

Stars Over Surrey

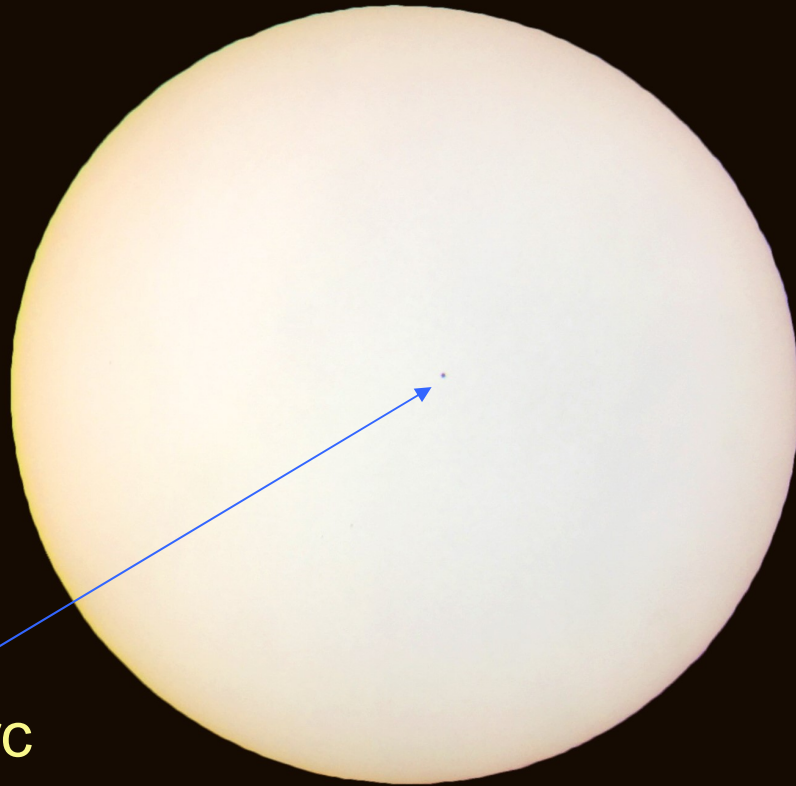
Astronomy & Spaceflight News

29th November 2019

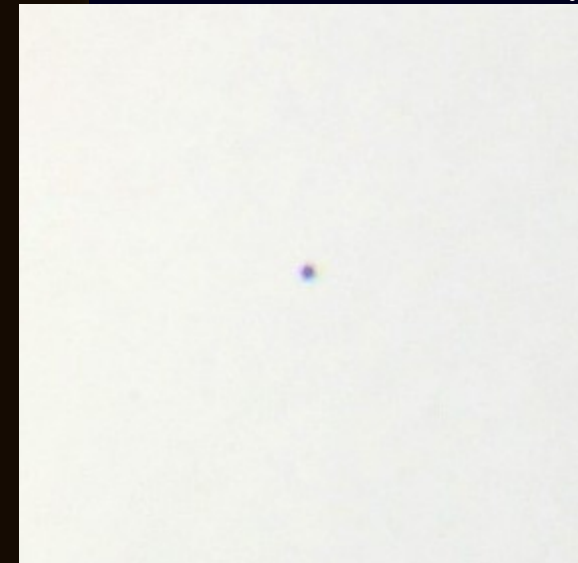


Transit of Mercury: 11th November

(next isn't until 2032!)



- Mercury
- Photo taken with just an iPhone clamped onto my 80mm refractor telescope
 - Using Baader Astrofilm solar filter



- Enlargement

Transit of Mercury



- Image taken by John Slinn on Isle of White
 - 2000 frames from a video stacked and merged
 - Coronado Ha solar telescope

USAF's X-37B Spaceplane Returns from Orbit



- **Secretive spaceplane lands at Kennedy Space Centre after 779 days in orbit**
 - • this was its 5th orbital mission, and its longest
- **But what does it do up there?**
 - they never say! Classified!

