, Fl. NASA's VAB in the background – as seen from Exploration Tower on Aug. 19. Credit: Ken Kremer/ kenkremer.com

Chinese officials silent after Long March rocket failure

September 2, 2016 Stephen Clark

Long March 4C rocket lifted off at 1855 GMT (2:55 p.m. EDT) Wednesday with the Gaofen 10 Earth observation satellite. Credit: Xinhua

A U.S. Air Force spokesperson said Friday that the military has not detected any objects deployed in orbit by a Chinese Long March rocket launch Wednesday, but China's official media outlets still have not acknowledged the apparent failure.

The Long March 4C rocket, standing 15 stories tall, was carrying the Gaofen 10 Earth imaging payload. The booster took off some time around 1855 GMT (2:55 p.m. EDT) Wednesday from the Taiyuan launch base in the Shanxi province of northern China.

Liftoff occurred in the wee hours of Thursday morning local time at Taiyuan, an arid launch site about 270 miles (435 kilometers) west of Beijing.

The China Xinhua News Network Corp., the television arm of the nation's government-run Xinhua news agency, released photos of the liftoff, but Chinese media never issued an update on the flight. Official news agencies typically announce the success of Chinese rocket launches within hours.

Warnings issued to pilots by Chinese authorities indicated the Long March 4C rocket would fly to the south, dropping its first stage stage and payload fairing over central China. Reports from Chinese social media showed parts of the launcher's first stage and nose cone that fell to the ground in their predicted drop zones.

But the flight apparently never reached orbit.

The U.S. military publishes orbit data for foreign space launches online, but no entries appeared after Wednesday's liftoff.

The military's Space Surveillance Network has not detected any objects attributed to Wednesday's launch from China, according to Air Force Capt. Nicholas Mercurio, a spokesperson for the Joint Functional Component Command for Space at Vandenberg Air Force Base in California.

Western experts suggest something went wrong with the Long March 4C's upper stage, and the Gaofen 10 satellite did not attain enough speed to enter orbit.

As of Friday, China's state-owned media have not reported on the failed launch, and there are scant details on what happened.

Wednesday's mishap was the first failure of a Chinese satellite launcher since December 2013, when a joint Chinese-Brazilian satellite was destroyed. In nearly three years since that failure, China logged 43 consecutive successful orbital launches in a row.

China has several crucial launches scheduled before the end of the year, and the impact of this week's failure on those plans remains unclear. Many of China's Long March rocket variants use the same types of engines, but the country's space engineers resumed Long March flights within weeks after crashes in 2011 and 2013.

Chinese media disclosed those failures soon after they occurred.

Ground crews are readying a Long March 2F rocket for launch at the Jiuquan space center in northwest China's Gobi desert next month with Tiangong 2, the country's next orbiting space laboratory. Two Chinese astronauts will blast off on another Long March 2F booster later this year for a 30-day visit to the Tiangong 2 space lab.

The heavy-lift Long March 5 rocket, powered by a new generation of engines, is also set for its debut mission before the end of the year.

Juno Captures Jupiter's Enthralling Poles From 2,500 Miles

Published: 2 Sep , 2016

by Evan Gough

Juno is sending data from Jupiter back to us, courtesy of the Deep Space Network, and the first images are meeting our hyped-up expectations. On August 27, the Juno spacecraft came within about 4,200 km. (2,500 miles) of Jupiter's cloud tops. All of Juno's instruments were active, and along with some high-quality images in visual and infrared, Juno also captured the sound that Jupiter produces.

Juno has captured the first images of Jupiter's north pole. Beyond their interest as pure, unprecedented eye candy, the images of the pole reveal things never before seen. They show storm activity and weather patterns that are seen nowhere else in our solar system. Even on the other gas giants.

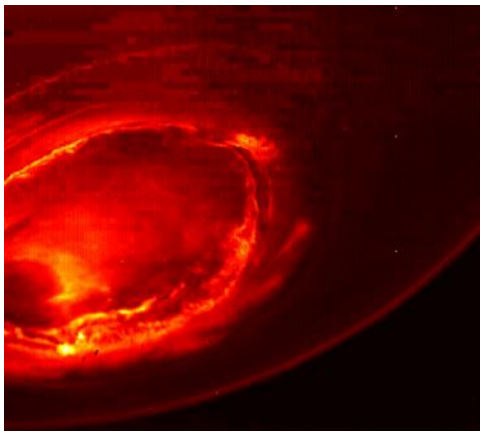
"…like nothing we have seen or imagined before."

"First glimpse of Jupiter's north pole, and it looks like nothing we have seen or imagined before," said Scott Bolton, principal investigator of Juno from the Southwest Research Institute in San Antonio. "It's bluer in color up there than other parts of the planet, and there are a lot of storms. There is no sign of the latitudinal bands or zone and belts that we are used to — this image is hardly recognizable as Jupiter. We're seeing signs that the clouds have shadows, possibly indicating that the clouds are at a higher altitude than other features."

The iconic storm bands of Jupiter are absent in this JunoCam image of Jupiter's northern polar region. Instead, the region is dominated by swirling storm patterns reminiscent of hurricanes here on Earth. Image: NASA/JPL-Caltech/SwRI/MSSS

The visible light images of Jupiter's north pole are very different from our usual perception of Jupiter. People have been looking at Jupiter for a long time, and the gas giant's storm bands, and the Great Red Spot, are iconic. But the north polar region looks completely different, with whirling, rotating storms similar to hurricanes here on Earth.

The Junocam instrument is responsible for the visible light pictures of Jupiter that we all enjoy. But the Jovian Infrared Auroral Mapper (JIRAM) is showing us a side of Jupiter that the naked eye will never see.



The Juno Infrared Auroral Mapper (JIRAM) captured this infrared image of Jupiter's south pole. This part of Jupiter cannot be seen from Earth. Image: NASA/JPL-Caltech/SwRI/MSSS

"JIRAM is getting under Jupiter's skin, giving us our first infrared close-ups of the planet," said Alberto Adriani, JIRAM co-investigator from Istituto di Astrofisica e Planetologia Spaziali, Rome. "These first infrared views of Jupiter's north and south poles are revealing warm and hot spots that have never been seen before. And while we knew that the first-ever infrared views of Jupiter's south pole could reveal the planet's southern aurora, we were amazed to see it for the first time."

"No other instruments, both from Earth or space, have been able to see the southern aurora."

Even when we're prepared to be amazed by what Juno and other spacecraft show us, we are still amazed. It's impossible to see Jupiter's south pole from Earth, so these are everybody's first glimpses of it.

"No other instruments, both from Earth or space, have been able to see the southern aurora," said Adriani. "Now, with JIRAM, we see that it appears to be very bright and well-structured. The high level of detail in the images will tell us more about the aurora's morphology and dynamics."

Beyond the juicy images of Jupiter are some sound recordings. It's been known since about the 1950's that Jupiter is a noisy planet. Now Juno's Radio/Plasma Wave Experiment (WAVE) has captured a recording of that sound.

"Jupiter is talking to us in a way only gas-giant worlds can," said Bill Kurth, co-investigator for the Waves instrument from the University of Iowa, Iowa City. "Waves detected the signature emissions of the energetic particles that generate the massive auroras which encircle Jupiter's north pole. These emissions are the strongest in the solar system. Now we are going to try to figure out where the electrons come from that are generating them."

Oddly enough, that's pretty much exactly what I expected Jupiter to sound like. Like something from an early sci-fi film.

There's much more to come from Juno. These images and recordings of Jupiter are just the result of Juno's first orbit. There are over 30 more orbits to come, as Juno examines the gas giant as it orbits beneath it.

There It Is! Philae Lander

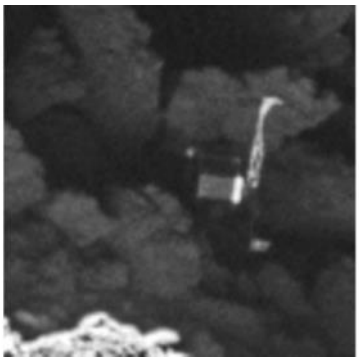
Found

Article Updated: 5 Sep , 2016

by Nancy Atkinson

The search is over, and looking at these images, no wonder it was so hard to find the little Philae lander!

The high-resolution camera on board the Rosetta spacecraft has finally spotted Philae “wedged into a dark crack on Comet 67P/Churyumov-Gerasimenko,” the ESA team said. They also said that now, seeing the lander’s orientation, it’s clear why establishing communications was so difficult following its landing on November 12, 2014.



Close-up of the Philae lander. Credits: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

Rosetta, orbiting the comet and getting ready for its own demise/touchdown on 67P, focused its OSIRIS narrow-angle camera towards a few candidate sites on September 2, 2016 as the orbiter came just 2.7 km of the comet’s surface. Clearly visible in the zoomed in versions are the main body of the lander, along with two of its three legs.

“With only a month left of the Rosetta mission, we are so happy to have finally imaged Philae, and to see it in such amazing detail,” says Cecilia Tubiana of the OSIRIS camera team, the first person to see the images when they were downlinked from Rosetta on September 4.

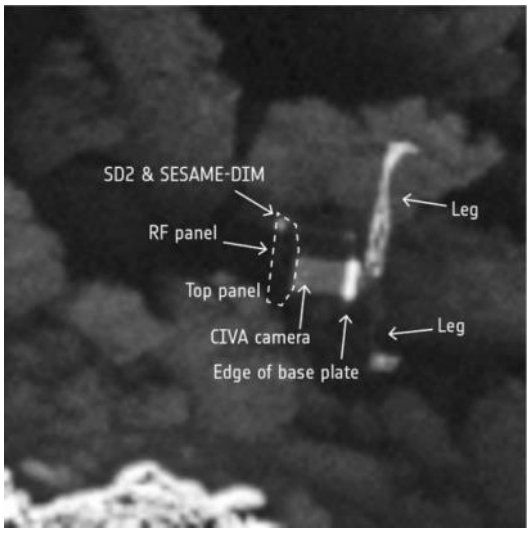
Tubiana told Universe Today via email that Philae wasn’t too hard to find in the images. “Philae was in hiding in shadow, and as soon as we stretched the brightness to ‘see’ into the shadow, Philae was there!”

