Stars Over Surrey

Astronomy & Spaceflight News

28th August 2020

Safe Return of Crew Dragon from ISS

- 2nd August, Benkhen & Hurley safely splashed down in Gulf of Mexico off Florida after their 64-day test flight to ISS
- Complete taxi-service provided by SpaceX
  - Falcon 9 launcher
  - Crew Dragon vehicle
  - Mission control for ascent/descent
  - Recovery team
- Crew-1 mission launch date now set for 23rd Oct 2020

SpaceX Starship Prototype Takes a Hop

- Starship full-sized prototype SN5 made a 150 metre hop on 4th August using a single Raptor engine
  - the final version of Starship will have 6 Raptors
  - it will be launched on top of a Super Heavy booster, 31 Raptors
- Starship prototype SN8 will have nose cone and body flaps, three Raptors and is expected to reach 12 miles
  - before that there will be other tests using SN5 and the identical SN6

- Video can be watched at

youtube.com/watch?time_continue=14&v=s1HA9LIFNM0&feature=emb_logo_x000B_

Misc Space X News

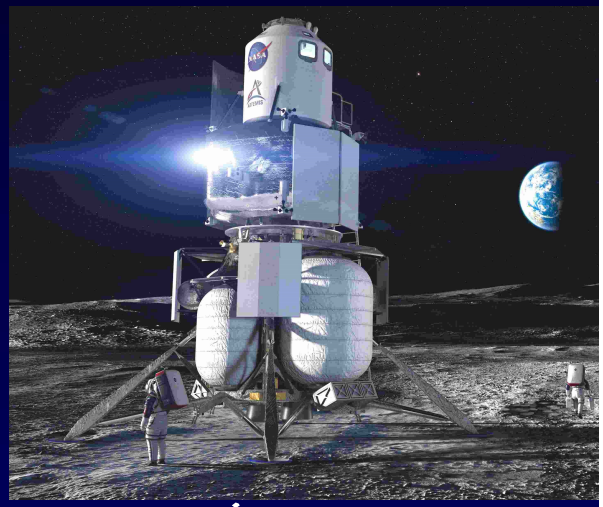
- **Two more batches of Starlinks launched**
  - August 7th and 18th, bringing total now in orbit to 653
  - latter of these was the 6th flight and landing for its Falcon 9 booster, a record
  - two more batches planned for September launches
  - Fairing captured again
    - both fairing and MS Tree were on automatic control during the capture

- Video can be watched at

https://www.youtube.com/watch?v=ni5xaFTw7To

Blue Origin Lunar Lander

- Jeff Bezos's Blue Origin leads a consortium submitting a bid to NASA for Project Artemis's Lunar lander
  - National Team: Blue Origin, Lockheed Martin, Northrop Grumman, Draper
- Engineering mock-up has just been delivered to NASA for testing
- Consists of three elements.
  - Descent Stage
    - Blue Origin's robotic Blue Moon lander
  - Ascent Stage
    - features from Orion capsule, Lockheed prime contractor
  - Transfer Stage
    - based on Northrop Grumman's Cygnus ISS resupply vessel
- Two other companies also contracted for lander development
  - Space X with Starship & Dynetix with Human Landing System



Virgin Galactic delayed by Coronovirus

- Covid-19 has been a factor in delaying any passenger flights on VG's sub-orbital flights until 2021
  - the company states that pandemic health and safety measures have “slowed its pace” towards operational flights
- Two more test flights are necessary from its new Spaceport America facility prior to commercial flights
  - Standard test flight with two crew in Autumn
  - Flight to test passenger cabin performance, two crew plus four mission specialists
- Richard Branson expects to fly in Spring 2021 on “soft launch” of commercial operations.