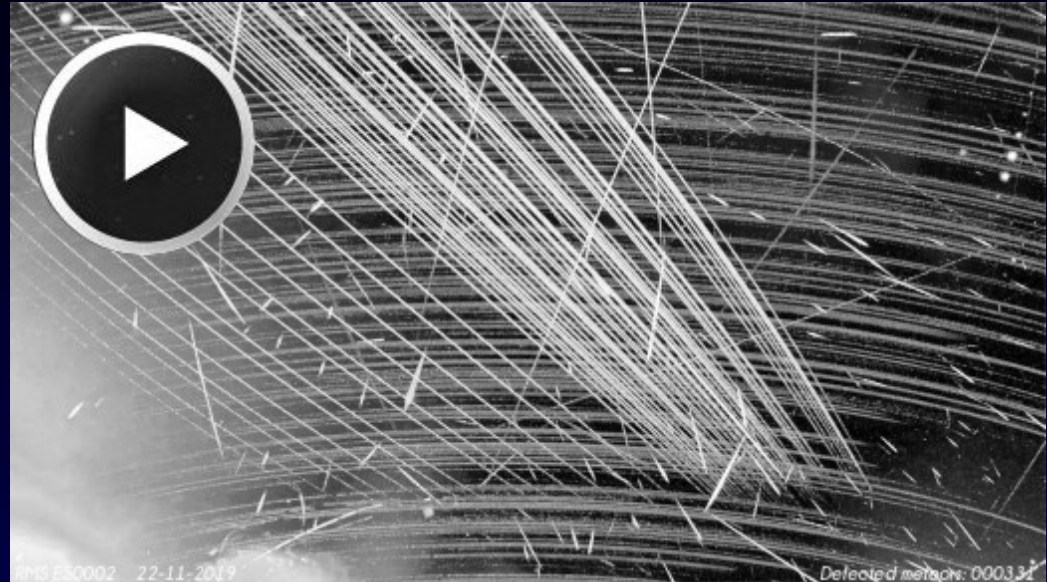
Successes for Space X (1)

- One of the NASA mandated milestones before sign-off of new crew capsule is to demonstrate the ability to hoist the spacecraft clear of a launch mishap.
- In April during a preparatory ground-firing test of the Super Draco escape rockets the Crew Dragon blew up
 - it turned out to be caused by a flaw in a fuel valve
- This was speedily remedied and the second attempt on 13th November was a complete success.
- The full demo will be launched by Falcon 9 in December



Successes for Space X (2)

- Space X have launched the second set of 60 Starlink broadband satellites.
- There were two "firsts"
 - First time a Falcon 9 has flown into space four times
 - First time a fairing has been re-used, having flown once before
- The 60 satellites are slowly making their way up into their operational orbits
- They photo-bombed a long time-elapsd recording of an outburst of meteors from the Alpha Monoceterids shower at an observatory in La Palma on 22nd November



Disappointment for Space X

- The Starship Prototype Mk1 suffered a calamity during fuelling testing on 20th Nov
- It had been partly dismantled for this test
- Space X state that this sort of thing should be expected during testing and that it's "not a serious setback"
- However its planned 20K high test flight is highly unlikely to take place in December as anticipated
- Elon Musk has tweeted that they'll move on to Prototype Mk3 for the next test



Boeing Tests Starliner Pad Abort

- Boeing's crew capsule for ISS missions is the Starliner
 - Could accommodate 7 astronauts
 - likely just to seat 4
- One milestone test prior to sign-off by NASA is to demonstrate the pad emergency abort system
 - This was tested earlier this month in New Mexico
 - emergency rockets blasted capsule clear, service module and heat shield separated correctly
 - two parachutes deployed OK but third failed to open
 - Boeing quickly identified this as a simple connection fault and state this issue is resolved
 - airbags deployed correctly for soft landing
 - Next major test is unmanned mission to dock with ISS
 - launch scheduled for 17th December



