

# Stars Over Surrey

## Astronomy &

## Spaceflight News

26<sup>th</sup> June 2020



Variety | Personality | Companionship

# Crew Dragon Docks at ISS

- After a 19 hour journey NASA astronauts Bob Behnken and Doug Hurley docked safely in their Space X Crew Dragon
  - both said the ride was smoother than on the Space Shuttle
  - docking was so smooth they didn't actually feel it happen
  - twice took manual control during approach to test procedures
- Now they are on ISS they're assisting the other 3 crew with experiments whilst also testing Crew Dragon systems
  - Demo-2 mission duration still unclear, between 1 and 4 months
- Next Crew Dragon Mission is Crew-1 (1<sup>st</sup> fully operational mission), and will take 3 NASA & 1 JAXA astronauts to ISS
- First Boeing Starliner crewed mission expected March '21



## New Space Toilet for ISS

- NASA has designed and built a new toilet (UWMS) which will soon be deployed to the ISS
  - Universal Waste Management System
- Much more “female friendly”
  - initial toilets were designed just for men
- Will be taken on Crew Dragon to test on ISS prior to inclusion in fitting into Orion capsule and Gateway lunar space station
- Feed into designs for long missions to Mars
  - 1/4 ton of faecal matter produced, even more urine!
- “In space, no-one can help you clean!”



# Misc Space X News

- **Starlink**

- Two launches have taken place in June

- 4<sup>th</sup> June - 60 satellites, including first deployment of “VisorSat” as test of approach to darken Starlink satellites. First time 1<sup>st</sup> stage booster recovered 5 times and also first to land on new drone ship “*Just Read The Instructions*”

- 13<sup>th</sup> June - 58 Starlinks, plus 3 other satellites as first launch in SmallSat Rideshare Programme. Both fairings had previously flown

- One scheduled originally for June 22<sup>nd</sup> postponed till July

- 58 Starlinks plus 2 BlackSky Earth observations satellites (Rideshare)

- **Starship**

- Latest prototype SN7 deliberately tested to destruction

- basically a stainless steel tank filled with liquid nitrogen

- SN4 exploded 29/5/20 (unintentionally) after test of its Raptor engine

# UK Government to invest in One Web?

- OneWeb - competitor to SpaceX in the broadband satellite market, filed for bankruptcy in March
- London based company, has 74 satellites in orbit
- Government has just announced it plans to invest c£500m in a 20+% stake in the company
- Plans to convert OneWeb satellite network to UK satnav system, given EU will deny us use of Galileo
  - OneWeb states it has innovative approach to make satellites dual purpose - broadband & Satnav
  - Problem: Satnav satellites are deployed in 20,000 km orbits and OneWeb network is at 1,200 km orbit
- UK Space Agency has advised Gov't that this is huge risk
- Gov't view is that developing our own alternative to Galileo from scratch would be too expensive, c£5 bn

# Virgin Galactic signs contract with NASA

- NASA and Virgin Galactic have agreed to work together preparing private astronauts for paid visits to the ISS
  - “private orbital readiness programme”
- This is likely to involve candidate identification, ground-based readiness training, plus probably sub-orbital experience on VG's Spaceship 2
- NASA and Virgin Galactic already have an agreement whereby NASA astronauts will get sub-orbital experience on board Spaceship 2, and it's probable that they will get this also on Blue Origin's New Shephard rocket & capsule



# US & UK sign agreement

- Launching satellites from the UK has just moved an important step closer

- The Technology Safeguards Agreement was signed 16/6/20

- makes it easier to bring US rocket hardware to UK.

- Lockheed-Martin & Virgin Orbit are keen to launch from UK

- UK firms Orbex and Skyrora also in the running

- great opportunities for other UK firms to be involved in the component supplier chain

- First sites likely to be Sutherland and Newquay

- other potential sites are Shetland, Western Isles, Glasgow Prestwick, Campbeltown, and Snowdonia.

