

# Stars Over Surrey

## Astronomy & Spaceflight News

25<sup>th</sup> October 2019



# First All Female SpaceWalk

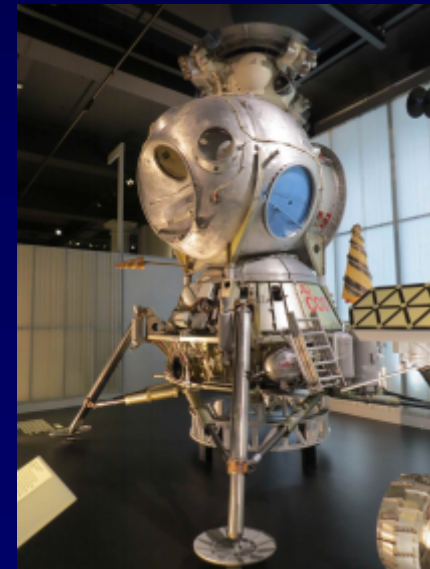
- On Friday 18th 2 NASA lady astronauts became the first pair to conduct a spacewalk together
  - Christina Coch (engineering)
    - 4<sup>th</sup> EVA (one just a week ago)
  - Jessica Meir (biology)
    - 1<sup>st</sup> EVA
- Spent 7 hrs 17 mins replacing faulty battery charging unit outside ISS
- There have been 221 previous assembly & maintenance spacewalks at ISS, 2 more scheduled in next fortnight.
- There have been 15 women who have walked in space
  - 1 Russian and 14 American



# Alexei Leonov RIP

- Death announced 11/10/19
- First ever Spacewalk
  - Voshkod 2, March 65
  - nearly died!
- Would have been 1<sup>st</sup> Soviet on Moon if programme hadn't been cancelled

© Max Alexander/Starmus



# Satellite Servicing Spacecraft

- MEV-1 launched on a Russian Proton rocket on 8th October
- Northrop Grumman's Mission Extension Vehicle -1 is designed to extend the life of a communication satellite that has run low on fuel
- Once in geostationary orbit, will dock with Intelsat 901 and take over its pointing & orbital maintenance functions
- After 5 years Intelsat 901 will be retired so MEV-1 will shunt it into the geostationery graveyard and then depart for some other satellite.
- MEV-1 has a 15 year design life.



# Space X Starship Prototype Mk.1



- Unveiled in Texas 30/9
- 34 metres x 9 metres
- Stainless Steel construction (301)
- Powered by 3 Raptor methane-fuelled engines
  - final version will have 6 Raptors
- 20K high test flight soon
- Prototype Mk.4 to orbit in 2020
- Super Heavy launcher will have 37 Raptors
  - 16 M lbs thrust (7.8 M Saturn 5)
- Full stack - 118 metres tall
- Both fully reusable

# Red Arrows Go Cosmic



- Red Arrows formate with Virgin Orbit's 747 "Cosmic Girl"
  - air launches satellites via "Launcher 1" rocket
- RAF have signed contract with Virgin Orbit to study RAF use of small satellites
  - Flight Lt. Stannard seconded to Virgin Orbit for 3 years

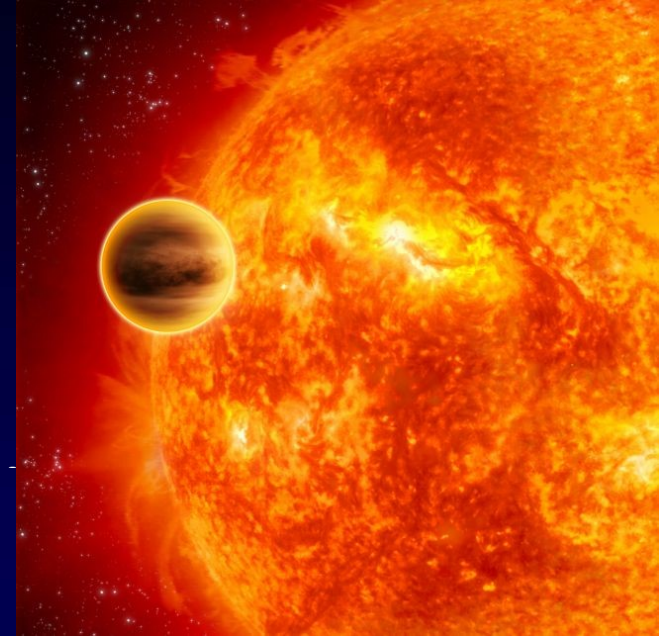
## Other Air-drop Launchers



- Northrop Grumman use a modified Lockheed Tristar L-1011 called "Stargazer"
  - Pegasus XL launched a NASA's ICON satellite on 11<sup>th</sup> Oct
- Stratolaunch & its plane "Roc" has just been bought by mystery buyer, following Paul Allen's death
  - The Scaled Composites "Roc" can carry 3 Pegasus XL