She added that nothing else about Philae’s condition has been revealed from the images so far.

The Philae lander was last seen after it first touched down at a region called Agilkia on the odd-shaped, two-lobed comet 67P. During its dramatic touchdown, the lander flew, landed, bounced and then repeated that process for more than two hours across the surface, with three or maybe four touchdowns. The harpoons that were to anchor Philae to the surface failed to fire, and scientists estimated the lander may have bounced as high as 3.2 kilometers (2 miles) before becoming wedged in the shadows of a cliff on the comet. After three days, Philae’s primary battery ran out of power and the lander went into hibernation, only to wake up again and communicate briefly with Rosetta in June and July 2015 as the comet came closer to the Sun and more power was available.

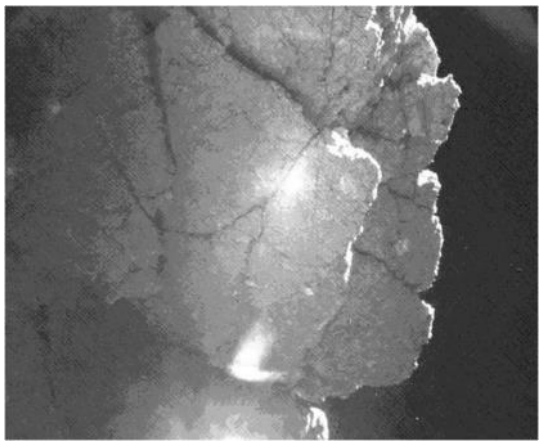
But after more than a year of silence, the Rosetta team announced in mid-August 2016 that they would no longer attempt communications with Philae.

Philae’s final location had been plotted but until yesterday, never actually seen by Rosetta’s cameras. Radio ranging data was used to narrow down the search to an area spanning a few tens of meters, and a number of potential candidate objects were identified in relatively low-resolution images taken from larger distances.



Philae close-up, labelled. Credits: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA.

Compare some of the features of the cliff in the image above to this image taken by Philae of its surroundings:

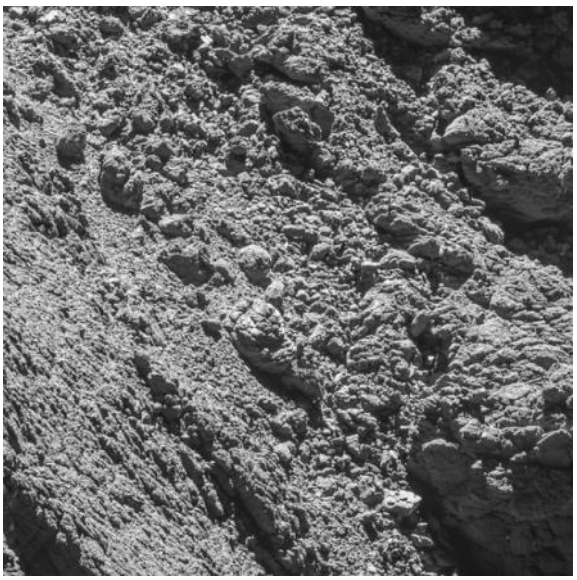


The Philae lander captured a picture of a nearby cliff, nicknamed “Perihelion Cliff”, on the nucleus of Comet 67P/Churyumov-Gerasimenko. Credit: ESA/Rosetta/Philae/CIVA.

“After months of work, with the focus and the evidence pointing more and more to this lander candidate, I’m very excited and thrilled that we finally have this all-important picture of Philae sitting in Abydos,” said ESA’s Laurence O’Rourke, who has been coordinating the search efforts over the last months at ESA, with the OSIRIS and SONC/CNES teams.

At 2.7 km, the resolution of the OSIRIS narrow-angle camera is about 5 cm/pixel, which is sufficient to reveal features of Philae’s 1 m-sized body and its legs.

“This wonderful news means that we now have the missing ‘ground-truth’ information needed to put Philae’s three days of science into proper context, now that we know where that ground actually is!” says Matt Taylor, ESA’s Rosetta project scientist.



An OSIRIS narrow-angle camera image taken on 2 September 2016 from a distance of 2.7 km in which Philae was definitively identified. The image has been processed to adjust the dynamic range in order to see Philae while maintaining the details of the comet's surface. Philae is located at the far right of the image, just above center. The image scale is about 5 cm/pixel. Credits: ESA/ Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/ UPM/DASP/IDA.

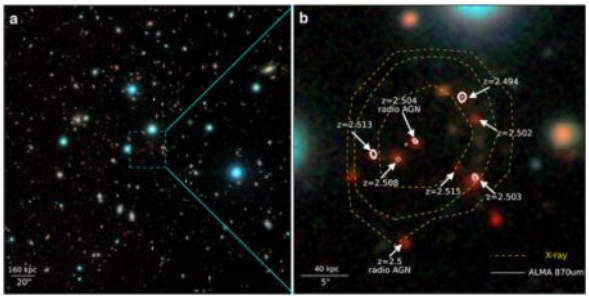
The discovery comes less than a month before Rosetta descends to the comet's surface. On September 30, the orbiter will be sent on a final one-way mission to investigate the comet from close up, including the open pits in a region called Ma'at, where it is hoped that critical observations will help to reveal secrets of the body's interior structure.

"Now that the lander search is finished we feel ready for Rosetta's landing, and look forward to capturing even closer images of Rosetta's touchdown site," adds Holger Sierks, principal investigator of the OSIRIS camera.

The Rosetta team said they would be providing more details about the search as well as more images in the near future.

Source: ESA

Conversation Points



An optical/infrared image of the center of CL J1001, from ESO's UltraVISTA survey. The right panel shows a close-up view with the redshifts of galaxies labeled, and two galaxies containing actively growing black holes labeled as "AGN". Image credit: Tao Wang.

"We meet aliens every day who have something to give us. They come in the form of people with different opinions." -William Shatner

It's been another big week here at Starts With A Bang, with stories covering the Universe near and far. Although the biggest announcements seemed to shatter our picture of how things are, this week was all about keeping it in perspective. There are lots of ideas — good and bad — floating around, but in the end, data and experiments will be the ultimate arbiter. Here's what we've covered over the past week:

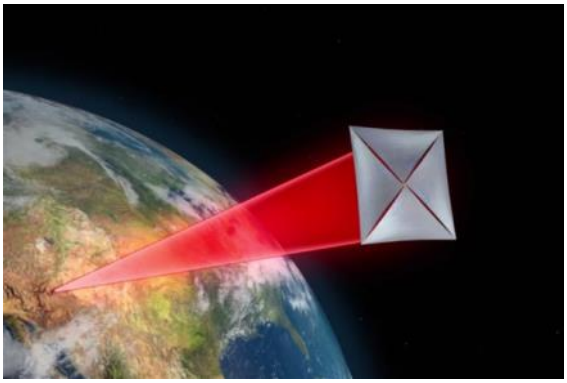
- How do we know the Universe is 13.8 billion years old? (for Ask Ethan),
- Dark matter riches: why some galaxies have more than others (for Mostly Mute Monday),
- Exoplanets: from fluke to fact (a great historical guest post by Sabine Hossenfelder),
- Record-breaking galaxy cluster confirms dark matter Universe,
- A Young, Dusty, Disk-Bearing Star Reminds Us 'Alien Megastructures' Aren't The Only Answer,
- Fifth Fundamental Force: Fact or Fiction?, and
- NASA's impossible space engine, the EMdrive, passes peer review.

As always, there's an ongoing conversation to have, so let's investigate all that we can on this edition of our comments of the week!

The Port Newark-Elizabeth Marine Terminal, easily showing detail on cars, from satellite imagery. Image credit: NASA.

From Omega Centauri on mapping resolution: "We are trying to image an object on the bottom of a swimming pool, wave motion of the surface is constantly defocusing the image. If I assume the blurring occurs at a height of 5KM and is a single arc second, I get atmospheric blurring as about 24cm."

Of course, there's a fundamental problem with imaging anything on the Earth's surface, and that's the fact that you have to contend with the atmosphere. The blurring effect we imagine may be small, but it's still present, and is dependent on the amount of turbulent airflow, wind speed and the temperature gradients. Perhaps fortunately, this effect is also wavelength dependent, and is being worked on for a different reason: the breakthrough starshot.

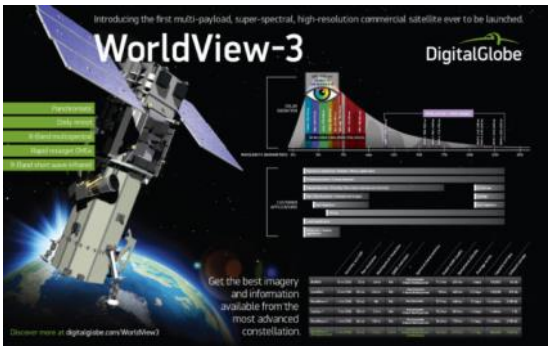


One key to success in an endeavor like a ground-based laser sail is to have as close to perfect laser collimation as possible, even through the atmosphere. Image credit: the Breakthrough Starshot initiative.

It's much cheaper to build a laser array on the ground than in space, but firing your lasers through the atmosphere results in a loss of collimation for the same reason the atmosphere "blurs" light of any form. But according to the breakthrough initiative:

Breakthrough Starshot aims to achieve the diffraction limit for an optical system of laser beams across 0.2-1km, which is 1-2 orders of magnitude beyond existing demonstrations. There are no fundamental physics limitations to achieving this improvement.

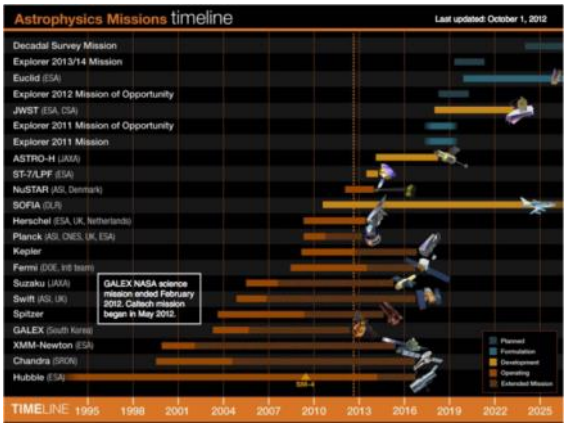
Of course, another way to improve it is to do binocular observations with large-dish telescopes rather than single-dish observation. This can get seeing in the infrared down to a resolution of 40 *milli*-arc-seconds, or a factor of 25 better than Omega's calculations. (1 cm resolution!) This is what Keck does from the ground, and there's no reason we can't equal that from space going the other way. The only question is whether it's worth it.