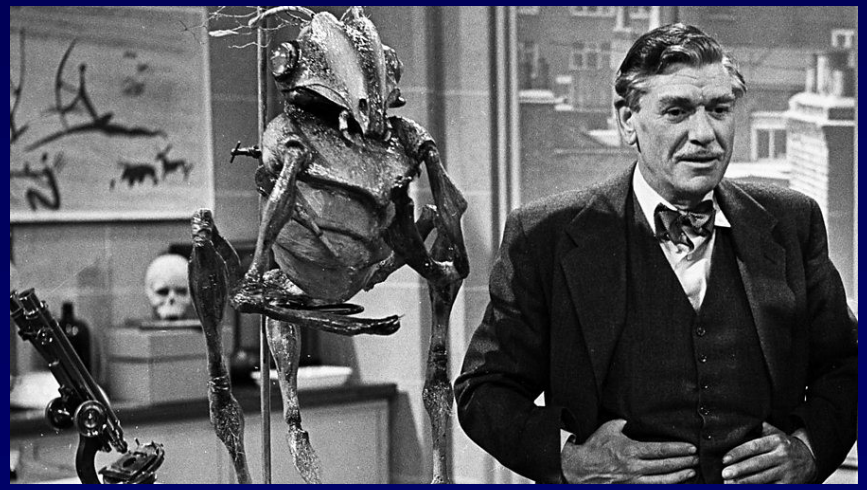
Misc ISS News

- Small leak detected in US section
  - the leak is said to be very minor but the crew are sealing themselves inside the Russian section this weekend whilst engineers try to detect its location.

- Last Japanese re-supply vessel departs Station
  - The ninth and final craft in the current series of Japan's HTV cargo ship has departed from the ISS laden with several tonnes of discarded equipment
  - It will burn up over the South Indian Ocean
  - The first HTV arrived at ISS in 2009
  - the new upgraded HTV-X will beging operations to ISS in late 2022.

Are we Martians?

- Japanese scientists from University of Tokyo left samples of a bacterium outside the ISS for years
  - They have announced that if the clumps of bacteria were thick enough then it could survive in the cold and vacuum of space for as long as three years
- We know that chunks of Mars have been ejected from Mars by the force of an asteroid impact and fallen to Earth as meteorites
- This means a colony the size of a grain of sand could have floated across to Earth and seeded life here
- Perhaps Prof Quatermass was right, life did come to Earth from Mars!



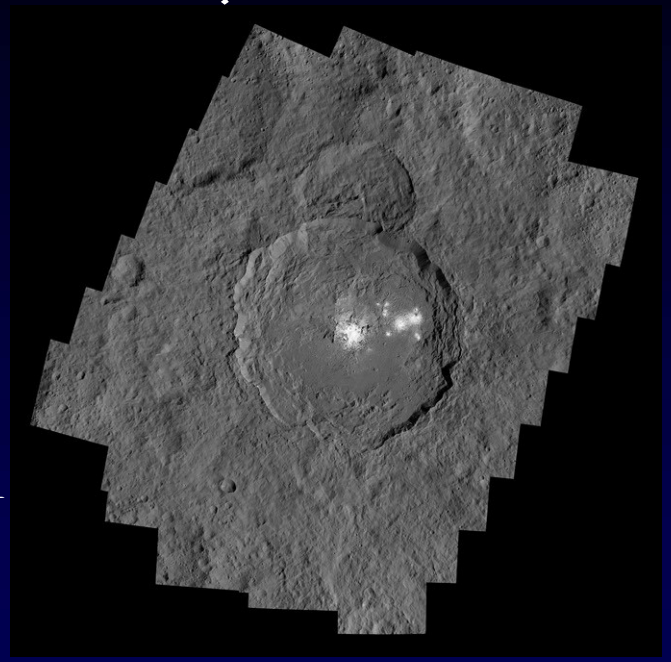
Asteroid Mission news

- Asteroid Bennu
  - early this month NASA's OSIRIS-REx spacecraft conducted a rehearsal of its touch-and-go sample retrieval mission
    - descended from its holding orbit 0.6 miles away to just 131 feet
  - actual sampling run set for 20th October
    - Intent is to gather 2 ounces of pristine surface material
- Asteroid Ryugu
  - Australian Gov't has formally approved the landing of Hyabusa 2's re-entry capsule on 6th December at Woomera