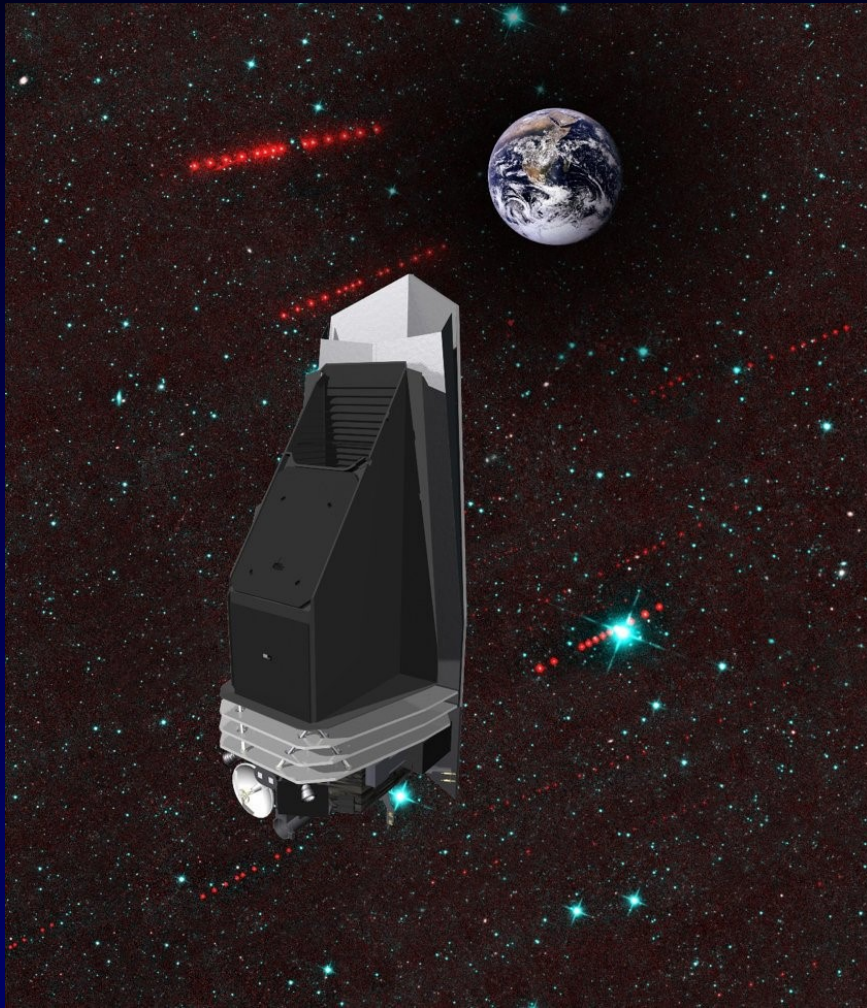
# Exoplanets: Nobel Prize

- The 2019 Nobel Prize for Physics has been awarded to the discoverers of the first exoplanet at a main-sequence star (not unlike our Sun)
- Michel Mayor and Didier Queloz discovered 51 Pegasi b in 1995
  - nicknamed then as “Bellerophon”
    - subsequently the star was named “Helvetios” & the planet “Dimidium”
  - discovered by slight wobble in star's path (51 LY distant)
  - planet is a “hot Jupiter” of around half Jupiter's mass
  - since then 4,000+ exoplanets have been discovered
- They shared the prize with James Peebles for theoretical discoveries in physical cosmology





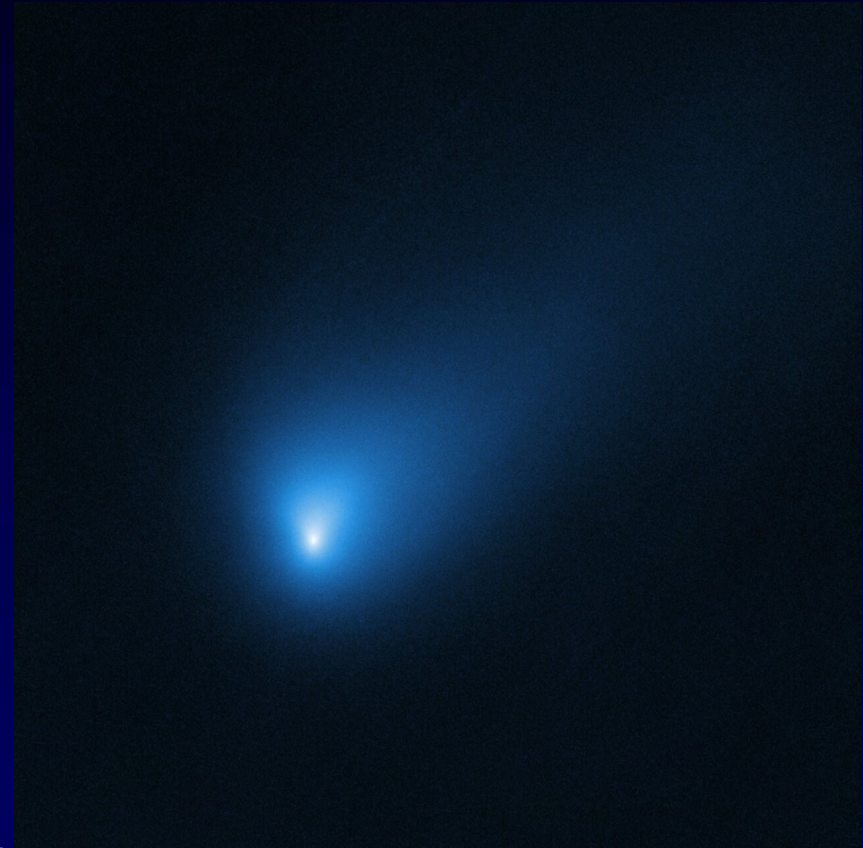
# NASA To Launch Asteroid Hunter in 2025



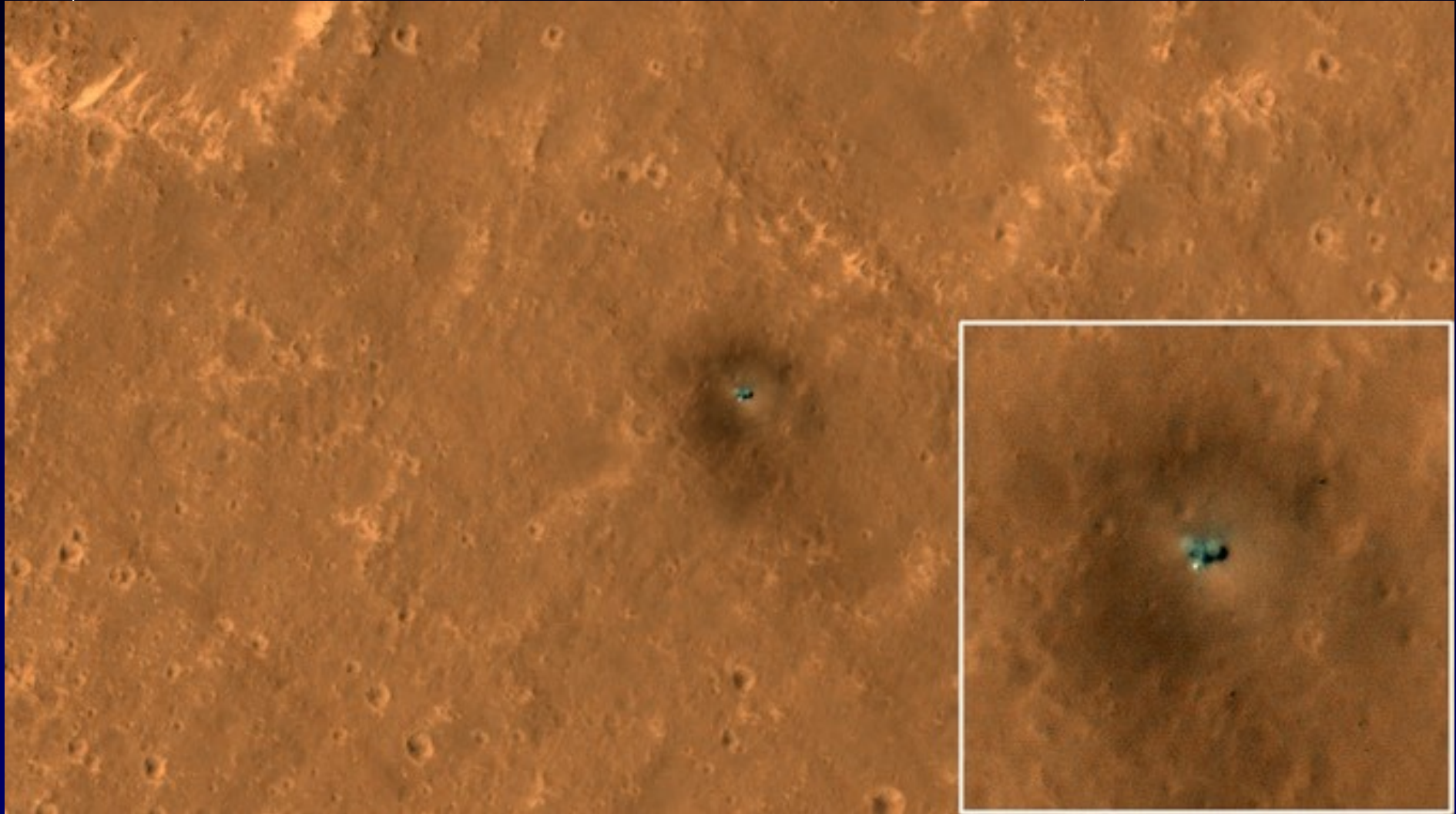
- NASA has secured funding to develop and launch its planned Near Earth Object Surveillance Mission (NEOS)
  - telescope with 50cm mirror
  - hope to launch by 2025
  - will sit at Lagrange Point L1
- Will hunt for asteroids of 140+ metres diameter
  - size that would devastate a small country
- To date 8,778 have been identified
- 25,000 thought likely to exist.