An infographic about Worldview-3. Image credit: DigitalGlobe.

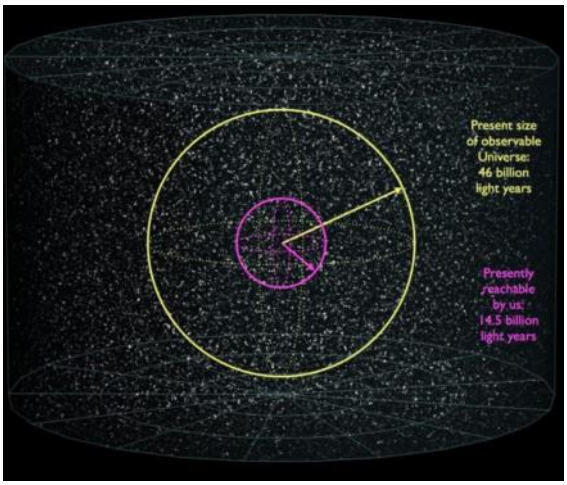
From Denier on WFIRST hatred: "This is what has me so bent out of shape about WFIRST. The total budget for DigitalGlobe's WorldView-4, including design from the ground up, construction, launch, and insurance is US$835 million. From proposal to first light is 9 years.
Contrast that with NASA who doesn't have to pay to design or build the KH11 2.4m Stubby Hubbles. Even with the massive head start NASA needs US$2.7 billion (and rising), and 15-20 years."

So I don't fully understand this. With James Webb or with any new, state-of-the-art, cutting-edge scientific instrument, you're often building special, one-of-a-kind tools for a unique assembly that have never been made before and will never be made again. Normally, development, construction, testing and deployment occur on timescales of around a decade. WFIRST was accepted as the #1 priority for NASA's decadal survey — to be the flagship mission of the 2020s — in the early 2010s. Shortly after (I believe 2012) was when the 2.4m Hubble clones were received by NASA, and after some debate, they decided it was worth using the free telescope rather than building WFIRST at the original (smaller) size. But all the instruments need to be built, all the people need to be hired, the full testing/maintenance cost needs to be factored in and the cost of WFIRST must include all the ongoing costs as well.



The Astrophysics mission timeline from NASA's astrophysics implementation plan, 2013. Note how the Decadal mission — which was not yet chosen as of October 2012 but is now WFIRST — still has 2024 as its launch date. Image credit: NASA.

These decadal missions normally run about $5 billion apiece, so WFIRST is a bargain there. And I don't know where you get 15-20 years; it's 2016 and launch is still slated for 2024! WFIRST is basically superpowered, multiwavelength SDSS from space, except doing much more of the sky and with planet-finding and supernova-hunting capabilities. WorldView-4 is basically unchanged from WorldView-2 and WorldView-3. That's why it's so much cheaper. If you wanted to build WFIRST-4, it'd be cheaper, too.

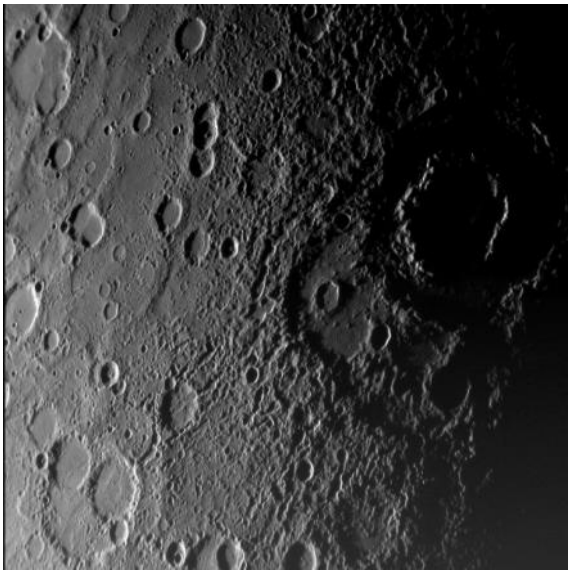


The size of our visible Universe (yellow), along with the amount we can reach (magenta). Image credit: E. Siegel, based on work by Wikimedia Commons users Azcolvin 429 and Freìdeìric MICHEL.

From Richard on older civilizations: "Considering the age of the Universe is 13.8 billion years old it makes me appreciate my 5.46 billion year old "possible" NWA 7325 Mercury Meteorite […] It makes me wonder sometimes if we will ever encounter anything older, an advanced civilization perhaps?"

Well, there are at least 10^22 potentially habitable planets in the observable Universe, and about 3% of them are potentially "encounterable" by us. But we are a young civilization, make no mistake about it. We can talk about how "Earth-like" conditions may have arisen billions of years before they did on Earth, but that doesn't mean much; we've only been a "civilization" in the technological sense for maybe a century or two (or less), depending on how you measure it. If aliens were like us and they came to Earth 20,000 years ago, would they have said, "nothing to see here" and simply moved along? Perhaps they would. Perhaps we will. But if we can

survive and thrive for just a few thousand years more, we may become more advanced than anything you're imagining.

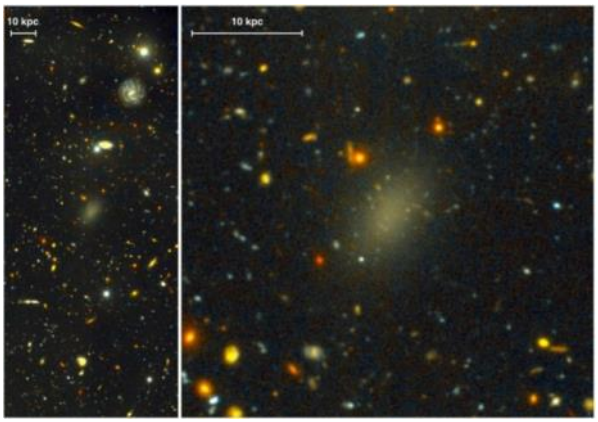


A close-up of the planet Mercury's surface from NASA's Messenger mission. Image credit: NASA.

Also, Michael Kelsey had it right,

"The Solar System has been rather precisely dated, using isotopic rations from CAI's, to 4.5682 Gy (yes, that's five digits of precision). Your putative Mercury meteorite is presumably 4.56 Gy old, not "5.46"."

Most meteorites on Earth from other planets come from less time ago than that, in the sense that there was an impact on Mercury, it kicked up rocks, one made it to Earth, and now you have a fragment of it. (In the best-case scenario.) But although it may be 4+ billion years since any thing changed about it on the Mercurian surface, it's likely been much less than that since it arrived on Earth.



An image of galaxy Dragonfly 44, recently discovered to have the largest offset between normal matter and dark matter of any known, large galaxy. Image credit: Pieter van Dokkum, Roberto Abraham, Gemini Observatory/AURA.

From Omega Centauri (again!) on matter stripping: "If the normal matter was stripped away by (gas) ram pressure, it must have happened before many stars were formed, otherwise a decent faction of the mass would have been in the forms of stars,which aren't stripped out by fast travel through the intergalactic medium. So I think this new one is still an enigma."

Ah, but this isn't the standard intergalactic medium; this is a galaxy *in the coma cluster* of galaxies. What would have happened if this galaxy had a rapid collision with a giant elliptical galaxy? What would happen to the stars, the gas, etc., as it collided?

Image credit: NASA, ESA; Acknowledgements: Ming Sun (UAH), and Serge Meunier.

Do you see the "stellar streams" being siphoned off of this galaxy? That's *nothing*! Imagine a collision large enough to pull nearly all the baryons out of the galaxy, yet that the initial speed was large enough that the dark matter component remained unbound from the central galaxy.

I'm not saying, "oh, that's definitely it," but this is a puzzle with a number of straightforward scenarios. It doesn't mean it's less cool, but it does mean that the voices you hear going, "oh, this galaxy is weird, maybe let's invent some new knobs to turn on the physics machine" had better look at the knobs we already have instead. They're already doing pretty great!

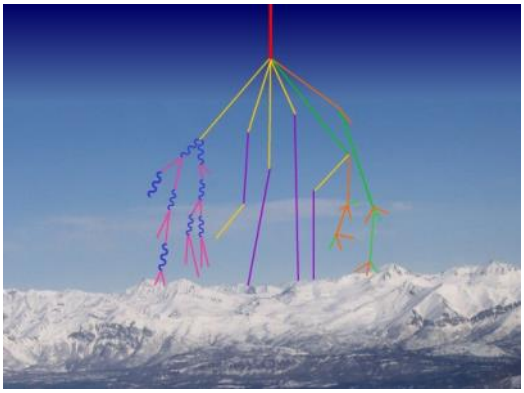


Image credit: Randy Russell using a photo via UCAR / Nicole Gordon.

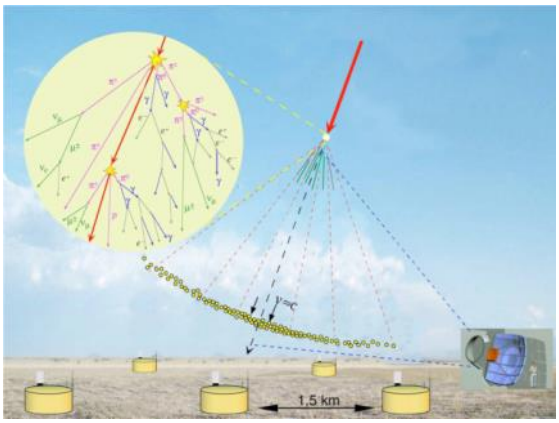
From William Murphy on the origin of boron: "Your description of the origin of Boron by spallation got me to thinking about the two main sources of boron on earth, Turkey and California.
If the early earth was struck by a cosmic ray stream big enough to penetrate and have an entry and exit point, on opposite sides of the earth, would that be a likely scenario for borons relative abundance and geographical localization?"