Boeing Starliner rolled out to launcher

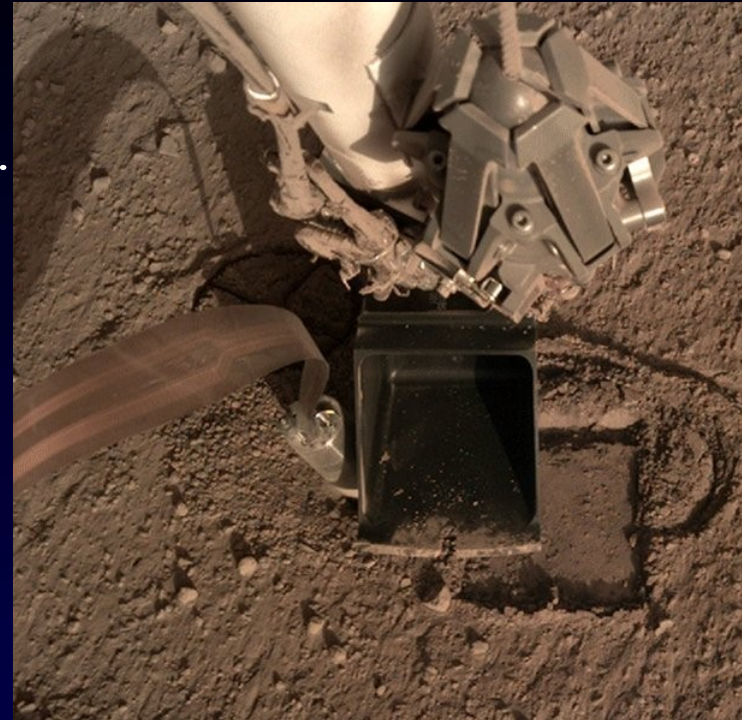
- The first Starliner capsule that will be launched into space has been rolled out to be hoisted onto its Atlas 5 launcher.