## 2<sup>nd</sup> Interstellar Visitor

- C/2019 Q4 (Borisov)  
reclassified as  
Comet 2I/Borisov
- Seems to be behaving like  
and composed in same way  
as solar system long period  
comets
  - Cometary tail is becoming  
more evident
  - nucleus size estimates vary  
between 1k & 6k
- Trajectory has been back-tracked
  - passed 5.7 LY from Kruger 60 (13 LY away) about 1 M years ago
- 



# InSight Lander Imaged On Mars



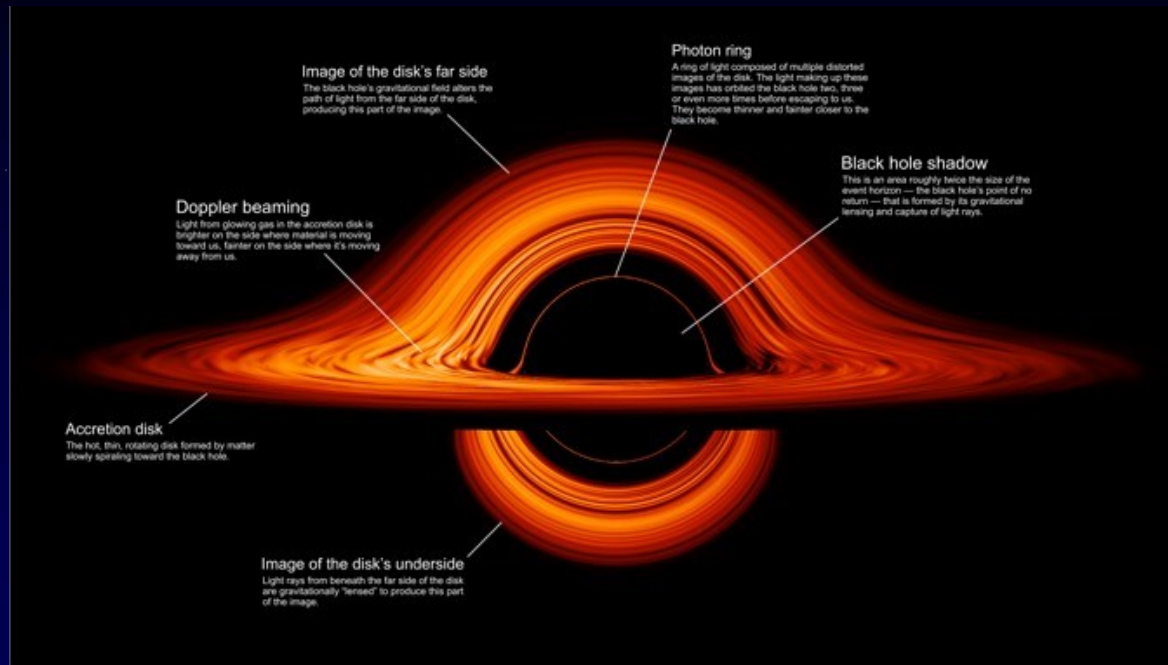
- InSight spotted on surface by Mars Reconnaissance Orbiter, 23/9/19
  - 2 solar panels, main lander, deployed instruments can be seen

# InSight's Probe Resumes Hammering

- The “fix” applied remotely by engineers seems to have been successful!
- First the lander's robotic arm has been used to scoop some soil into the hole around the probe and then compress it.
- Next it was pressed against the probe and this provided the friction it needs to work
- The hammering action has now resumed and it is beginning to get deeper.
- 



# New Modelling Shows Black Hole Warp Effect



- Simulation from NASA Goddard Space Flight Centre shows how a Black Hole's intense gravity warps space around it
  - much like a carnival mirror distorts images
- Light & dark lanes caused by shears and stresses within magnetic fields disrupted by changing orbital velocities
- <https://astronomynow.com/2019/09/26/new-computer-simulation-brings-black-holes-to-life/>.

## News In Brief

- Boeing announces date for first orbital unmanned test of its CST-100 Starliner
  - Will launch to ISS on 17th December using Atlas V
  - after a week it will return and parachute down to White Sands, NM
- Space X hope to fly their in-flight abort test of Crew Dragon late November or early December
- Space X's next launch of 60 Starlink satellites will use a Falcon 9 that has been launched 3 times previously
  - suggest the final Starlink constellation may comprise 30,000 satellites
- Saturn 82 : Jupiter 79
  - Team using Subaru telescope on Mauna Kea, Hawaii, discover 20 more small satellites (5k diameter), so Saturn overtakes Jupiter

November's Suggested  
Constellation - but which one?