There are a lot of ways to answer this, and honestly, Michael Kelsey did a great job, so I'm reproducing his answer *first*.

"No, it wouldn't work, and you should be able to work out for yourself why not. The most important word is "flux," the rate of incoming particles per unit area per second. The second most important word is "product," the number of atoms of boron (in this case) you want to produce.
For simplicity, you can assume perfect (100%) efficiency: every single incoming cosmic ray produces one boron atom. In reality, of course, the efficiency for an single species is tiny, as spallation produces a broad spectrum.
Start with an estimate of the total number of atoms of boron

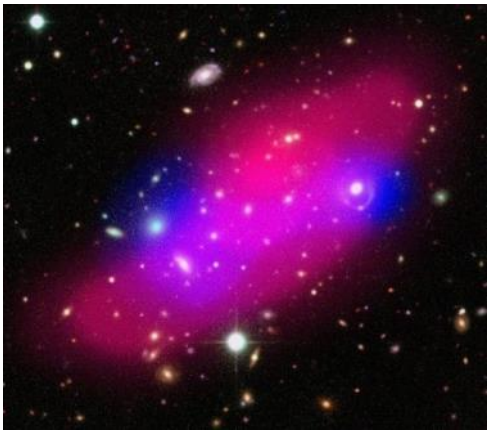
in each region, the approximate area of each region, and from those, work out what the flux would have to be. Also, estimate how _fast_ that flux would have to be delivered in order to produce all the boron in a limited area, before the Earth's rotation spread that area out too much."

There are a lot of reasons why this wouldn't work, but even if you threw all of these (correct) reasons that Michael gave away, there's another problem: what would the by-products be? Most of Earth is made of silicon dioxide: silicon and oxygen atoms. If you want your cosmic rays to produce boron, what *else* must they produce? If you're going from oxygen, you'd need lithium (or lighter); if you're going from silicon, you'd need fluorine (or lighter). You'd also only get "surface" boron, as you wouldn't get penetration deep into the Earth. But this brings up the real killer: cosmic rays have to go through the atmosphere, and the atmosphere is where this "showering" really happens.



The production of a cosmic ray shower, produced by an incredibly energetic particle from far outside our Solar System. Image credit: Pierre Auger Observatory, via http://apcauger.in2p3.fr/Public/Presentation/.

The whole point of spallation isn't that something created elements once the Earth was already here, but rather that something created these elements throughout the Universe *in space* and over time: once the first heavy elements were already in place. Now, these elements become a part of the interstellar medium, and get incorporated in the formation of new planets and stars. That is where our boron comes from! The reason it's on the surface in some locations is the same reason that any elements form "veins" of materials on our world: the geological dynamics of Earth. But that's a science question for another day!



Composite image of the Bullet Group showing galaxies, hot gas (shown in pink) and dark matter (indicated in blue). Dark photons could never explain this gravity alone. Image credit: ESA / XMM-Newton / F. Gastaldello (INAF/IASF, Milano, Italy) / CFHTLS

From axil on dark photons, "Do you [believe] that dark matter is caused by dark photons?"

No. No one does. The dark photon idea is that there's a "dark electromagnetism" that couples to dark matter *only*, the way that electromagnetism couples to normal matter but not dark matter. But I don't believe there's a good reason to think dark photons exist at all; there's certainly no good evidence for it. (I'm still waiting for the "fifth force particle" the Hungarian team found to be confirmed before I give it much credulity.) But under no circumstances could a dark photon, which would behave as radiation, account for the missing mass problems of the Universe.

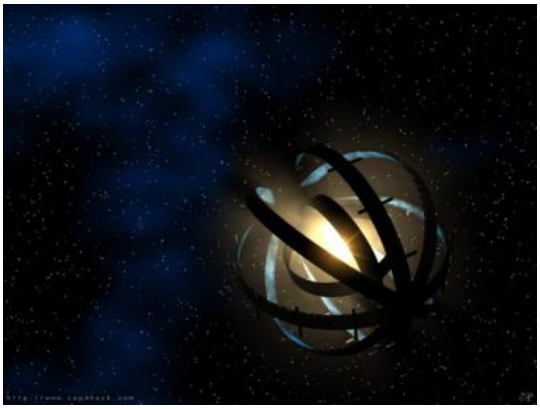


Image credit: public domain art by CapnHack, via http://energyphysics.wikispaces.com/Proto-Dyson+Sphere.

From PJ on alien megastructures, "Somehow, I feel any alien society would not usurp their planets resources to capture their suns energy. There would not be enough planet left after completion, methinks."

Well, why use your own planet? Why not mine Mercury or Mars and use their resources to build what you want to build? But I also don't understand why, if you were going to build anything like this, you'd put it so far out? Surely, building a large, energy-capturing structure closer to your parent star would be the more efficient way to go? Remember how flux works; why would you go 100 times farther away, to have to build something 10,000 times as large to collect the same amount of energy? Just build it in close and "beam" the energy over. What's the worst that could happen?

From eric in response to PJ's comment, "yeah, no truly intelligent species would poison/destroy its own long-term ecosystem for some comparatively short-term gain. Why, they'd have to be crazy to do that!"

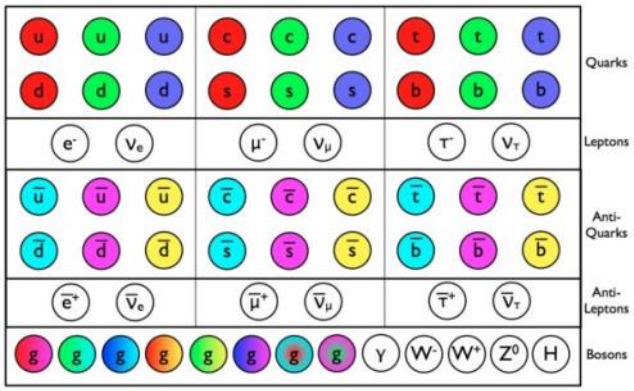
I lol'ed.

This is a picture from the internet.

From anonymous longtime reader on the comment section: "Please reconsider the decision of not banning SN from posting. (I have been a reader since 2009, but have refrained from posting before now.)
I find that I can't read the comments anymore – if I see the name "See Noevo" I have to leave the page…"

I don't know why we wouldn't do an experiment to test it out? Let's ban See Noevo for a week and see if the place improves. If it does — and this is up to people to still leave good comments — we can see about a second week, and so on.

Adios, for a little while, See Noevo.

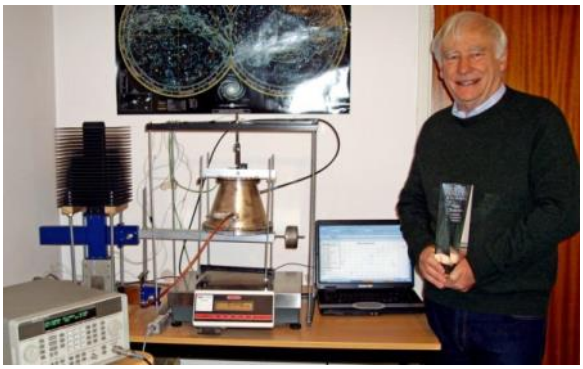


The particles and antiparticles of the Standard Model. Image credit: E. Siegel.

From Anonymous coward on the neutrino: "Neutrino physics seems to be just about the only particle physics these days that is reaching beyond the Standard Model. The original Standard Model has it that neutrinos have no mass, but it's been shown that they do have mass. All explanations for the origin of neutrino mass (either via the Higgs mechanism or by considering them as Majorana fermions) seem to require the postulation of a right-handed neutrino, which is so far unobserved."

This is a certainty: the original Standard Model certainly doesn't predict massive neutrinos, nor that they'd have less than one *millionth* the mass of the next lightest particle, nor that they'd oscillate from one species into another. Yet they do!

But you can have a neutrino mass without a Dirac/Majorana right-handed version; you'd just need a very small Yukawa coupling to the Higgs in the neutrino sector. Why would it do that? No one knows… but nature isn't there to tell us why, it simply tells us how it is. I prefer, personally and professionally, the models that have reasons for the dynamics to behave as they do, but nature doesn't necessarily care what I prefer.



Inventor Roger Shawyer with a prototype of his EMdrive. Image credit: Roger Shawyer, Satellite Propulsion Research Ltd.

From Jody on the EMdrive: "There's actually a recently published paper that gives a theoretical framework for how the EM Drive could produce thrust without violating Newton's 3rd Law. Not an expert in these matters to evaluate the possibility, but I know enough to know that there's a testable hypothesis here that can be validated or refuted."

I prefer not to comment on alternative theories unless I have something positive to say about it, so you won't get a comment from me about that paper in particular. But the whole (and *only* reason) the EMdrive is interesting is *because* it violates Newton's 3rd law! If all it turns out to be is an energy-suck machine that puts out a tiny amount of thrust *and* gives off exhaust, well, that's not very exciting; we can do that already. If it gives off radiation, we can do that already, too. The "crazy" part is that it's a reactionless drive; you take that away and all you have is a craptacularly inefficient engine.

Image credit: Cannae.com at http://cannae.com/press-release-from-cannae/.

And finally, from Sinisa Lazarek, expressing what many people must be thinking: "seriously.. this again?"

What a lot of people don't realize is that AIAA is *not* a physics journal. They aren't concerned with someone's physical explanation for something, about whether it's legitimate or plausible or fringe or accepted or completely insane. What they are concerned with is the engineering, which is to say (in an overly simplified fashion), "If you build thing A, your device will do this thing B, and you will see that thing C." So you've got a device that you can build, and you test your your device to see if it does the thing you say it does, and then your report what you see, and then you've got an AIAA paper.

But that's not the same as having broken the laws of physics; it means you have a device that the people building and operating and testing it don't fully understand. It *could* be a herald of new physics, but the far more likely explanation is that there's something fundamental going on that the builders, operators and testers are missing. And if I'm wrong, I'll admit it as soon as the evidence matches up in quality to the magnitude of the claims being made. What I'll never understand is the credulity of those who don't require that.

My question for you is, "why *don't* you demand that?"