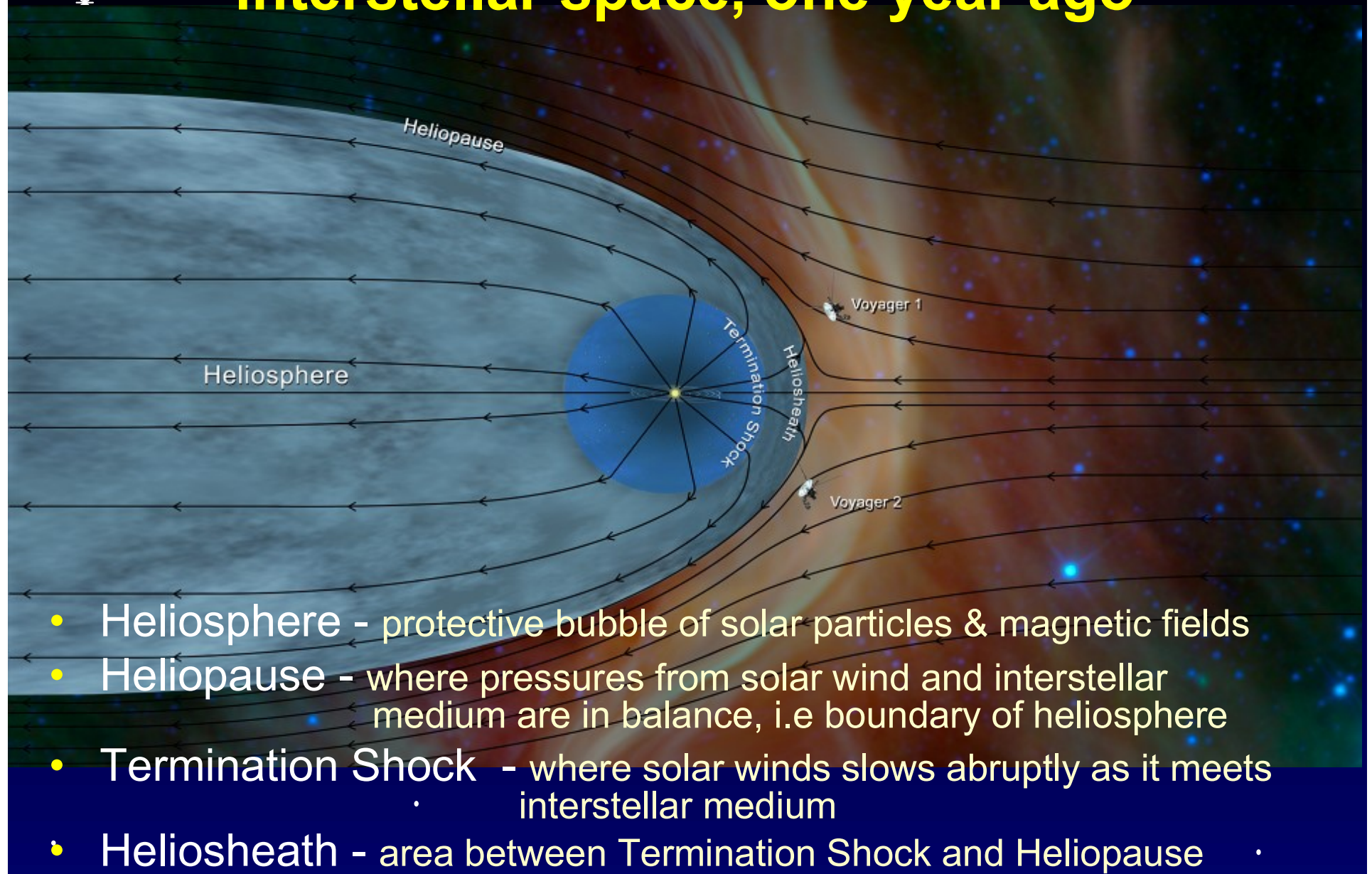
- Boeing has strongly disagreed with a NASA study that puts an expensive pricetag on the per seat cost of launching an astronaut to ISS via Starliner, i.e. \$90M
 - Comparative costs for Space X are \$55M and Soyuz \$86M

InSight's Probe - Further Setback

- The “fix” applied remotely by engineers was thought to have worked.
- The hammering action had resumed and the mole began to get deeper.
- After penetrating only a few centimetres the probe backed half way out of its hole!
- They're trying again having moved the scoop to provide more grip.



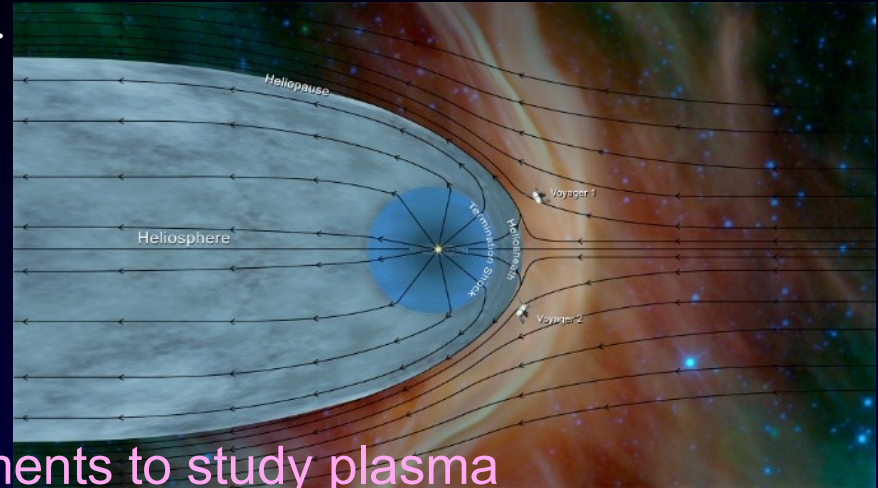
Learnings from Voyager 2's passage into interstellar space, one year ago