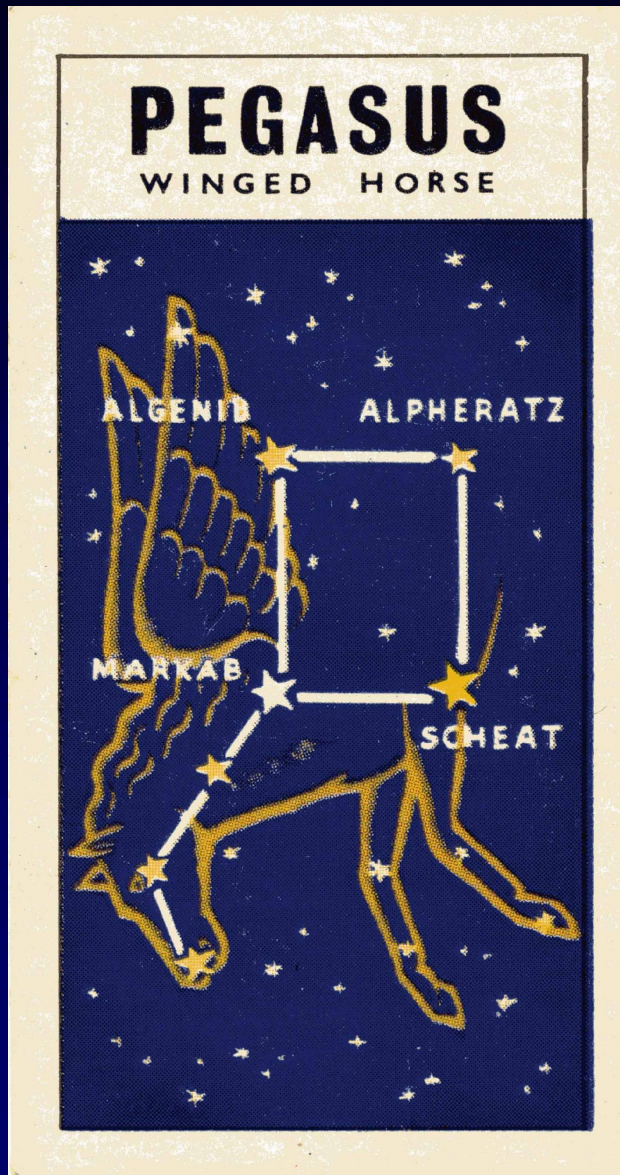
# November's Suggested Constellation - but which one?



That's right - Pegasus



# November's Suggested Constellation



A SERIES OF 50 No. 42

## OUT INTO SPACE

*Approved by A. Hunter, Ph.D.,  
Sec. Royal Astronomical Society*

### PEGASUS (The Winged Horse)

Pegasus is seen upside down in our latitudes. Only half of Pegasus is illustrated in celestial maps—one star, Alpheratz, forming part of the adjoining constellation of Andromeda. It is prominent on the meridian at midnight in September. There are many small stars within and in clear atmosphere over 100 may be observed. Markab, a white star of second magnitude, is a navigational star. Scheat is a deep yellow star also of second magnitude. According to mythology Bellerophon tried to ride to heaven on Pegasus' back and was thrown off.

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# Where is it?



E

N

W



# Messier & Caldwell Objects in Pegasus



**M15 (NGC 7078)**

**Distance** 30,600 light years  
**Visual Brightness** Magnitude 6.3  
**Apparent Dimension** 18.0 arc minutes  
**Discovered** 1746 by Jean-Dominique  
Miraldi II



**C30 (NGC 7331)**

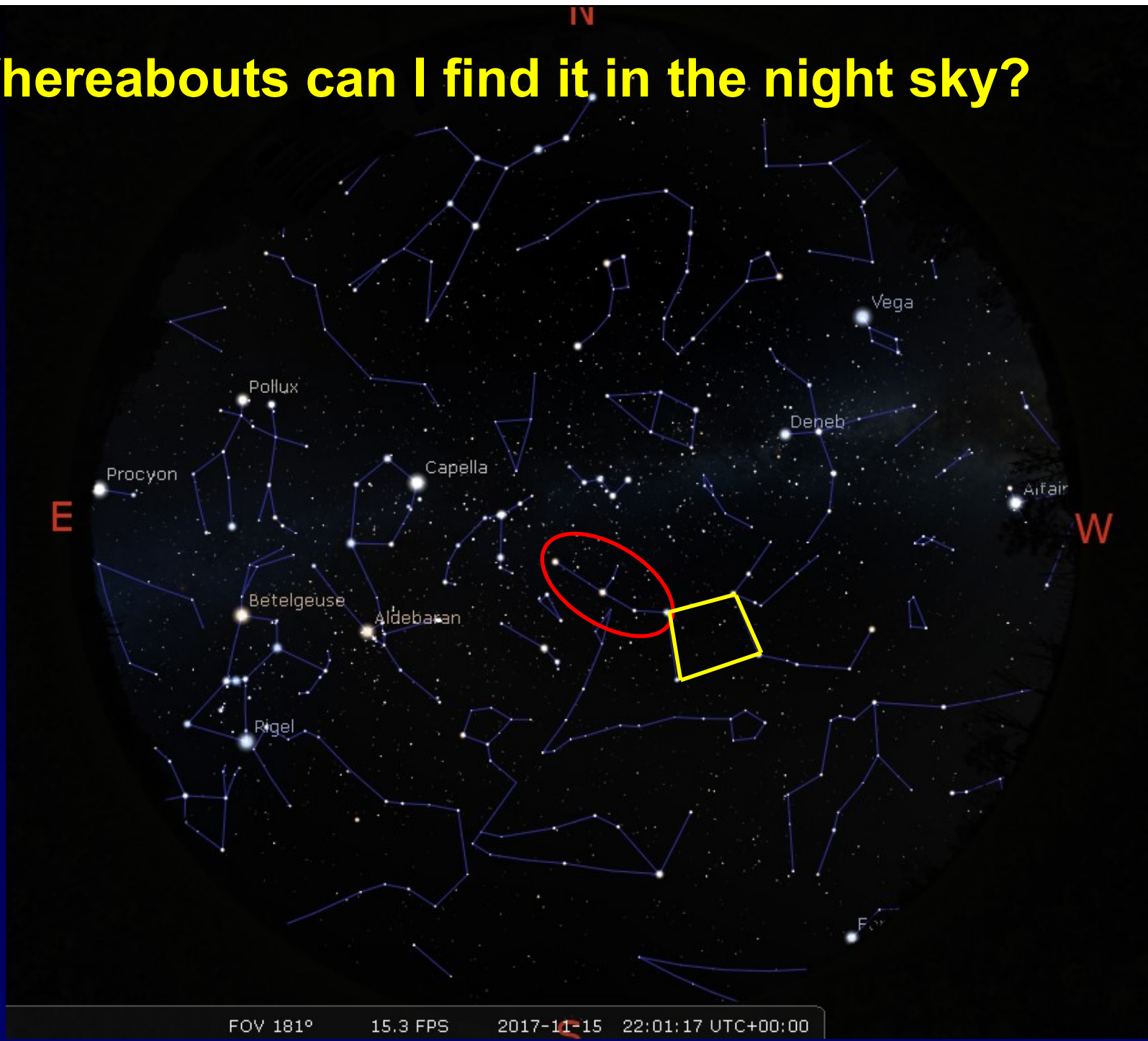
**Distance** 47,000,000 light years  
**Visual Brightness** Magnitude 9.5  
**Apparent Dimension** 9.7 arc minutes  
**Discovered** 1784 by William Herschel