MEMBERS VIEWING LOGS and IMAGES

Viewing Log for 5th of August

Mark Radice of Salisbury Plain Observing Group (SPOG) had arranged a viewing session at Casterley Camp just above Upavon, normally this is a bit far for me to travel to (about 40 minutes on a good drive), but this time I thought I would give it a go as I have not been to many observing sessions arranged by SPOG since I have been a member, must be for over five years now?

As I was running late I decided not to meet up in the 'Ship' pub beforehand but go straight to the meeting point. When I arrived I was the first to get there and was met by a brilliant sunset BUT very strong wind! This could be a problem with the scopes as the wind could bounce them around making it hard to observe objects? Anyway I was glad I brought my winter coat with me as I would be well wrapped up before the end of the session with woolly hat and gloves being worn as well and this in early August! The place is high and no protection from any wind that is blowing around the place.

I had my Meade 8 inch GOTO telescope set up by 21:45 and as usual would be using a Pentax 14 mm eye piece giving me a magnification of 143. First object to view was the thin crescent Moon getting close to the horizon, could make out a few craters along the terminator line before cloud on the horizon blocked out the view of the Moon. Before carrying on with my Herschel 400 list I had a look at Mars and Saturn as they were starting to also get close the horizon, pity they were not higher up in the sky as their light is going thru a lot of atmosphere which affects the appearance of these two planets. Back to the Herschel list and my first target was NGC 6144 a Globular Cluster (G C) which had a fuzzy glow to it even with the telescope bouncing around a bit! The last two targets were also G C's in NGC 6316 and NGC 6304 both came across as faint fuzzy blobs to look at. As Jon Gale was observing beside me I asked him to confirm that he could see a G C in the eye piece, he agreed with me so this meant I had now finished the 400 list J. This list I started back on 14th of January 2012 and over the course of just over four and a half years I have now finished this marathon viewing project which the author of the book had hoped you could do in one year! It took 30 sessions to complete this marathon, hardest object to get was NGC 3079 in Ursa Major, it must have taken at least five goes using GOTO equipment to confirm I had got it?

Anyway after a bit of a verbal celebration it was time to carry on with my Messier list as the remaining objects were in Scorpius and Sagittarius which are starting to get low at this time of the year! First object was M107 in Ophiuchus, this G C looked like a faint blob (F B) to view? Next target was much nicer to view and was also bright, M12 was the target and for a G C is probably one the best to look at? The same could also be said for M10, another G C. M14 and M9 were good G C's to look at, not as good as the previous two but still good? Went across the border and into Scorpius and try and bag M4 near Antares, unfortunately this G C was either behind a cloud bank or too close to the horizon to be viewed? Yet nearby and a bit higher was M80, this G C came across as being dim to view but better than a FB! Back into Ophiuchus and M19, I had to use adverted vision to locate this very faint G C. Could not make out M62 or M7 (the most southern and lowest Messier object), again I think there was a cloud bank on the horizon? Yet I could make out M6, maybe a gap in the clouds to view this loose Open Cluster (O C)? M11, the Wild Duck Cluster was another nice and bright G C to look at! M26 in Scutum was a loose O C and dim to look at. My final Messier object was M16, the Eagle Nebula which has an O C attached with it and before you ask I could not make out the 'Pillars of Creation'! My final objects for the now early morning was the Ice Giants in Neptune and Uranus, these seem to be the finishing list for me during the summer. I think I could make out M45 rising in the east, this was confirmed by another SPOG member who had a pair of binoculars with him, winter is on its way and tonight I think it had arrived….early!

The session had lasted just over three hours and I did cover a lot of the targets I wanted to view, hopefully the three I miss I will get these next time I am out viewing? While I was viewing I took a few pictures of the night sky especially towards the Galactic Centre, hopefully you will be able to see one of my efforts elsewhere in this magazine?

Clear skies for the coming season.

Peter Chappell

Viewing Log for 8th August

The night was very quiet with little wind in the air and I was free (very different to a few days ago when I was at Casterley Camp), so I thought I would carry on with my Messier list and see if I could finish all 110 objects in probably the most famous list of deep sky objects to view?

I arrived at Uffcott and had my Meade 8 inch GOTO telescope set up by 22:25. As I was going to view the constellation of Sagittarius I needed a very good clear south western horizon, unfortunately at my usual viewing place there is a hedge that has grown up a lot during the summer and was standing about six foot all so I needed to find another place! Driving up the road about 800 yards the hedge opened up in to a Maze field, so I parked just off the road and prepared to start.

As usual I would be using a 14 mm Pentax XW eye piece which would give me a magnification of 143. The trouble was I did not bring my Messier list with me so I did not know what objects to view, from what I can remember all the 15 objects would be in Sagittarius (this constellation has the most Messier objects in), lucky I brought my Sky & Telescope Pocket Sky Atlas with me J, so all I would have to do is consult the book and track them down. Before all that I had a look at the thin crescent Moon getting very close to the western horizon, so with this source of light out of the way I would have very good sky conditions? I carried on the theme of Solar System objects by looking at Saturn with the second largest moon in the Solar System (Titan) close by and finally Mars to the west and slightly higher than Saturn.

Now to start with the Messier (M) list, my previous session there was a few objects I could not view due to the low cloud at Casterley Camp (see last viewing log for details). So I started off by viewing M4 in Scorpius, a Globular Cluster (G C) which looked like a fuzzy blob, could be due to the lowness of this object which made it hard to make out as I have seen it better than this? Across the border and just into Ophiuchus and M62, a condense G C, back into Scorpius and the lowest Messier object in the sky and M7, a very loose Open Cluster (O C), this is only the second time I have seen this object from the shores of the UK? Now on to Sagittarius and hope to bag all the objects there, it was a case of looking at the pages of this constellation and see if I could find them all? I thought I would start in an area called the 'Teapot' within Sagittarius, this area is made up of seven stars and looks like a teapot? M70 is between the stars Ascella and Kaus Australis, this G C was dim to view, and it was the same for M69. M54 was also dim to view but had a condense centre and was slightly higher in the sky to look at. M55 is about 10 degrees east of the Teapot and was another dim object to look at! I was now going above the Teapot and into the plane of the Milky Way and probably lots of stars to view? First object to view was M22, this G C was large and bright to view, and if higher in the sky it might challenge M13 for brightness? Another bright G C

was M28, this had a condense centre. M8 (the Lagoon Nebula) had some nebulae around this G C and it had what looks like an O C nearby which my star chart does not show up? M20, the Trifid Nebula was dim to view and M21 was a loose O C. M24, a Star Cloud (only one in his list) was hard to pick out as there are a lot of stars in this area of the sky as we are looking towards the centre of our galaxy. M17, the Swan or Omega Nebula is a Bright Nebula which when added with a Deep Sky filter really brings the detail of this object out? M23 was a nice O C to view and M18 was a small loose O C to view. The only Index Catalogue (IC) entry in Messier's list is M25 (IC4725), all other objects have a NGC entry or are stars close by (M40 and M73) or Star Cloud (M24). M25 was a loose O C to look at. I could find 14 objects within this constellation, finding the 15th was hard work, it finally gave away its position very close to the border with Capricornus, which turned out to be M75, a condense but small G C. My final objects for the evening would return me to the Solar System and looking at the Ice Giant planets of Uranus and Neptune. It was now 23:53 and time to pack up, during this viewing session only one car went past me which meant my night sight was never affected. While packing up my telescope gear I noted how quiet it was. When I got home I checked my Messier list and it is now complete, what next to view?

It took six sessions to complete all 110 objects in his list J, it has been suggested by the likes of Jon Gale and others I should start the second list of the Herschel 400, eh no thanks as it took nearly five years to finish the first 400 list. So what next, I think I will attack the Caldwell list (named after Patrick Moore who came up with this list after being asked by an American magazine to do one) of 110 objects. I think the most you can see from the UK is 69 (C69 is the Bug Nebula) and is seasonal so I will not be able to find them in three or four attempts? I have seen some of them when I have been on my travels to the southern hemisphere like the Coal Sack Nebula or the Jewel Box Cluster both near Crux, the Southern Cross.

Clear skies for the coming season.

Peter Chappell

Log August 2016 Tony Vale

Variable star observations now total 871. Poor weather, particularly during June has restricted my observations during the summer months. In addition, my focus over the last few months has been to bring the 16" telescope into regular use which has required much landscaping, wall building and shed erecting. The new telescope will allow me to follow many cataclysmics through their cycle instead of just observing them near maximum and it will also bring many more within range. The larger aperture also transforms the view of many deep sky objects. The Veil Nebula, planetary nebulae – M57, M27, M76, the Blinking nebula and the Blue Snowball, Globular clusters - M13, M92, M2, M15 are all objects I've observed with the new telescope and whose appearance is transformed. However, the telescope is intended mainly for observing variables and to regularly get to magnitude 15 and perhaps below. I have recorded AM Her at 15.3 which is my limit to date but I'm told I should be able to achieve Mag 16 on the best nights – something to aim for !

AM Herculis (AM Her) is an unusual type of dwarf nova. It is the prototype of a class of dwarf novae which are called "Polars". These are systems whose primary white dwarves have such strong magnetic fields that the accretion disc which forms around the white dwarves in other types of dwarf novae can't form. Instead, plasma is drawn straight from the red dwarf (the secondary star in the system) , along the magnetic field lines of the white dwarf's magnetic field and crashes straight onto the surface of the white dwarf. The plasma follows a spiral pathway as it travels along the magnetic field lines and generates cyclotron radiation as it does so. The cyclotron radiation is polarised, either circularly or linearly depending on the orientation of the field lines to earth, hence the name "polars". The impact as the plasma crashes on to the white dwarf generates high energy blue, ultra violet and x ray radiation which is characteristic of this type of star. Currently, AM Her is very much fainter than usual so it is presumed to be "detached", ie material is not currently being drawn from the red dwarf. However it is fluctuating, albeit at very low magnitudes and we are therefore probably seeing fluctuations in the luminosity of the red dwarf alone which may be caused by flares or starspots.

The AAVSO is currently co-ordinating an observing campaign for the University of Southampton to support observations of RX And by the Chandra X-ray orbiting telescope. These observations will be triggered when the star is in outburst and suitably placed. Amateur efforts are directed towards alerting the researchers of outbursts. RX And is a Z Cam type dwarf nova whose light curves typically show frequent outbursts and standstills (see my log for March 2016 for a description of Z Cam type dwarf novae).