- Heliosphere - protective bubble of solar particles & magnetic fields
- Heliopause - where pressures from solar wind and interstellar medium are in balance, i.e boundary of heliosphere
- Termination Shock - where solar winds slows abruptly as it meets interstellar medium
- Heliosheath - area between Termination Shock and Heliopause

Learnings from Voyager 2's passage into interstellar space, one year ago

- Voyager 2 exited the Solar System on Nov 5th last year
 - 11 billion miles from Sun
 - Voyager 1 left in 2012
- Voyager 2 still has 5 working instruments
 - magnetic field sensor, 2x instruments to study plasma
 - 2x energetic particle detectors (in different energy ranges)
- Nov 4th 5 papers were produced, each on the findings of an instrument during and after that crossing
- Summary:
 - Heliosphere contains hot but sparse plasma, interstellar medium has denser but cold plasma
 - Heliosphere protects us from 70% of cosmic rays
 - Heliosphere expands/contracts with 11 year Solar Cycle



Star discovered being flung out of galaxy

- 5 million years ago a binary star system wandered too close to the Super Massive Black hole at the centre of our galaxy
 - mass = 4 million x Sun
- One star got absorbed but the other was accelerated at such a speed that it is now moving 10 times faster than other stars in the Milky Way
- It's now 29,000 LY away, doing 3.7M mph and will take about 100 million years to escape our galaxy
- Spotted accidentally by the Siding Springs Observatory in Australia whilst looking for remnants of galaxies absorbed by the Milky Way
 - 3.9 metre Anglo-Australian Telescope



Japanese probe on way back

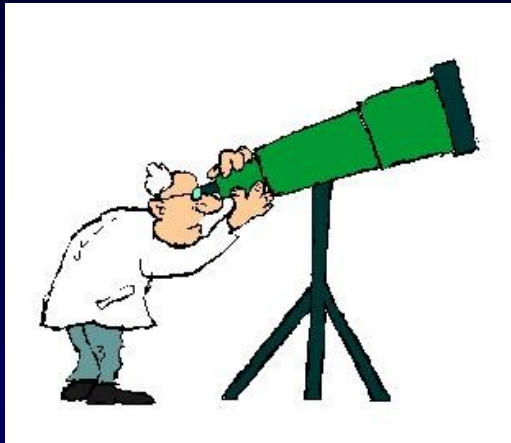
- JAXA asteroid probe Hayabusa 2 has recently left the asteroid Ryugu at the end of its spectacular mission and is now heading back to Earth
- It spent 18 months exploring the asteroid, during which it deployed four landers, three of which were rovers (hopping around)
- It is gently moving away from Ryugu and will fire its main ion thruster in December to begin the year long return journey
- The intention is to separate the capsule containing asteroid samples and soft land it under parachutes in Australian desert.

News In Brief

- Ultima Thule, visited on New Year's Day by the New Horizons probe, has been renamed Arrokoth
 - Although the original name was used by medieval map makers for the unknown outer reaches, it was later used by Nazis as the mythical homeland of the Aryan people, and is still apparently used by neo-Nazi groups today. To avoid this Nazi link it's been renamed using the Algonquin word for "Sky".
- Indian Space Agency has just confirmed that its Lunar probe Chandra 2 suffered a descent engine problem and crashed, previously they just said they'd "lost contact"
- At the next Falcon 9 launch Space X will attempt to recover both fairings with two chase boats each equipped with a giant catch net
 - the fairings have small thrusters to help control their descent

What's Up!