# November's other Suggested Constellation ✨

## Andromeda: the myth ✨

- In Greek mythology Andromeda was the daughter of Cassiopeia and Cepheus. Cassiopeia angered Poseidon by claiming that both she and Andromeda were more beautiful than any of Poseidon's nymphs. Poseidon retaliated by chaining Andromeda to a rock to be eaten by his sea-monster. Perseus arrived in the nick of time, flying on Pegasus and clutching Medusa's head, which he used to kill the monster. Having rescued her, what else could he do? He married her!

# Whereabouts can I find it in the night sky?



# Andromeda

Triple Star  
Mag 2.5, 6.3 & 5.5  
Double Star  
Mag 6.5 & 5.5

M31/32/110  
(Galaxies)

Caldwell C23  
(Spiral Galaxy)

Double Star  
Mag 4 & 11

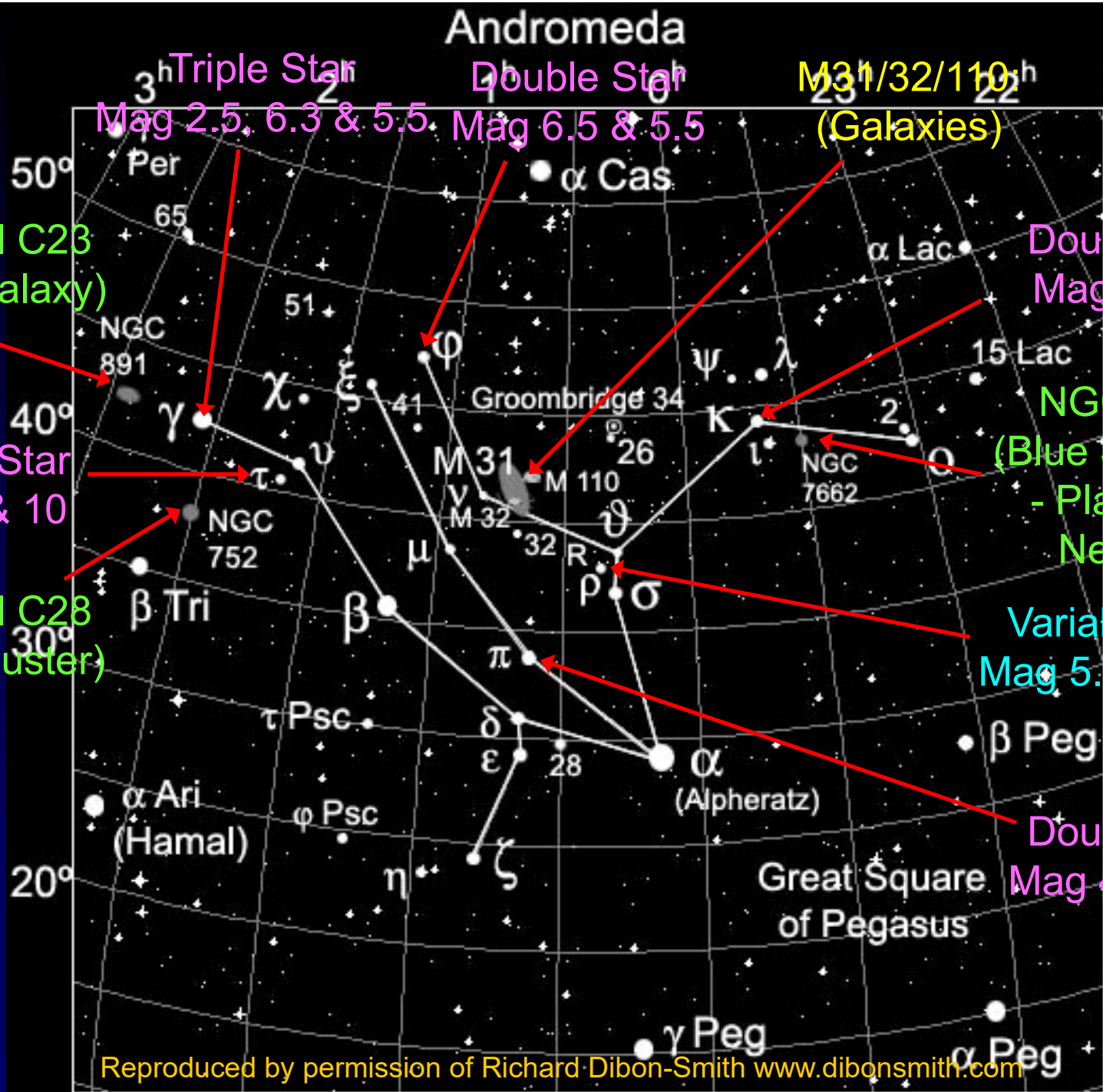
Double Star  
Mag 5 & 10

NGC7662  
(Blue Snowball  
- Planetary  
Nebula)

Caldwell C28  
(Open Cluster)

Variable Star  
Mag 5.8 → 14.9

Double Star  
Mag 4.4 & 8.9



## Messier Objects in Andromeda

**M31** (NGC 224) [also  
showing M32 & M110]



**Great  
Andromeda  
Galaxy**

**Distance** 2,900,000 light years  
**Visual Brightness** Magnitude 3.4

**Apparent Dimensions** 178 arc minutes  
**Discovered** 964 Abd-al Al-Sufi



## Messier Objects in Andromeda (contd)



**M32 (NGC 221)**

**Distance** 2,900,000 light years  
**Visual Brightness** Magnitude 8.1  
**Apparent Dimension** 8 arc minutes  
**Discovered** 1749 Le Gentil