Asteroid skims past Earth

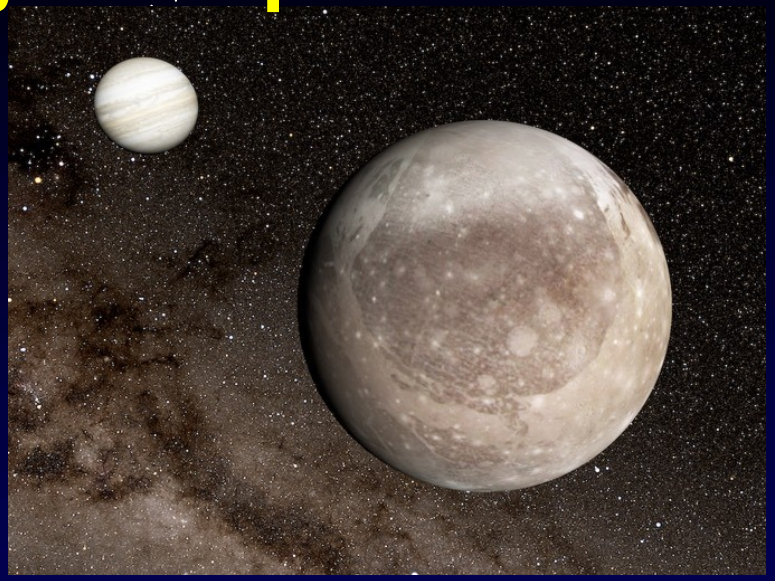
- The closest pass ever by an asteroid (without impacting us) occurred on 16th August
- It was discovered several hours afterwards
  - Zwicky Transient Facility (robotic survey instrument) at Palomar Observatory
- Asteroid 2020 QG passed 1,830 miles above Indian Ocean
- Sized somewhere between 10 and 20 feet
  - Not big enough to penetrate atmosphere, it would have burned up.
- This sort of encounter is believed to occur about once every year, most undetected.

Ceres may still be cryovolcanically active



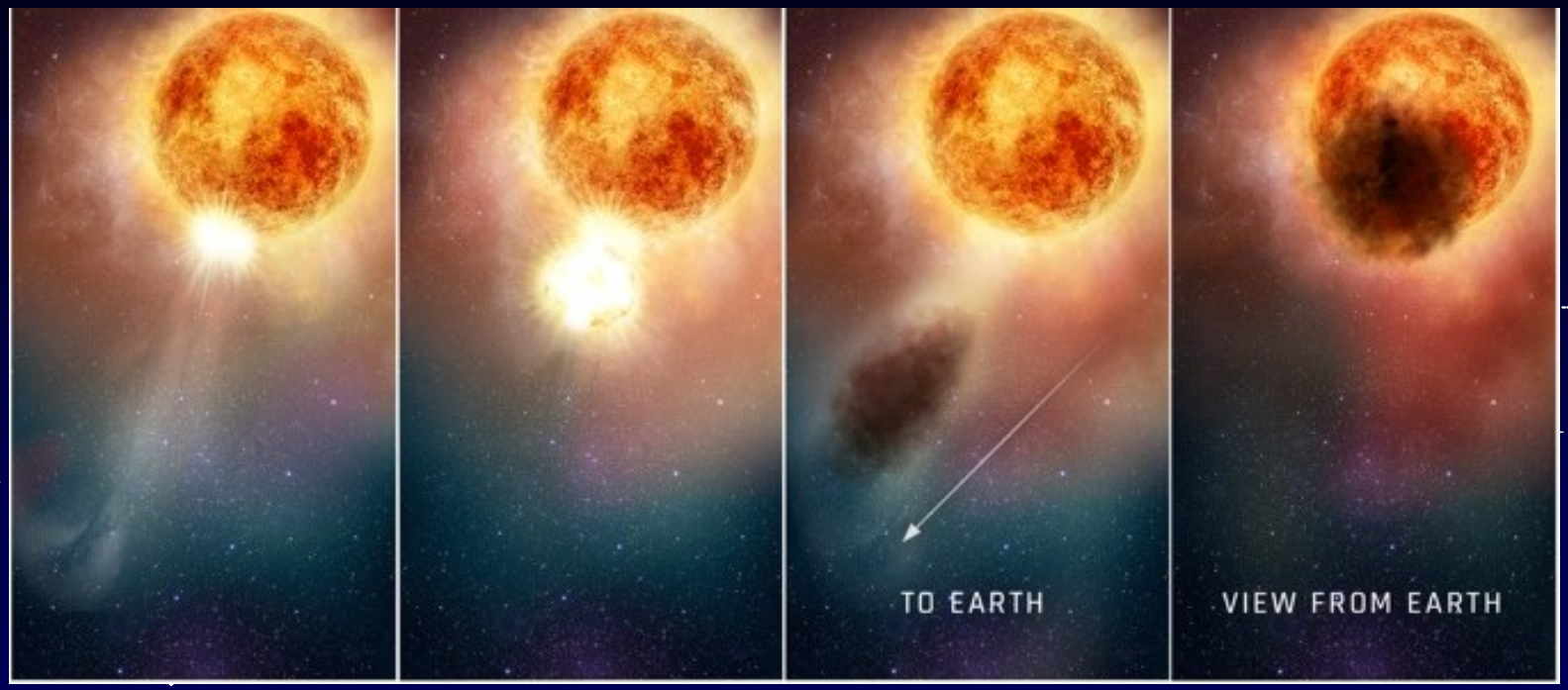
- These bright spots on the dwarf planet Ceres aroused considerable interest when discovered by NASA's Dawn spacecraft in 2018
  - they are in the Crater Occator which is 57 miles across and was caused by an impact 22 million years ago
  - At the end of the mission Dawn flew to just 22 miles above the surface to study these spots
- These are briney salt deposits, caused where brine has been able to seep through surface layers and settle out
- It's thought that this cryovolcanic activity began only nine million years ago and continued until just one million
- Conclusion is that Ceres could still be active and with sub-surface lakes of liquide briney water, 25 miles deep