For December 2019



Exhibitions at National Maritime Museum, Greenwich

- **The Moon**

- until 5th January 2020

- £9.00

- **Astronomy Photographer of The Year**

- until 26th April 2020

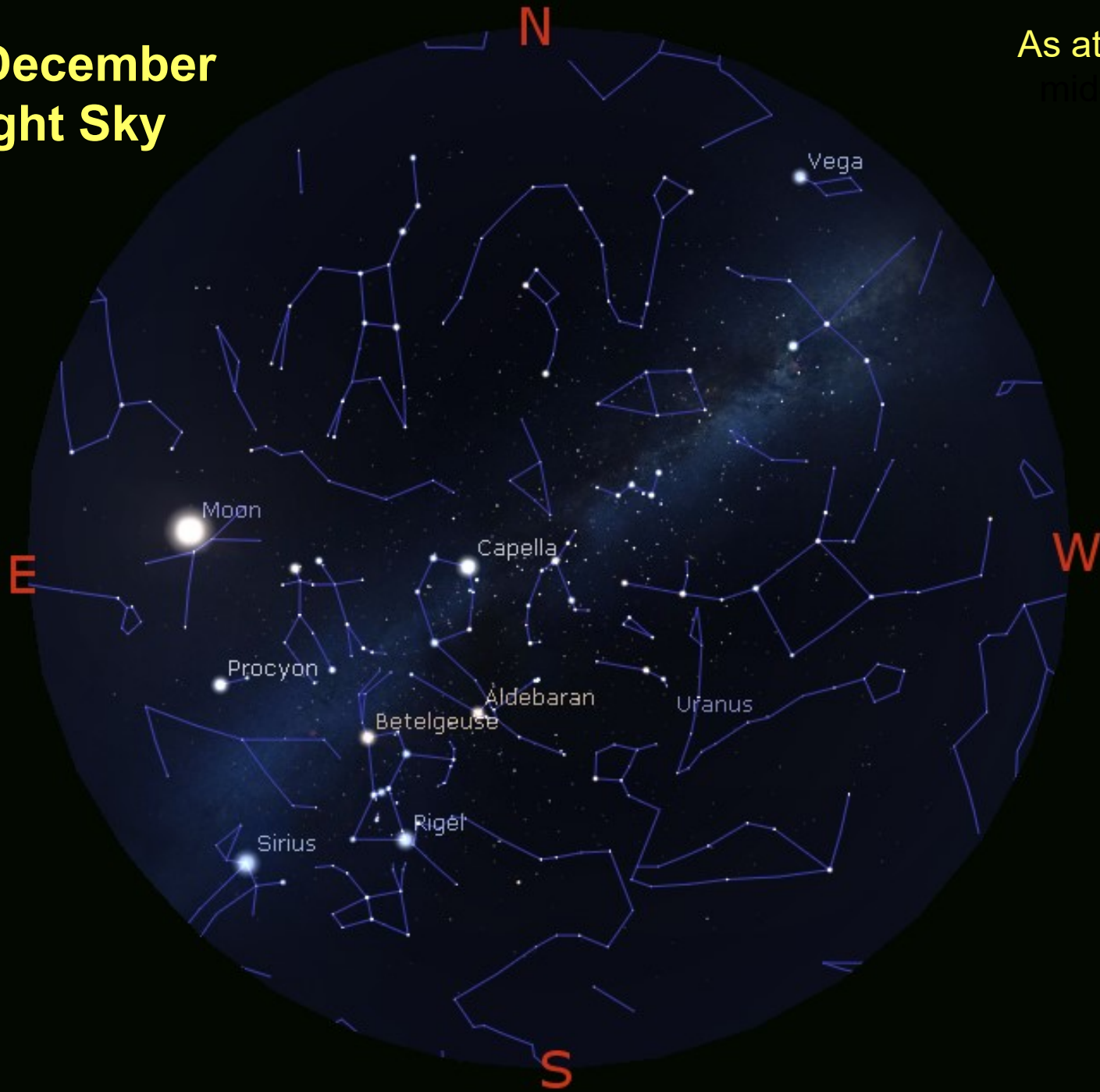
- £9.00

- **Combined ticket now available**

- £13.50 in advance or £15 on day

The December Night Sky

As at 10 p.m.