Viewing Log 26th August Andy Burns

It is one of those 50:50 cloud cover mornings, when some cloud can cover the Moon for long enough to use some binoculars. Not clear enough for main telescope use so a chance to stand in garden pyjama log style...
The binoculars I picked up where the trusty 15x80 Vixens. A bit heavy for most to handhold, but excellent optics.
Orion, belt and sword below the band of cloud so good views of Orion Nebula, then above the cloud and Moon, the Pleiades always look like superb jewels in the bins.

On round through Auriga, the bright star Capella shepherding the goats (a triangle of stars that include the long period variable eta Auriga). Just catching the big clusters of M38, M36 but M37 is hidden from me by the neighbour's house.

So a move round to the back, the plough asterism shining through so a quick search shows the galaxies M81 and M82 at the edge of the cloud.

Ursa Minor and the pole star are only partly visible and I am just able to pick up the diamond ring asterism around Polaris.

To the west Cygnus and Lyra shining brightly Vega and the Eta Lyra double double very clear. Moving down to the bottom of the parallelogram and midway between the stars is a thin grey shape, M57 the ring nebula is just visible. Up through the Milky Way in Cygnus and the clusters of M29 and M39 are seen but so many other jewel boxes opened up by these big binoculars.

Cassiopeia is high up and about half of Pegasus with Andromeda showing so the giant galaxy M31 with its companion M32 revealed.

I love the binocular mornings…

Viewing Log 30th August. Andy Burns

While shooting the Milky Way at Grange Hill, Creech, near Kimmeridge, Dorset. This 'exotic' site is next to the tank range on the Jurassic Coast and is on top of a ridge with views all round, but Poole Harbour and Weymouth/Portland

put some light pollution into the sky, but deep southern view over the sea makes up for this.

Binoculars 11x70 Celestron.

Some mist over the sea. Sunset to 23:20pm as they lock the car park I was in.

Within 20 minutes of sunset scanning the horizon behind were it went down shows the round shapes of Venus then inside that marker Jupiter, very very low down and about 3º inside Venus. Luckily the altitude of the viewing site gives me the clear view. Moving to the southerly view Mars and Saturn (with Antares) aren't for behind showing. But I was there to set up for Milky Way imaging with two camera rigs, one tracking and the other taking a time lapse movie of the Milky Way crossing the sea horizon (see the Wiltshire Facebook page for this movie).

Once running and darker skies prevailed I could use the binoculars some more to run down the Milky Way boundaries. Using Cygnus tail star Deneb is a starting point (having looked at Andromeda galaxy with some curious by standers). Around the central star of the 'cross' of Cygnus

is the star Sadr. This part of the sky is so full of stars it is difficult picking out clusters of stars from the background but M29 does stand out, running down the neck to the head there are many clusters, ngc6883 and 6871 are visible then Albireo at the head. It does split in the clear skies even in these smaller binoculars. To the left ¼ of the way to Vega is the globular M56.

The blue stars of Delphinus look superb, then the smudge of the Dumbbell can be seen. A sweep of Sagitta picks out another faint globular and Brocchi's Coat Hanger Cluster. Aquila is bereft of a lot of objects due to the dust lines from the Cygnus rift, but by time I am down to Scutum and Serpens Cauda the pace picks up. M11, M26, ngc6712, M16 the Eagle nebula (though only the star cluster associated show up in these binoculars), M17 Omega nebula (again cluster only), M18, M24 the huge star drift window in Sagittarius, M25, M23, M21 Triffid, M8 Lagoon, M22, M28 then over in Ophiuchus globulars M14, M12, M10, M9, M19. In the teapot part of Sagittarius M54, M70 and M69,

Trips to the camera confirm the misty conditions creeping in so then spend most of the rest of the session keeping the camera lenses dry, as you can see from a couple of red glows

in the video!

Andy
Many thanks for the lovely pictures and great talk. We may well follow up on a observatory session in the future.
Best wishes
Faith

Hi Andy,
I'm just getting in touch to let you know that I'm leaving East Wichel Primary School (to do a History PhD in Manchester). I've taken the liberty of passing the Wiltshire Astronomical Society website link and your email to the new Year 5 teachers Timi and Bill (there will be two year 5 classes next year as the school is expanding) and they may get in touch with you when they teach their Space topic next year.
I hope you are enjoying the summer - I've been following the Marden Henge dig on twitter, and think I saw a photo of your drone!
best wishes,
Katherine

The Dark Nebula in the Cygnus Cephius region.
Barnards E, Dark regions near Altair.

Above pictures Nikon D810A using 85mm Nikkor lens on Star Adventurer mount.

Wide angle shot of Milky Way was using 14-24mm zoom on same camera and set up.

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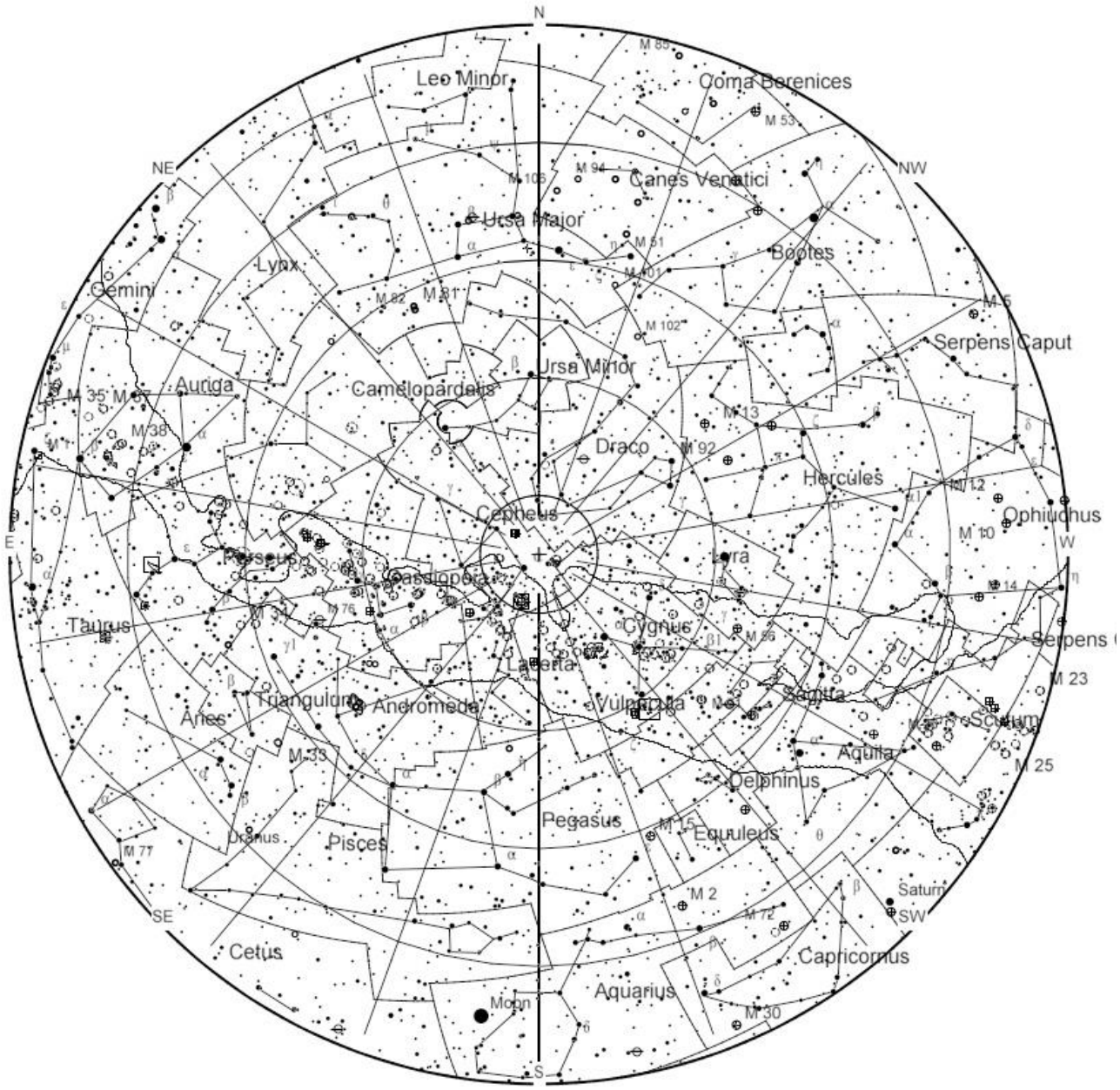
Now images from Friday night. Nikon D810A on 102TMB telescope, 60second exposures.

M13 and M92 in Hercules.

Coat Hanger Cluster

M27 Dumbbell planetary nebula

WHATS UP, SEPTEMBER 2016



September 3 - **Neptune at Opposition.** The blue giant planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than any other time of the year and will be visible all night long. This is the best time to view and photograph Neptune. Due to its extreme distance from Earth, it will only appear as a tiny blue dot in all but the most powerful telescopes.

September 16 - **Full Moon.** The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at 19:05 UTC. This full moon was known by early Native American tribes as the Full Corn Moon because the corn is harvested around this time of year. This moon is also known as the Harvest Moon. The Harvest Moon is the full moon that occurs closest to the September equinox each year.