- More consultation and planning inquiries under way



# New Satellite Test Chamber

- A giant satellite test vacuum chamber has been installed at the National Satellite Test Facility at Harwell in Oxfordshire
- Built in Italy, delivered by ship, sections transported from Portsmouth by road
  - 98 tons, 16 metre long, 8 metre diameter
  - one of biggest road movements ever seen in UK.
- Together with existing smaller chambers, this now provides a one-stop testing shop for UK satellite manufacturers
  - complete satellites, components, instruments, sensors
  - previously these had to be shipped off to Europe at great expense and difficulty.



## News In Brief

- China launches final satellite to complete its GPS-like satellite navigation system
  - 30<sup>th</sup> of their BDS-3 series of satellites, Biedou System
  - launched by Long March 3B, 23/6/20 (live TV event)
- Covid-19 closures have caused further delays to launch of James Webb Telescope
  - already much delayed and over-budget
  - scheduled launch date of March 2021 now shelved
- NASA's Perseverance Rover is undergoing final preparation and positioning prior to its launch July 22<sup>nd</sup>
  - launch by Atlas V for 7 month journey, budget was \$2.4 B
  - 1<sup>st</sup> US Rover since Curiosity launched in 2011

## News In Brief (cont'd)

- Space X and NASA have agreed that astronauts will be flown on re-used Crew Dragon capsules
  - Modified Commercial Crew contract now allows this and also re-use of Falcon 9 1<sup>st</sup> stages for manned missions.
- Bob Behnken will make EVA with fellow NASA astronaut Chris Cassidy to replace ageing batteries on ISS Solar Power system
  - Four such space walks are planned
  - Breaking News: Crew Dragon will return from ISS about August 2<sup>nd</sup> and next Crew Dragon mission to ISS now expected in September

# New Study: Civilisations rare in our galaxy

- Fermi Paradox “If Aliens exist - where are they?”
- Spread of civilisations in our galaxy usually calculated using the Drake Equation, best guesses as to likelihood of star having planets, planets being suitable for life, chance of it evolving/surviving, etc.
- New study by University of Nottingham takes different approach
  - number of stars in galaxy similar in metal content to our Sun
  - 5 billion years old (time for Earth to form and life to evolve)
- Produces answer of just 36 “active civilisations”
- Problem: average distance between would be 17,000 LY
- If we were to find one it might indicate the possibility of civilisations lasting a long time
- If we don't, and are alone - time to worry!

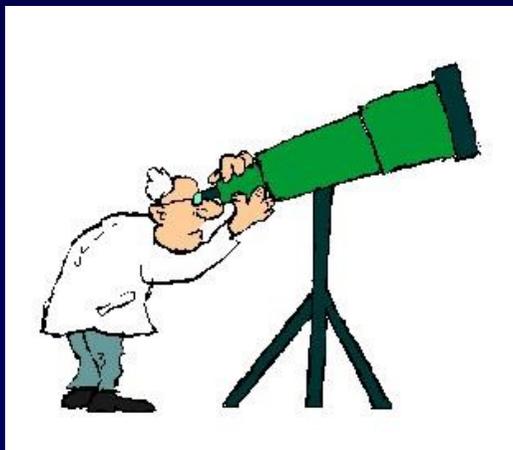
# Gravity Wave - interesting merger detected

- The US-based LIGO and Italian Virgo gravity wave observatories detected a merger in August 2019
  - 790 MLY distant
- Black Hole 23 times the mass of our Sun merged with another object of just 2.6 solar masses
  - 9:1 ratio is highest ever seen
- Smaller object is either most massive ever Neutron Star or smallest ever known Black Hole (unknown as to which)
  - either way it breaks a record and helps fill in the “mass gap” between Neutron Stars and Black Holes
- Final object is Black Hole of 25 solar masses
  - half a solar mass emitted as Gravity Wave energy