Solar System's Largest Impact?



- Researchers at Kobe Uni have re-examined data from Galileo & Voyagers 1 & 2 and believe they've found evidence of a huge impact on Jupiter's Moon Gannymede
  - the impact structure stretches 4,800 km across the surface (Ganymede's circumference -16,530 km)
  - impactor would have measured 150 km travelling at 10 km/sec
- The Perine Regio area is almost circular and reminiscent of the mare on the Moon which were caused by volcanism following impacts by large asteroids.
- The lighter areas on the surface feature groves that are concentric, focusing on one point, and this suggests crustal movement following an impact

Betelgeuse's dimming: another theory



- Last year Betelgeuse suddenly dimmed, reason unknown
  - recent theory was that a giant sunspot darkened the surface
- Now Hubble has studied it using ultra violet wavelengths
- Conclusion is a cloud of debris ejected and cooled, forming dust cloud between the star and Earth

50 more Exoplanets by AI

- Number of confirmed exoplanets discovered to date is 4201, over half discovered using NASA's Kepler mission.
  - vast majority discovered using transiting method, looking for a dip in light as planet passes in front of a star
- Warwick Uni scientists have just added 50 using a 'machine learning' artificial intelligence algorithm looking at datasets from Kepler.
  - this has found a way of removing false positives that hitherto prevented confirmation.
    - interference from background object
    - camera error

High Speed Supernova Debris

- In 1604 a Type 1a Supernova occurred 20,000 LY away, bright enough to be seen naked eye
  - one of those who observed it was Johannes Kepler and it is known as the Keplar Supernova to this day

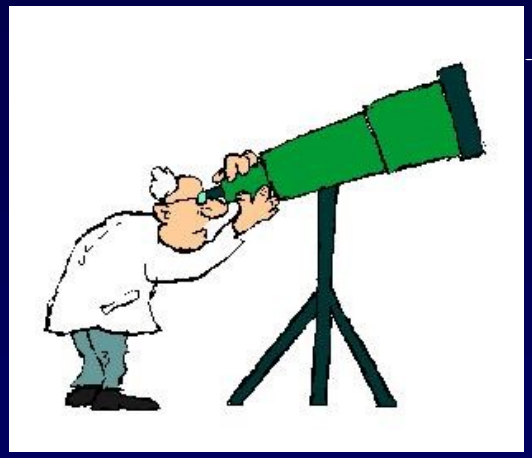
- Researchers have used images taken by the Chandra X-ray Observatory satellite and have measured changes in the debris cloud since 2000
- The fastet knot in the debris cloud was still travelling at 23,000,000 mph 400 years after the explosion
- It's not clear why this should be
  - was it a particularly violent Type 1a Supernova?
  - was the local matter density very low?
  - was it a merger of two white dwarfs?

Stable early galaxy spotted

- A primitive galaxy not unlike our Milky Way in shape has been discovered by the ALMA radio telescope
  - the 'ring of fire' is caused by gravitational lensing, the light being bent around an intervening galaxy and magnified
- The galaxy is 12 billion light years away
- This means it was in existence only 1.4 billion years after the Big Bang
- Deconstruction of the image reveals an apparently stable galaxy with a rotating disc and a central bulge, just like our Milky Way. It's not clear why this should be
  - current thinking has been that galaxies this early would be chaotic and unstructured
- Video at: s://www.youtube.com/watch?time_continue=2&v=Nvy_wUvTI2E&feature=emb_logo

What's Up!