Sun & Moon in December

- **First Quarter** 4th
- **Full Moon** 12th
- **Last Quarter** 19th
- **New Moon** 26th

		Sun	Moon
1 st	Rise	07.44	12.00
	Set	15.57	20.36
15 th	Rise	08.00	19.23
	Set	15.54	11.28*
30 th	Rise	08.07	11.19
	Set	16.03	20.40

What's Up - Planets

• Mercury

– Visible until last week of the month as a morning object, best seen at start of month shining at mag -0.5 about 1½ hrs before sunrise in the South East

• Venus

– A brilliant evening object shining at mag -3.8 in the South West. Sets about 90 mins after sunset on 1st and 3 hours after on 31st.

• Mars

– A morning object, the red planet rises towards 3 hours before the Sun at start and 3½ hrs by end. It's on the far side of its orbit, so shines only at mag +1.6, but will improve in 2020

What's Up - Planets

- Jupiter

–Can be glimpsed at the start of the month very low in the South West, quite bright at mag -1.7, but then it's soon lost to view

- Saturn

–Last chance to see this evening object, at mag +0.9, in the SW for the first half of the month, but gradually dropping lower into the evening twilight.




- Uranus

–Now a very well placed evening object at mag +5.7, culminating at 49° due South for the whole month

- Neptune

–A well placed evening object in Aquarius in the South, but telescopic at mag +7.9

Phenomena in December

- **1st** Saturn, Venus & Jupiter are close together in the evening twilight. 
- **11th** Venus less than 2° below Saturn just after Sunset
- **13/14th** Maximum of Geminids meteor shower, theoretical max of 75 per hour. Waning gibbous Moon will interfere.
- **22nd** Maximum of Ursids meteor shower, but theoretical max of only 10 per hour.
- **23rd** Mars just 3.2° from waning crescent Moon, 6 a.m. low in SE. 
- **27th** Saturn just 2.8° from 2% lit waxing crescent Moon, SW at 4.30 pm. 
- **28th** Venus just 4.8° from waxing crescent Moon, SW at 5.30 pm
- **29th** Waxing crescent Moon now other side of Venus, just 6.9° away, in SW at 5.30 pm

Meetings at Local Societies

- Guildford AS *Lecture Theatre L, Uni of Surrey*
 - Thursday 5th December, 7.45 p.m.
 - **A machine learning tool for characterising evolution of nearby galaxies**
 - Choong Ling Liew-Cain
 - » Mullard Space Science Laboratory

Meetings at Local Societies

- Farnham AS *Aldershot Cricket Club*

– Tuesday 10th December, 7.45 p.m

- **AGM**

Meetings at Local Societies

- **Croydon AS** *Royal Russell School, Coombe Lane, Croydon*
 - Friday 6th December, 19.45 hrs
 - **Christmas Meeting**

Meetings at Local Societies

- **Ewell AS** *Nonsuch High School for Girls, Cheam*
 - Friday 13th December, 19.45 hrs
 - **AGM**
 - **Quiz**

University of Surrey

- Department of Physics

- Wednesday 18th December
19.00 hrs

- Lecture Theatre E

- Talk

- title & speaker tbc

- followed by Stargazing (if clear)

- or

- Night Sky Talk

- Free event, but booking required, via web site

- <https://www.surrey.ac.uk/departments-physic/outreach/astronomy-evenings>

- Astronomy Evening



Astronomy on TV

The Sky at Night

“Review of the Year”

Presenters Chris Lintott and Maggie Aderin-Pocock look back at some of the major stories in space exploration over the past 12 months. - from New Horizons' fly by of Ultima Thule on the Solar System's edge, to the release of the first ever image of a black hole and the discovery of geological activity on Mars; 2019 has certainly been one to remember.

Sunday 10th December BBC 4, 10.00 pm

Thursday 14th December BBC 4, 7.30 pm

*for exact times please check www.radiotimes.com
or www.bbc.co.uk/skyatnight*



"That's all Folks!"