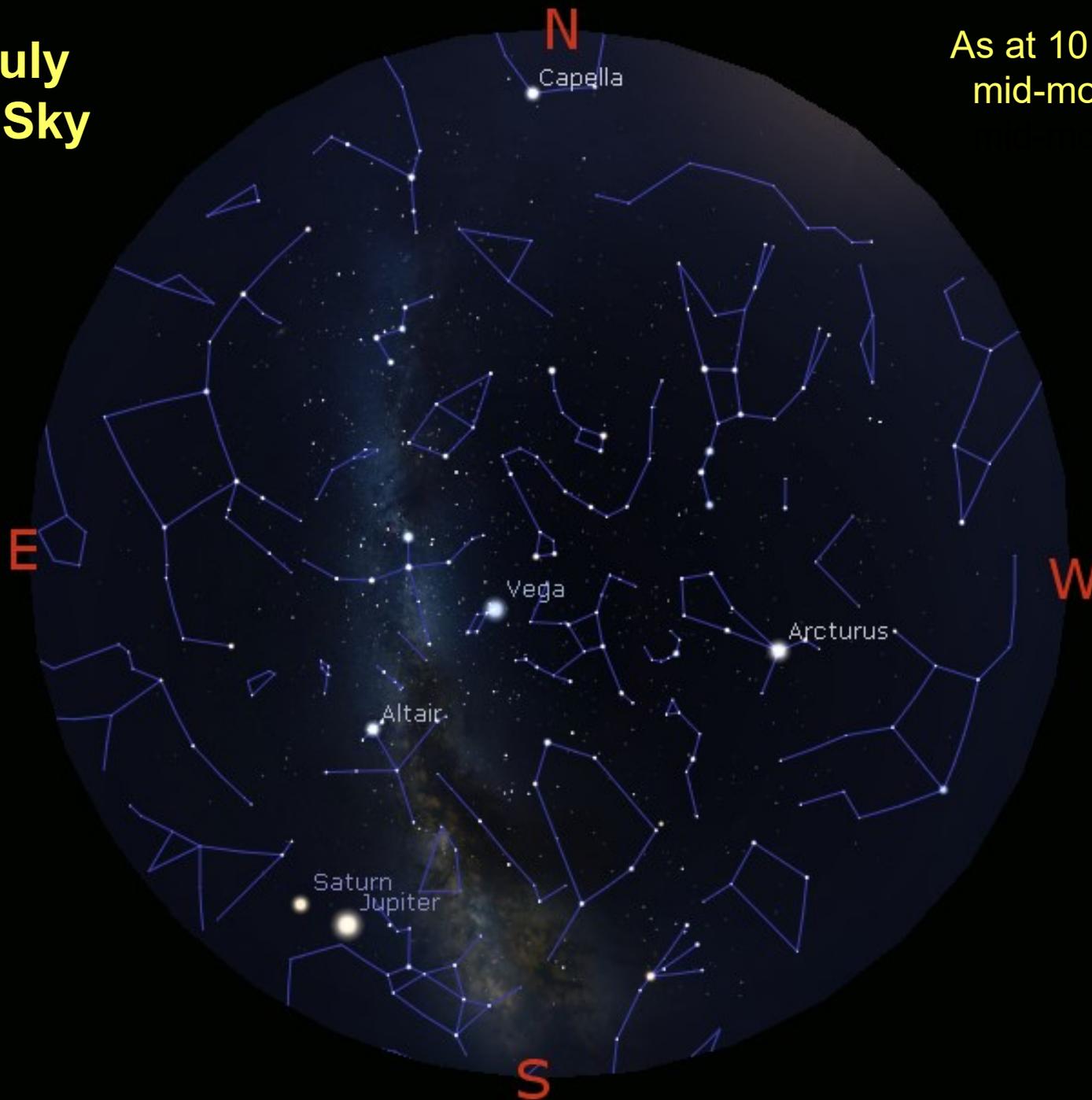
# What's Up!