**M110 (NGC 205)**

**Distance** 2,900,000 light years  
**Visual Brightness** Magnitude 8.5  
**Apparent Dimension** 17 arc minutes  
**Discovered** 1780 Messier

# Caldwell Objects in Andromeda



**C23 (NGC 891)**

**Distance** 10,000,000 light years  
**Visual Brightness Magnitude** 10.0  
**Apparent Dimension** 13.5 arc minutes  
**Discovered** 1784 William Herschel



**C28 (NGC 752)**

**Distance** 1,300 light years  
**Visual Brightness Magnitude** 5.7  
**Apparent Dimension** 60 arc minutes  
**Discovered** 1786 William Herschel

# Another Deep Sky Object of interest in Andromeda

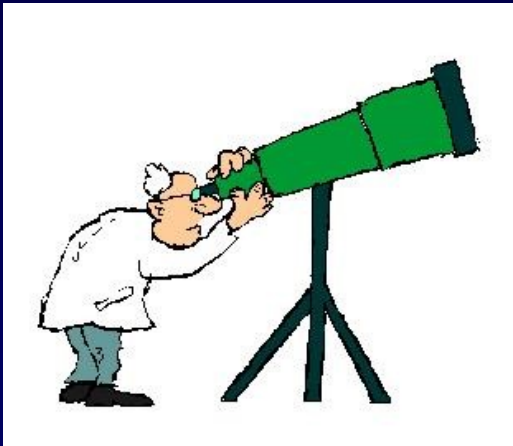


NGC 7669  
Blue Snowball Nebula

**Distance** 2,200 light years  
**Visual Brightness** Magnitude 8.3  
**Apparent Dimension** 18 arc seconds  
**Discovered** 1865 Gaspare Ferrari

# What's Up!

For November 2019





[www.ucl.ac.uk/mssl](http://www.ucl.ac.uk/mssl)  
@MSSLSpaceLab



# Mullard Space Science Laboratory Open Evening

**Tuesday 29th October 19:00-21:00**

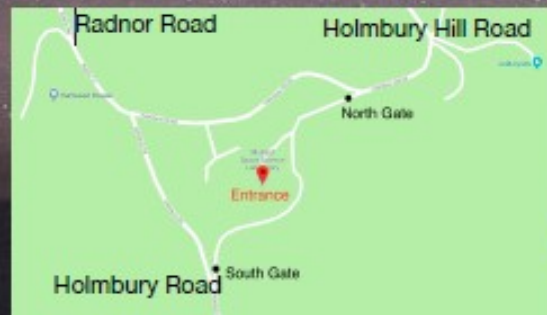
Want to learn about our universe? Come and interact with the research taking place in an active space laboratory, including:

**Black Holes - Aurora  
Building space telescopes**

**See the stars and planets (weather permitting) with Guildford Astronomical Society - refreshments provided**

Interested?

Contact Stella Willis - [stella.willis@ucl.ac.uk](mailto:stella.willis@ucl.ac.uk)/01483 204200



Mullard Space  
Science  
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Holmbury St Mary  
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RH5 6NT

# Transit of Mercury: 11<sup>th</sup> November

- Mercury will be visible as a tiny black dot passing across the face of the Sun
  - next one won't be until 2032
  - Next Transit of Venus is in another 98 years!
- NB Never look at the Sun using binoculars or a telescope!
- Special solar filters are needed, or a dedicated Solar telescope, or use the projection method
  - projecting the Sun's image through a telescope onto a piece of white card
- Starts at 12.35 until sunset at 4.22 pm
- Guildford AS plan an observing event, details tbc
  - check [www.guildfordas.org](http://www.guildfordas.org) nearer the date for details
  - Check at other local astronomical societies' websites in case they plan something nearer to you