September 16 - **Penumbral Lunar Eclipse.** A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra. During this type of eclipse the Moon will darken slightly but not completely. The eclipse will be visible throughout most of eastern Europe, eastern Africa, Asia, and western Australia. (**NASA Map and Eclipse Information**)

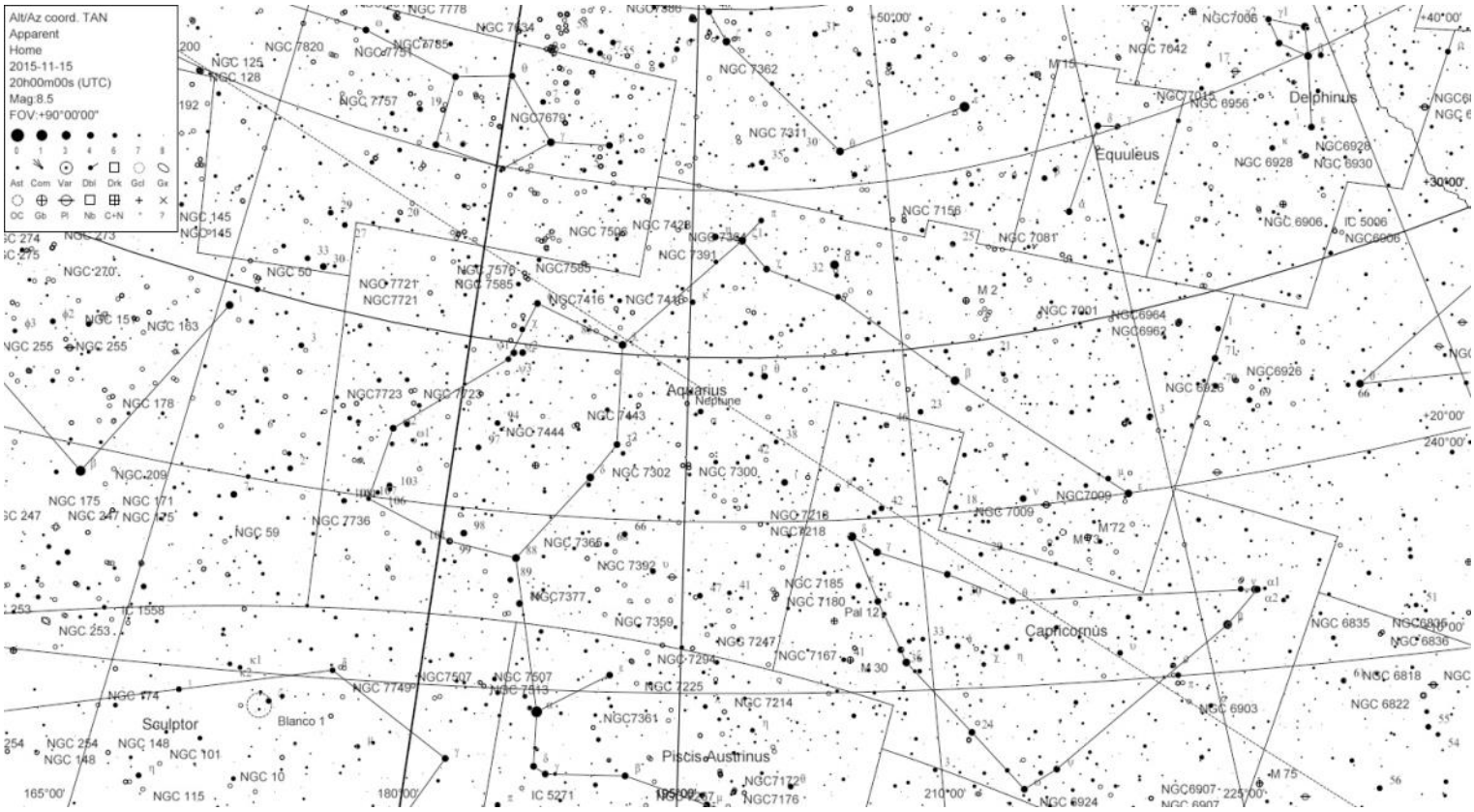
September 22 - **September Equinox.** The September equinox occurs at 14:21 UTC. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of fall (autumnal equinox) in the Northern Hemisphere and the first day of spring (vernal equinox) in the Southern Hemisphere.

September 28 - **Mercury at Greatest Western Elongation.** The planet Mercury reaches greatest western elongation of 17.9 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. Look for the planet low in the eastern sky just before sunrise.

A perseid meteor from the11th August. We only had a small window of clear skies but around 90 meteors were

seen by group of observers (not all by anyone). But some were very bright.

CONSTELLATIONS OF THE MONTH: Aquarius



In Greek mythology Aquarius was Ganymede, "cup-bearer to the gods". Ganymede's story is told in "Aquila". His position was essentially to pour wine for all the gods on Olympus, a function far removed from the initial importance of the Water Bearer, as it first rose in Babylonia.

In fact, the constellation seems to have represented water in a number of ancient cultures. In Egypt, for instance, the constellation was thought to cause the Nile to give forth its annual floods. The waters of the Nile, far to the south, would start to rise in June as the rains from the Ethiopian highlands began to run off into the Blue Nile. The night sky, in June, would show Aquarius at its zenith: the bringer of water.

Even if *alpha Aquarii* is a supergiant, perhaps a hundred times the size of the Sun, since it's a thousand light years away it only shines with a 2.96 visual magnitude.

Alpha Aquarii ("Sadalmelik") and *beta Aquarii* ("Sadalsuud") are twin supergiants with nearly identical names. The names mean, respectively, "The Lucky One of the King" and "The Luckiest of the Lucky". *Gamma Aquarii* shares in the good fortune: "Sadachbia": "The Lucky Star of Hidden Things".

"Why is so much luck found in Aquarius", you may ask. When the sun entered Aquarius the new year was about to begin, Spring was on the horizon and the watery season would assure abundant crops. One can therefore appreciate the importance of the Water Bearer.

Incidentally, if the "Age of Aquarius" was celebrated in the 1960s, the real event is still some 600 years off: at that time Aquarius will contain the vernal equinox, marking the return of the Sun into the northern celestial hemisphere.

Aquarius has a few nice binaries, a unique variable, and a few deep sky objects of some interest (but the Messiers here are generally sub-par). The stars are generally fourth magnitude.

The most notable asterism is of the water jug itself, tipped and pouring water. This small asterism, which fits nicely into a binocular field of view, is just west of alpha Aquarii and made up of zeta Aqr and three other stars.

Double stars in Aquarius:

Zeta^2 *Aquarii* and *zeta*^{1} *Aquarii* form a binary of two equal white stars with an orbit of 760 years.

Zeta^2 *Aquarii* is the primary: 4.4, 4.6; current PA 266º and separation: 2.3".

Struve 2944 is a nice triple system, with all three in a neat line.

AB: 7.0, 7.5; PA 276º, separation 2.5".
C: 8.4; PA 106º, separation 50".

The binary is 2º due east of kappa Aquarii.

Struve 2988 is a very attractive pair of equal stars: 7.2, 7.2; PA 101º, separation 3.5".

The binary is 3º SW of psi^1 Aquarii.

Variable stars in Aquarius:

The most remarkable variable in the constellation is *R Aquarii*, usually listed as a "Mira variable". Yet this red giant isn't your normal long-period variable; it is a 'symbiotic star', resembling Z Andromedae.

"Z Andromedae" stars are those which show two separate spectra, indicating two quite different temperatures, one cool, the other very hot. This phenomenon is caused by a very close binary system, which the larger star the cooler one, the small star(perhaps a white dwarf) the hot one.

And in fact, R Aquarii has a small blue companion, which is encircled by a gas cloud. When this small star eclipses the giant, the visual magnitude of the primary drops several degrees.

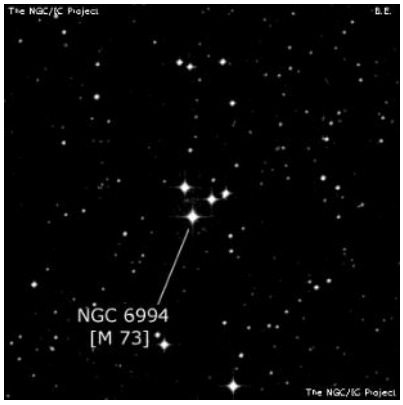
The star has a period of 386.96 days and a range from 5.8 to 12.4; the best time to view this star after the year 2000 is in 2005, in the first week of September.

Deep Sky Objects in Aquarius:

M2 (NGC 7089) is a globular cluster, compact and bright, about 50,000 light years away.

The cluster is 5º N of *beta Aquarii*.

M72 (NGC 6981 is also a globular cluster, about 3º WSW of the Saturn Nebula (see below). It is one of Messier's least attractive objects.



M73 (NGC 6994) is another uninteresting Messier, a 'cluster' comprised of four unrelated stars about 1.5º east of *M 72*.

NGC 7009, "Saturn Nebula" is a planetary nebula quite spectacular in large instruments. It has 'rays' which extend from both sides of the main disc. The nebula is 1º west of *nu Aqr*. Burnham (p. 190) has a location chart.

NGC 7293, "Helix Nebula" (or the "Helical Nebula"), is another planetary nebula, given its name apparently because it is said to resemble the DNA double helix. It really is a ring nebula, only much larger and fainter than the more notable Ring Nebula in Lyra.

The nebula is 1.5º W of *upsilon Aquarii*, or 21º due south of *zeta Aquarii*.

Upcoming Local Astronomy Events.

How Outer Space looked to the Georgians. Priory Barn, Newtown, Bradford on Avon 7pm Tuesday 13th September

Jonathan Hall from the Herschel Museum, Bath, will give a talk around the famous brother and sister astronomers, William and Caroline Herschel. William was a pioneer of what we now call 'cosmology' and one of the first people to try and accurately plot our galaxy from observations he had made of double-stars. He also built the largest telescope in the world (at the time) that could see fainter objects and further into the universe. William discovered the planet Uranus from his garden at 19 New King Street, Bath on 13th March 1781. Both he and Caroline were also gifted musicians. This should prove to be an interesting evening combining scientific and artistic content, with a definitely local and historic flavour. This is a collaborative event between Bradford on Avon Preservation Trust and BoA Arts Festival. Ticket only £4, including refreshment.