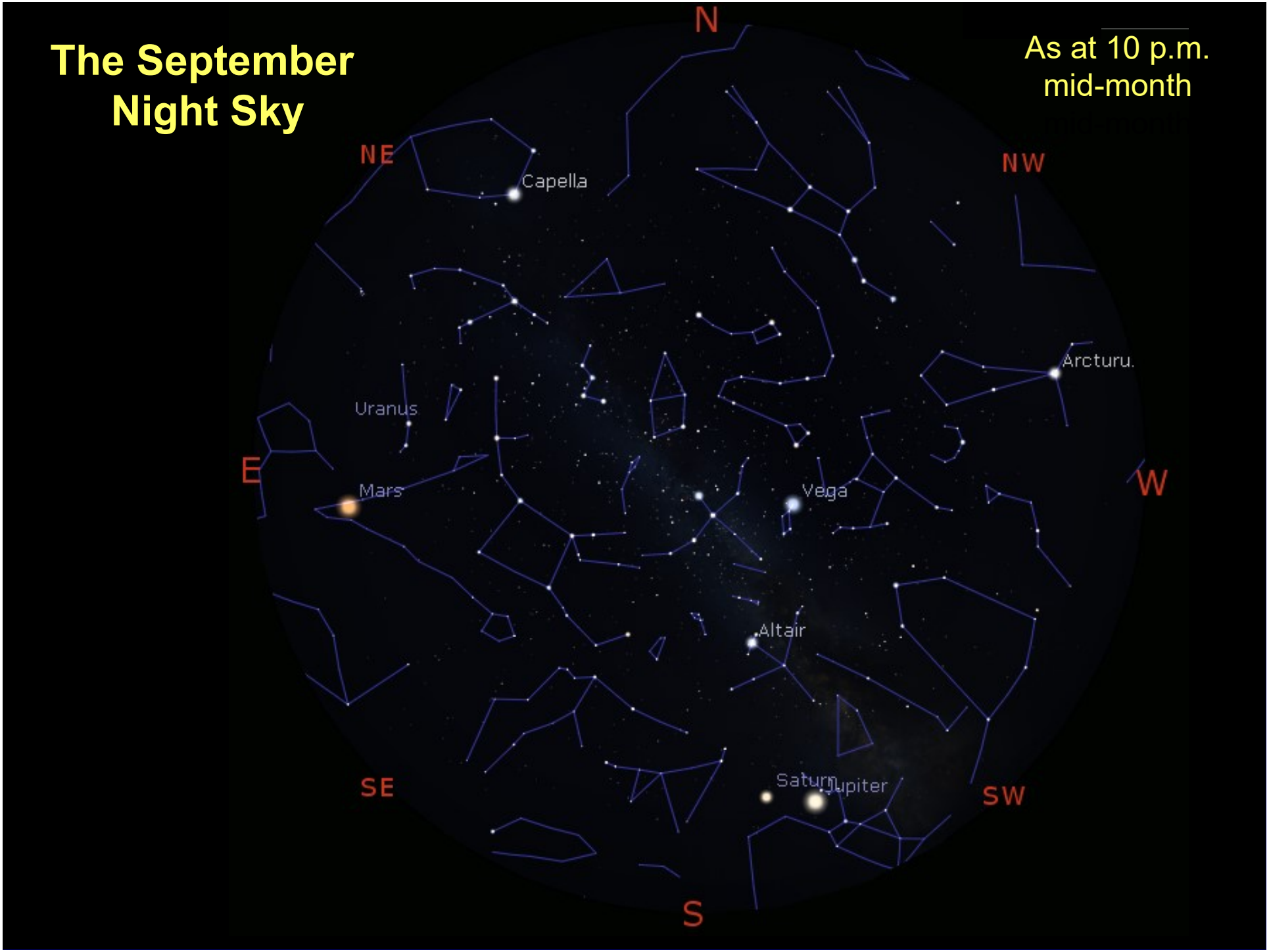
For September 2020



Brooklands Radio
The Sound of Surrey
DAB | Online | Mobile App
Variety | Personality | Companionship

The September Night Sky

As at 10 p.m. mid-month



Sun & Moon in September

- Full Moon 2nd
- Last Quarter 10th
- New Moon 17th
- First Quarter 24th

		Sun	Moon
1st	Rise	06.15	20.04
	Set	19.47	06.05
15th	Rise	06.37	03.21
	Set	19.15	18.57
30th	Rise	07.01	19.41
	Set	18.46	06.12

What's Up - Planets

- **Mercury**
  - Not visible this month
- **Venus**
  - Venus is a brilliant morning object blazing away at magnitude -4.1 in the East. It rises four hours before sunrise at the start of the month.
- **Mars**
  - The red planet can be seen rising in the East about 9 pm at the start of the month, and before 8 pm by the end. Best seen when it culminates in the South in the early hours. It brightens to mag -2.4 by the end of the month.