# Transit of Mercury: 2019 Nov 11

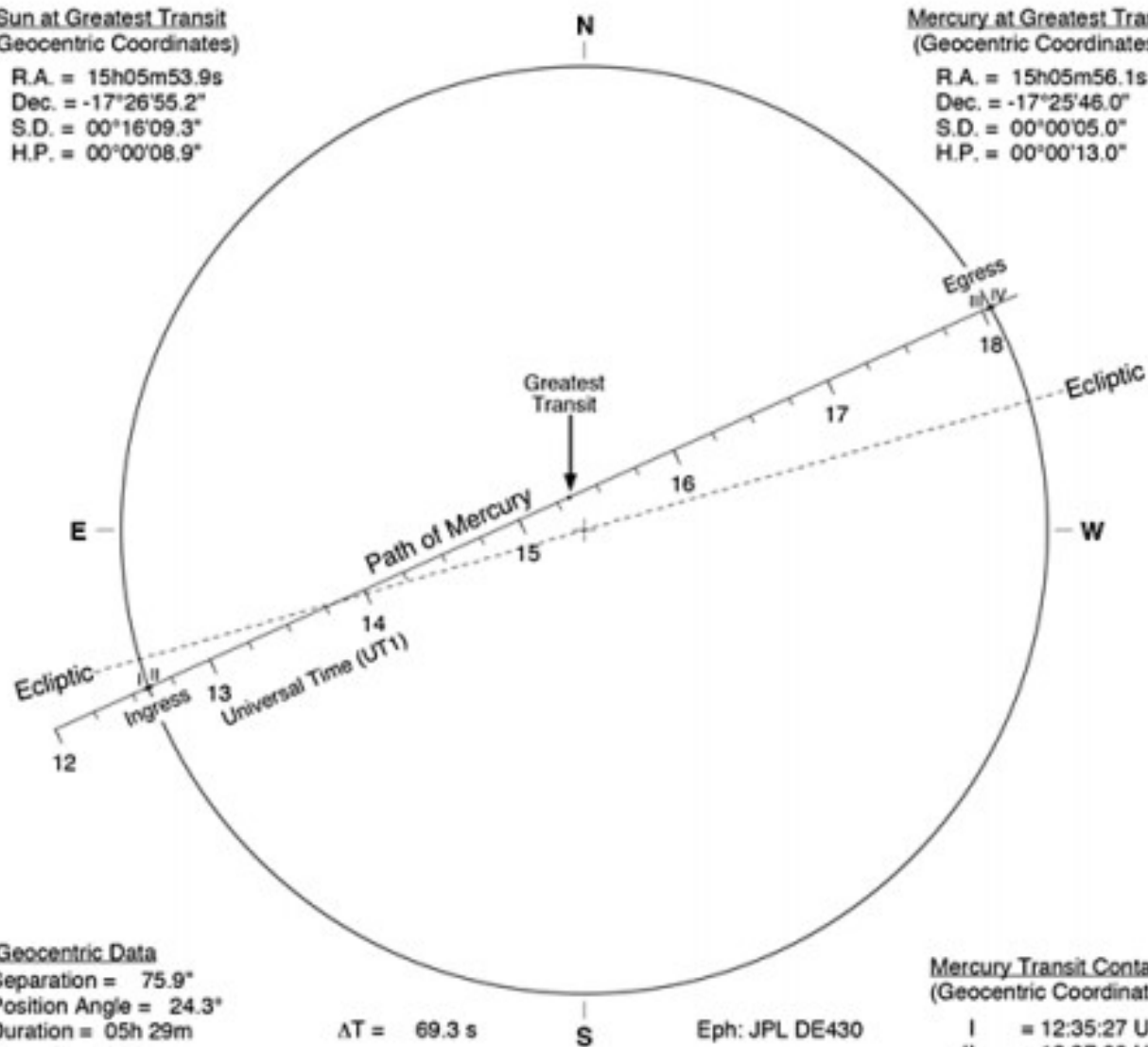
Greatest Transit = 15:19:47.7 UT1

## Sun at Greatest Transit (Geocentric Coordinates)

R.A. = 15h05m53.9s  
Dec. = -17°26'55.2"  
S.D. = 00°16'09.3"  
H.P. = 00°00'08.9"

## Mercury at Greatest Transit (Geocentric Coordinates)

R.A. = 15h05m56.1s  
Dec. = -17°25'46.0"  
S.D. = 00°00'05.0"  
H.P. = 00°00'13.0"



## Geocentric Data

Separation = 75.9°  
Position Angle = 24.3°  
Duration = 05h 29m

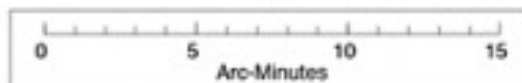
## Ascending Node

Transit Series = 247  
Sequence No. = 11 of 19

## Mercury Transit Contacts (Geocentric Coordinates)

I = 12:35:27 UT1  
II = 12:37:08 UT1  
Greatest = 15:19:48 UT1  
III = 18:02:33 UT1  
IV = 18:04:14 UT1

$\Delta T = 69.3$  s Eph: JPL DE430



©2018 F. Espenak, www.EclipseWise.com

# Exhibitions at National Maritime Museum, Greenwich

- **The Moon**

- until 5<sup>th</sup> January 2020
- £9.00

- **Astronomy Photographer of The Year**

- until 26<sup>th</sup> April 2020
- £9.00

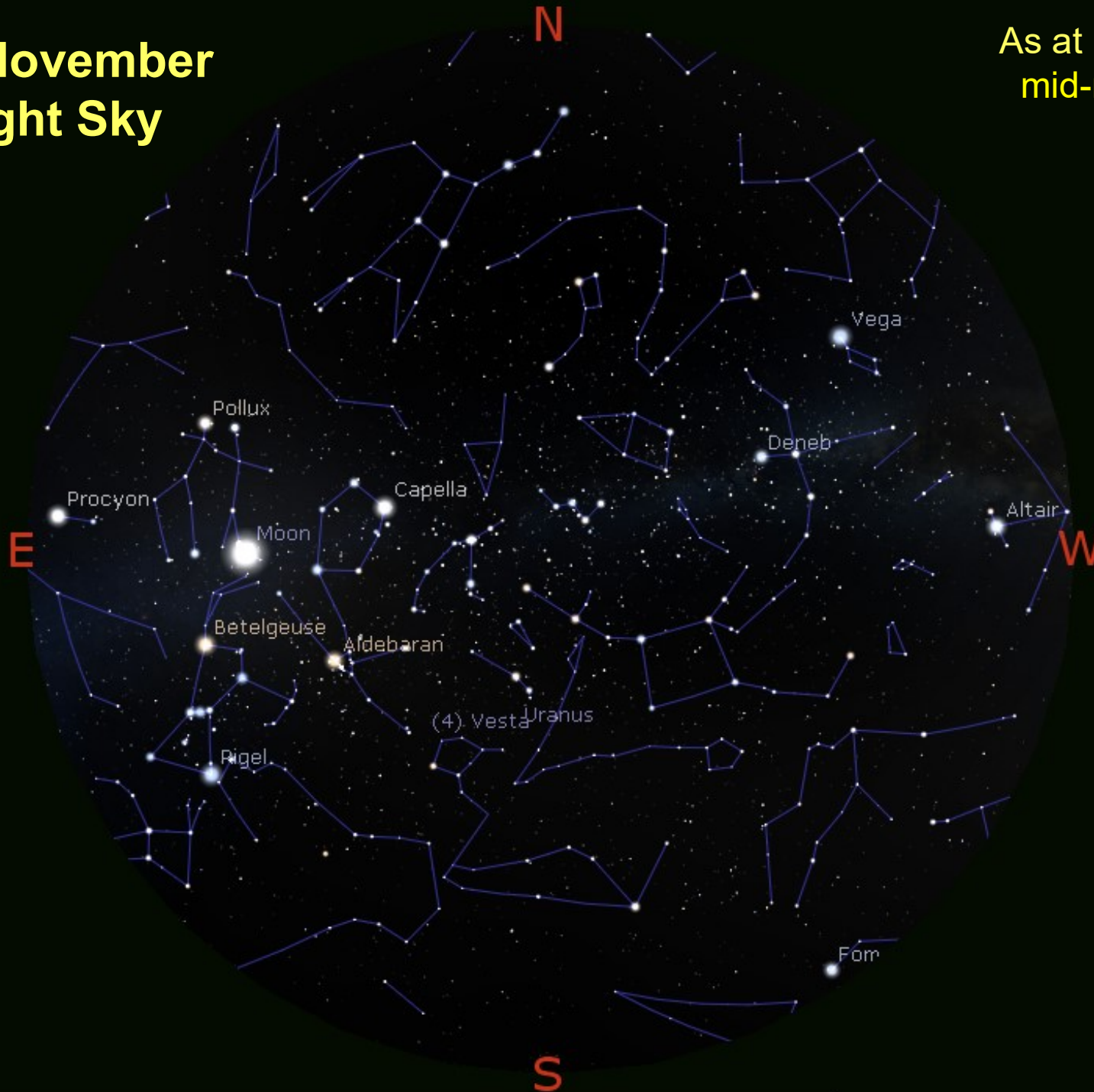
- **Combined ticket now available**

- On line £13.50, walk-up £15.00
- children half price



# The November Night Sky

As at 10 p.m.  
mid-month



# Sun & Moon in November

- **First Quarter** 4<sup>th</sup>
- **Full Moon** 12<sup>th</sup>
- **Last Quarter** 19<sup>th</sup>
- **New Moon** 26<sup>th</sup>