Price: £4.00

Also October Friday 14th, Saturday 15th

International Astronomy Show 2016

Warwickshire Show Ground Off Fosse Way, Stoneleigh Park, Warwickshire, CV8 2LZ

ISS PASSES For Summer 2016 From Heavens Above website maintained by Chris Peat

Date	Brightness	Start	Highest		End					
	(mag)	Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
06 Sep	-0.9	05:49:53	10°	S	05:52:12	18°	SE	05:54:31	10°	E
07 Sep	-0.6	04:58:47	10°	SSE	04:59:55	11°	SE	05:01:04	10°	ESE
08 Sep	-1.9	05:40:24	10°	SSW	05:43:20	30°	SSE	05:46:16	10°	E
09 Sep	-1.4	04:49:46	17°	S	04:50:57	20°	SE	04:53:28	10°	E
10 Sep	-0.6	03:59:23	12°	SE	03:59:23	12°	SE	04:00:17	10°	ESE
10 Sep	-2.8	05:32:01	15°	SW	05:34:31	50°	SSE	05:37:42	10°	E
11 Sep	-2.3	04:41:35	33°	S	04:42:02	34°	SSE	04:45:03	10°	E
12 Sep	-0.8	03:51:06	17°	ESE	03:51:06	17°	ESE	03:52:17	10°	E
12 Sep	-3.3	05:23:44	22°	WSW	05:25:43	73°	SSE	05:29:00	10°	E
13 Sep	-3.1	04:33:13	55°	SSE	04:33:13	55°	SSE	04:36:23	10°	E
13 Sep	-3.3	06:06:17	10°	W	06:09:35	84°	N	06:12:52	10°	E
14 Sep	-0.7	03:42:41	18°	E	03:42:41	18°	E	03:43:43	10°	E
14 Sep	-3.4	05:15:19	28°	W	05:16:56	89°	N	05:20:14	10°	E
15 Sep	-3.0	04:24:47	61°	E	04:24:47	61°	E	04:27:35	10°	E
15 Sep	-3.3	05:57:29	10°	W	06:00:47	90°	NNW	06:04:04	10°	E
16 Sep	-0.4	03:34:15	15°	E	03:34:15	15°	E	03:34:56	10°	E
16 Sep	-3.4	05:06:52	35°	W	05:08:07	85°	N	05:11:25	10°	E
17 Sep	-2.3	04:16:22	44°	E	04:16:22	44°	E	04:18:45	10°	E
17 Sep	-3.3	05:49:00	13°	W	05:51:55	72°	SSW	05:55:11	10°	ESE
18 Sep	0.0	03:25:53	11°	E	03:25:53	11°	E	03:26:03	10°	E
18 Sep	-3.4	04:58:32	51°	W	04:59:15	87°	S	05:02:32	10°	E
19 Sep	-1.5	04:08:07	29°	E	04:08:07	29°	E	04:09:51	10°	E
19 Sep	-3.0	05:40:46	18°	W	05:42:56	49°	SSW	05:46:07	10°	SE
20 Sep	-3.3	04:50:26	65°	S	04:50:26	65°	S	04:53:33	10°	ESE
21 Sep	-0.6	04:00:13	15°	ESE	04:00:13	15°	ESE	04:00:54	10°	ESE
21 Sep	-2.4	05:32:54	25°	WSW	05:33:50	30°	SSW	05:36:44	10°	SSE
22 Sep	-1.6	04:42:50	24°	SE	04:42:50	24°	SE	04:44:21	10°	SE
22 Sep	-1.1	06:16:01	10°	WSW	06:17:02	11°	SW	06:18:03	10°	SSW
23 Sep	-1.3	05:25:37	15°	SSW	05:25:37	15°	SSW	05:26:50	10°	S
29 Sep	-1.1	20:01:56	10°	SSE	20:02:50	12°	SSE	20:02:50	12°	SSE
30 Sep	-1.7	20:43:29	10°	SW	20:45:13	24°	SSW	20:45:13	24°	SSW
01 Oct	-1.8	19:51:12	10°	SSW	19:53:45	21°	SE	19:54:48	18°	ESE
01 Oct	-0.7	21:26:35	10°	WSW	21:27:26	17°	WSW	21:27:26	17°	WSW
02 Oct	-3.1	20:33:51	10°	SW	20:36:53	51°	S	20:36:53	51°	S
03 Oct	-2.5	19:41:13	10°	SW	19:44:15	36°	SSE	19:46:13	18°	E
03 Oct	-1.3	21:17:15	10°	W	21:18:50	26°	W	21:18:50	26°	W
04 Oct	-3.4	20:24:23	10°	WSW	20:27:39	75°	SSE	20:28:04	61°	ESE
05 Oct	-3.1	19:31:34	10°	WSW	19:34:47	57°	SSE	19:37:15	16°	E
05 Oct	-1.6	21:07:55	10°	W	21:09:52	33°	W	21:09:52	33°	W
06 Oct	-3.4	20:15:00	10°	W	20:18:16	89°	N	20:18:59	51°	E
06 Oct	0.1	21:51:27	10°	W	21:51:36	11°	W	21:51:36	11°	W
07 Oct	-3.3	19:22:04	10°	WSW	19:25:20	79°	SSE	19:28:05	14°	E
07 Oct	-1.9	20:58:31	10°	W	21:00:41	38°	W	21:00:41	38°	W
08 Oct	-3.4	20:05:34	10°	W	20:08:51	85°	N	20:09:45	45°	E
08 Oct	0.0	21:42:02	10°	W	21:42:21	12°	W	21:42:21	12°	W

END IMAGES

The Sun was putting on some occasional spurts of activity through the summer but we are approaching the end of the current cycle.

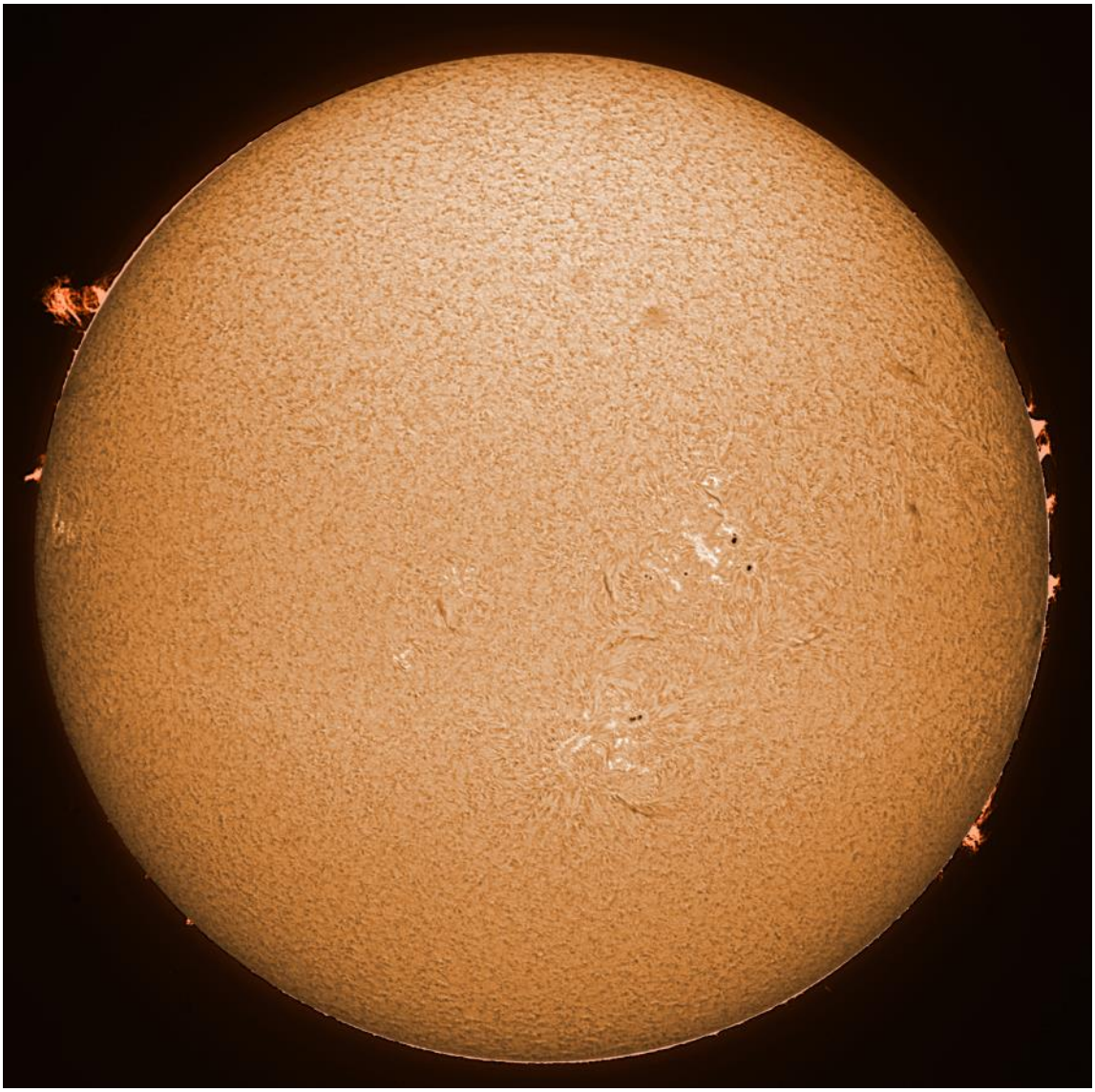
Flares as seen in the north west edge attest to this.

BUT these Coronal Mass Ejections are already feeding potential UK visible Aurora.

Keep eyes and ears open for late calls for Aurora.

Imaged 15th August Halpha on televue 127.

Andy Burns



Date	Moon Phase	Observing Topic
2016		
Friday August 12th	*Waxing Gibbous (rising 4pm)*	*Perseid meteors*
Friday September 23rd	Last Qtr (Rising 12 midnight)	Deep sky
Tuesday September 27th	*Waning crescent (sets 5pm)*	*Conjunction of Venus and Jupiter*
Friday October 28th	Waning crescent (sets 5pm)	Deep Sky
Friday November 25th	Waning crescent (sets 3pm)	Deep sky
Tuesday 13th / Wednesday 14th December	*Full*	*Geminids meteors*
Friday December 30th	Waxing crescent (Sets 6 pm)	Deep Sky & Lunar targets (Xmas session, meet at 6pm)
2017		
Friday 27th January	New Moon	Deep Sky
Friday 24th February	Waning crescent (sets 3pm)	Deep Sky
Friday 24th March	Waning crescent (sets around 2pm)	Deep Sky
Friday 28th April	Waxing crescent (sets 11pm)	Deep Sky & Lunar targets
Friday 26th May	Waxing crescent (sets around 10pm)	Deep Sky & Lunar targets

OUTREACH ACTIVITIES

September/October date to be arranged for clear sky window. Chippenham 10th Scout troup. Westmeade Fields.

Early January 2017? Star Gazing Live

January 26th Lacock Positives Photographic Society Talk.