What's Up - Planets

- **Jupiter**
  - Best seen in the South after nightfall, quite dominant at mag -2.4, low amongst the stars of Sagittarius. It remains an evening object all month, but dims slightly by month end.
- **Saturn**
  - Following on behind Jupiter, i.e just to its East, low in the South, late evening and early hours, at mag +0.6
- **Uranus**
  - Well positioned in the South in the early hours
- **Neptune**
  - Visible all night long. Can be found in Aquarius in the South at mag +7.8 approx 30° high

Astronomical Phenomena in September

- **2nd** Full Moon occurs at apogee - a “micromoon”
- **6th** The Moon will be ½° from Mars before sunrise
- **10th** Mars seems to stop moving easterly against the background of stars. This is known as its “Stationary Point” and will then begin to move westward. This is just an effect caused by the particular positions reached by Earth and Mars in their respective orbits.

- **14th** Before sunrise Venus will be about 2° below M44 'The Beehive' cluster and the waning crescent Moon will be 1.5° above the cluster

- **24th** The Moon is close to Jupiter
- **25th** The Moon is close to Saturn

Meetings at Local Societies

- Given the current Covid-19 situation, all meetings at our local astronomical societies have been cancelled until further notice.
- You might like however to see their websites for items of interest:
  - **Guildford AS** http://www.guildfordas.org/
  - **Farnham AS** https://www.farnham-as.co.uk/
  - **Croydon AS** http://www.croydonastro.org.uk/
  - **Ewell AS** https://ewellastronomy.org/
  - **Walton AG** http://www.waltonastrogroup.co.uk/

Meetings & talks on-line

- You might find free Zoom sessions of interest:
  - **British Astronomical Association: *Autumn Meeting***
    - Saturday 5th September, 2 talks of 1 hr each
    - 11 am: *The Life and Death of Black Holes*
      - Prof Christine Done, Durham University
    - 2.30 pm: *The Search for the Universe's Missing Mass*
      - Dr Andreea Font, Liverpool John Moore Uni
    - https://www.britastro.org/node/22777
  - **British Astronomical Association: Zoom webinar** *"Comet C/2020 F3 NEOWISE"*
    - Wednesday 16th September at 7.00 - 8.00 pm
      - Nick James, Director BAA Comet Section
    - https://www.britastro.org/node/23903

Meetings & talks on-line

- You might also find this of interest:
  - **GoSpaceWatch: Zoom talk "*SpacePort Cornwall: Launching the UK Back into Space*"**
    - Wednesday 16th September, 7.30 - 9.30pm
      - book via Helm Tickets, £3.00
    - www.gospacewatch.co.uk/

Meetings & talks on-line

- and this one:
  - **Society of Popular Astronomy: Zoom talk**
    "*Meteorites: the stones from outer space that made our world*"
    - Saturday 19th September, 2 pm, free
      - Dr Tim Gregory, British Geological Survey
    - www.popastro.com/main_spa1/meetings-and-events/

Astronomy on TV

The Sky at Night *" Beyond The Visible"*

- This month the team find out how astronomers are learning about the Universe by looking beyond visible light. Exploring radio astronomy, the unusual sounds that space missions have captured of the cosmos and the detection of ripples in space-time known as gravitational waves, this episode is about how so much more can be detected by studying the unseen.

Sunday	13th September	BBC 4, 10.00 pm
Thursday	17th September	BBC 4, 7.30 pm

World Space Week: 4th - 10th October

- World Space Week is a UN declared international space event, covering all aspects of spaceflight and astronomy
  - 4th October is the anniversary of the launch of the world's first ever satellite, Sputnik 1, in 1957.
- Last year there were 8,000+ events in 96 countries, including one in Guildford
- This year all the events will have to be on-line, but plenty of interesting things are planned
  - Organised by local branch of Institute of Physics with support from University of Surrey's Physics Dep't, MSSL, Surrey Satellites Ltd, Guildford AS, etc


"That's all Folks!"