(BST)		Sun	Moon
1 <sup>st</sup>	Rise	06.54	11.49
	Set	16.36	17.50
15 <sup>th</sup>	Rise	07.18	18.24
	Set	16.14	11.14
30 <sup>th</sup>	Rise	07.42	11.21
	Set	15.58	19.31

# What's Up - Planets

- **Mercury**

- Poorly placed at the start of the month in South West, setting very soon after sunset. The planet morphs from evening object to morning object after the transit, and can be best seen from 20<sup>th</sup> onwards in the South East, about 1½ hrs before sunrise

- **Venus**

- A brilliant evening object shining at mag -3.8 in the South West. Sets about 50 mins after sunset on 1<sup>st</sup> and 90 mins on 30<sup>th</sup>.

- **Mars**

- A morning object, the red planet improves as the month draws on, rising 2 hours before the Sun at start and almost 3 hrs by end.

# What's Up - Planets

- Jupiter

- We effectively lose Jupiter by the end of the month as it slips into the evening twilight, but it can be seen for much of the month very low in the South to South West, still reasonably bright at mag -1.9 and this helps to find it.

- Saturn

- Still a good evening object, at mag +0.6, in the South to SSW for the first half of the month, but gradually dropping very low which hinders locating it.





- Uranus

- Now a very well placed evening object at mag +5.7, culminating at  $49^\circ$  due South about 22.30 hrs. mid-month

- Neptune



- An evening object in Aquarius in the South, but telescopic at mag +7.9

# Phenomena in October

- **3<sup>rd</sup>** Crescent Moon just  $1.5^\circ$  above Jupiter 
- **4<sup>th</sup>** 1<sup>st</sup> quarter Moon just  $1^\circ$  from Saturn 
- **8<sup>th</sup>** Maxima (early hours of 9<sup>th</sup>) of Draconid meteor shower, theoretical max of 20 per hour.
- **10<sup>th</sup>** Maxima of Southern Taurids meteor shower, theoretical max of only 5 per hour.
- **21<sup>st</sup>** Maxima of Orionid meteor shower, theoretical max of 20 per hour. Waning gibbous Moon will interfere.
- **29<sup>th</sup>** Just after Sunset 3% lit crescent Moon will be  $2.8^\circ$  above Saturn 
- **31<sup>st</sup>** Crescent Moon very close again to Jupiter early evening. During daytime at 14.10 hrs Jupiter will be just 9 arc minutes from edge of Moon - but telescope needed. 

27<sup>th</sup> End of BST at 02.00 hrs.  
Clocks go forward by 1 hour

# Phenomena in November

- **2<sup>nd</sup>** Crescent Moon just  $5.5^\circ$  to left of Saturn 
- **11<sup>th</sup>** Transit of Mercury, 12.35 to 4.22 pm
- **13<sup>th</sup>** Moon passing through upper section of Hyades open cluster in Taurus
- **17/18<sup>th</sup>** Maxima of Leonids meteor shower, theoretical max of 20 per hour. Waning gibbous Moon will interfere.
- **23-25<sup>th</sup>** Venus & Jupiter v.close, just  $1.4^\circ$  apart on 24<sup>th</sup>
- **25<sup>th</sup>** Thin crescent Moon very close to Mercury, low in East South East at 06.30 hrs 
- **28<sup>th</sup>** Jupiter occulted by Moon in daylight, reappears 10.30
- **28<sup>th</sup>** Low in South West find Saturn, Moon, Venus & Jupiter close together, just after sunset





- **Conjunction on 29<sup>th</sup> November, after sunset**
- **Joined by ISS at 4.31**

# Meetings at Local Societies

- **Guildford AS** *Lecture Theatre L, Uni of Surrey*

– Thursday 7<sup>th</sup> November, 7.30 p.m.

» **Black Holes That Feed On Galaxies**

» Dr. Leah Morabito

» Centre for Extragalactic Astronomy  
Durham University



# Meetings at Local Societies

- **Farnham AS Aldershot Cricket Club**
  - Tuesday 12<sup>th</sup> November, 7.45 p.m.
    - **“A Whistle-stop Tour Of The Planets”**
      - » William Joyce
      - » Farnham AS

# Meetings at Local Societies

- **Croydon AS** *Royal Russell School, Coombe Lane, Croydon*
  - Friday 1<sup>st</sup> November, 19.45 hrs
    - **Supernovae - The Exploding Universe**
      - Dr. Heather Campbell
        - » Dept. of Physics, Uni of Surrey
    - Fridays 15<sup>th</sup> & 22<sup>nd</sup> November, 19.45 hrs
      - **tba**

# Meetings at Local Societies

- **Ewell AS** *Nonsuch High School for Girls, Cheam*

- Friday 8<sup>th</sup> November, 19.45 hrs

- **One Month To Save The Hubble Telescope**

- Graham Bryant.

- » Hampshire AG

# Meetings at Local Societies

- **Walton Astronomy Group**
  - Friday 22<sup>th</sup> or Saturday 23<sup>th</sup> November, 8pm till late
    - **Dark Sky Trip** (Stargazing session)
      - Venue & night to be decided nearer to date
        - » check website for details
        - » <http://www.waltonastrogroun.co.uk>

# University of Surrey

- Department of Physics

- Wednesday 20<sup>th</sup> November  
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-physics/outreach/astronomy-evenings>

- Astronomy Evening



# Astronomy on TV

## The Sky at Night

### *“Rosetta: Revealing the Comet's Tale”*

As the Rosetta mission officially ends, the team reveals the new discoveries that are revolutionising our understanding of comets, including the discovery that shows the crucial role these space rocks may have played in starting life on Earth.

Sunday 10<sup>th</sup> November BBC 4, 10.00 pm

Thursday 14<sup>th</sup> November BBC 4, 7.30 pm

*for exact times please check [www.radiotimes.com](http://www.radiotimes.com)  
or [www.bbc.co.uk/skyatnight](http://www.bbc.co.uk/skyatnight)*



*"That's all Folks!"*