For July 2020



# The July Night Sky

As at 10 p.m.  
mid-month



# Sun & Moon in July

- Full Moon 5<sup>th</sup>
- Last Quarter 13<sup>th</sup>
- New Moon 20<sup>th</sup>
- First Quarter 27<sup>th</sup>

		Sun	Moon
1 <sup>st</sup>	Rise	04.50	17.18
	Set	21.21	02.29
15 <sup>th</sup>	Rise	05.04	01.18
	Set	21.11	16.11
31 <sup>st</sup>	Rise	05.25	18.52
	Set	20.50	02.38

# What's Up - Planets

- Mercury

- An morning object visible from middle of the month, low in the North East an hour before sunrise.

- Venus

- Venus is a brilliant morning object shining at mag -4.3 in the East North East. By the end of the month it will be rising 3 hours before sunrise.

- Mars

- A morning object in the South East, the planet is definitely improving this month, climbing higher and brightening to magnitude -1.1 by month end.

# What's Up - Planets

- Jupiter

- At its biggest and brightest (mag -2.8) for this year, but low amongst the stars of Sagittarius, in the South, late evening and early hours

- Saturn

- Following on behind Jupiter, i.e just to the East, low in the South, late evening and early hours

- Uranus

- Visible in the East as a morning object, climbing higher to about  $30^\circ$  by month end.

- Neptune

- Another of this month's improving morning objects. Can be found in Aquarius in the South South East at mag +7.8

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# Astronomical Phenomena in July

- **1<sup>st</sup>** Jupiter is just 42 arc seconds above Pluto, but this is at mag +14.3, so a large telescope would be needed 
- **4<sup>th</sup>** The Earth is at aphelion today - its furthest distant point in its elliptical orbit around the Sun
- **8<sup>th</sup>** Venus will be passing the Hyades open star cluster in Taurus (V-shaped face of the bull) today.
- **11<sup>th</sup>** Venus is just  $1^\circ$  from Aldeberan, the main star of Taurus
- **12<sup>th</sup>** The waning gibbous Moon is just  $3^\circ$  from Mars in the pre-dawn sky 
- **17<sup>th</sup>** The waning crescent Moon is just  $3^\circ$  from Venus in the morning sky
- **19<sup>th</sup>** Mercury get a visit from a slender waning crescent Moon, again just  $3^\circ$  away, pre-dawn 

## Astronomical Phenomena in July (cont'd)

- **20<sup>th</sup>** Saturn reaches opposition today (i.e. Earth is directly between it and the Sun). When this occurs more sunlight is reflected back to Earth from the ice particles making up Saturn's ring system. This causes the rings to appear much brighter than normal, and is known as the Seeliger Effect



- **30<sup>th</sup>** The Southern Delta Aquirid meteor shower reaches its peak, with a theoretical maximum (under perfect conditions) of 18 meteors per hour.

Whole Month - watch out for Noctilucent Clouds  
1½ - 2 hrs after sunset, low above NW horizon  
1½ - 2 hrs before sunrise, low above NE horizon



# 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 these of interest:
  - **Asteroid Day Live Stream**
    - 30<sup>th</sup> June, 11.00-17.00 hrs
    - <https://asteroidday.org/>
  - **GoSpaceWatch: Zoom talk about NASA's Insight probe on Mars (book via EventBright, £3.00)**
    - Weds 15<sup>th</sup> July, 7.30m
    - [www.gospacewatch.co.uk/](http://www.gospacewatch.co.uk/)
  - **British Astronomical Association: free Zoom webinars every Wednesday evening at 7.30 pm**
    - <https://www.britastro.org/node/21142>

# Astronomy on TV

The Sky at Night

“The Lives of Stars”

- This month the team looks at the lives of stars. Chris Lintott investigates why Betelgeuse dimmed in late 2019 and speaks to researchers who've been photographing the star using the Very Large Telescope. Maggie Aderin-Pocock wonders what the discovery of the brightest ever supernova means for our understanding of stars, while Lucie Green looks closer to home and reveals the science of our own Sun. Pete Lawrence tries his luck at imaging a new supernova in galaxy M61

Sunday

12<sup>th</sup> July

BBC 4, 10.00 pm

Thursday

16<sup>th</sup> July

BBC 4, 7.30 pm



*"That's all Folks!"*