

# SPACEWATCH

the newsletter of the Abingdon Astronomical Society

## Next Talk

8<sup>th</sup> April 2019

**Astrophysics at the Highest Energies**

**Professor Tony Bell**

**University of Oxford**

## EDITORIAL

As with previous months this month's Spacewatch comes in two forms, the printed and the web version with more on the deep sky objects that Steve has chosen illustrated in the web version. With only two months now to the AGM in is time to start thinking about whether you think you may be able to help the society. This can come in various forms as well as standing for the committee. We need help for after tea talks and beginners talks as well as at the Observing sessions. This may become particularly acute later in the year when Trevor retires back to the south coast. The weather does not look very good for this new moon period and given we only have one more month of darkness left for an observing session we have struck out quite badly this year. The society will have a stand at the biannual Abingdon Societies Fair on Saturday 16<sup>th</sup> March and if you are in town that day drop by and say hello. If you have an hour to spare to help out that would be even more useful. Please contact Chris Holt if you think you can give some time. We have had to give up on the Abingdon ATOM event because we do not have enough people to cover both weekends.



M109 – Steve Creasey

## THE NIGHT SKY THIS MONTH

by Steve Creasey

Well despite all of the warm and sunny February days, not many of them materialised into clear, Observing or Imaging friendly nights. High cloud, mist and fog each played their parts in disrupting what could have been a good run of clear nights.

Having said that, I did manage to get out and do a bit of imaging 3 or 4 nights, not bad out of 28 for the UK 😊

With Leo rising earlier this month and Ursa Major being nice and high, we are getting into Galaxy season, the Leo triplet, the Virgo cluster, the M81 group, M51 the Whirlpool galaxy, M101 the Pinwheel galaxy, M109, M104, M106 and NGC 4013, are just some of the dozens of spectacular Galaxies we can see for the next month or two.

## The Planets

**Mercury** passes between us and the Sun (inferior conjunction) on the 15<sup>th</sup>. It may be possible to see it at the start of the month just after sun set if you have a good western horizon.

**Venus** begins March at a magnitude of -4.1. with its angular size reducing from 16 to 13 arc seconds during the month as it moves away from the Earth. However, at the same time, the percentage illuminated disk (its phase) increases from 72% to 81% - which is why the brightness only reduces from -4.1 to -3.9 magnitudes. Venus rises about 2 hours before the Sun at the beginning of the month with an elevation of ~7 degrees before dawn, but both reduce as the month progresses. We have nearly come to the end of its morning apparition as it moves towards superior conjunction (behind the Sun) in August. It will not then be visible, low in our south-western sky, until late November.

**Mars** though fading from +1.2 to +1.4 magnitudes during the month, remains prominent in the south western sky after sunset at an elevation of ~37 degrees. Mars is moving north-eastwards through Aries and passes into Taurus on the 23rd/24th of the month. (If only it could have been at this elevation when at closest approach last year!) Its angular size falls from 5.3 arc seconds to 4.7 arc seconds during the month so one will not be able to spot any details on its salmon-pink surface.

**Jupiter** starts the month rising around 2 a.m. and brightens from magnitude -2.0 to -2.3 as the month progresses whilst its angular size increases slightly from 36.2 to 39.7 arc seconds. By month's end it rises by ~1 am BST so will be higher in the sky before dawn. Sadly it is heading towards the southern part of the ecliptic and currently lies in the southern part of Ophiuchus just above Scorpius. By the end of March, it will lie almost due south as the Sun rises but will only have an elevation of ~14 degrees so atmospheric dispersion will blur its image somewhat

**Saturn** shining with a magnitude of +0.6, rises two and a half hours before the Sun at the start of the month some 2 hours after Jupiter. Its disk is ~16 arc seconds across and its rings - which are still 24 degrees from the line of sight - spanning 35 arc seconds across. Sadly, Saturn now to the left of the 'teapot' in Sagittarius is now at the lowest point on the ecliptic and so will only have an elevation of ~10 degrees when due south before dawn in a month's time.

**Uranus** by March the planet starts to subside noticeably to the West, evening on evening, so it is best observed early in the period.

**Neptune** reaches conjunction with the Sun on the 7th of March so is not observable in this period.

### **Meteor Showers**

There are no meteor showers for the Northern hemisphere this month

### **Comets**

Not much happening in 2019 Comet wise unfortunately, but there is always the possibility of something coming along to surprise us.

46P/Wirtanen – Past its best but is still visible

C/2018 Y1 (Iwamoto) is still visible but fading fast so the beginning of the month will be the last chance to see it.

### **Deep Sky Objects**

As I mentioned at the start, we are coming into Galaxy season, so this month's DSOs are going to be mainly a selection of our Galactic neighbours.

**M81** (also known as **NGC 3031** or **Bode's Galaxy**) is a spiral galaxy about 12 million light-years away, with a diameter of 90,000 light years, about half the size of the Milky Way, in the constellation Ursa Major. The galaxy's large size and relatively high brightness also makes it a popular target for amateur astronomers.

Due to its proximity to **M82**, both galaxies can be observed in the same field of view through most scopes.

**M82** (also known as **NGC 3034** or the **Cigar Galaxy**) is a starburst galaxy approximately 12 million light-years away in the constellation Ursa Major. A member of the M81 Group, it is about five times more luminous than the whole Milky Way and has a center one hundred times more luminous than our galaxy's center. The starburst activity is thought to have been triggered by interaction with neighbouring galaxy M81. As the closest starburst galaxy to Earth, M82 is the prototypical example of this galaxy type.

In 2014, in studying M82, scientists discovered the brightest pulsar yet known.

**M51** The Whirlpool Galaxy, also known as NGC 5194, is an interacting grand-design spiral galaxy with a Seyfert 2 active galactic nucleus. It lies in the constellation Canes Venatici, and

was the first galaxy to be classified as a spiral galaxy. Its distance is estimated to be around 23 million light-years.

The galaxy and its companion, NGC 5195, are easily observed with amateur telescopes, and the two galaxies may be seen with binoculars. The Whirlpool Galaxy has been extensively observed by professional astronomers, who study it to understand galaxy structure (particularly structure associated with the spiral arms) and galaxy interactions.

**M109 (NGC 3992)** is a barred spiral galaxy located in the constellation of Ursa Major.

It's an extremely large galaxy with a physical diameter of 180,000 light-years and contains about a trillion stars.

It is estimated to be 83.5 Million light-years from Earth, making it the furthest object in Messier's catalogue.

Despite its large distance, it's relatively bright at magnitude +10.3 and therefore within the range of small to medium size scopes.

**M101 The Pinwheel Galaxy** is a large face-on spiral galaxy located 22 million light-years away in the constellation of Ursa Major. At magnitude +7.9, it can be glimpsed in binoculars or small telescopes from dark sites. However, this galaxy suffers from low surface brightness and in bad seeing conditions or light polluted areas is sometimes difficult to spot even with 200mm (8-inch) scopes. M101 is best seen from the Northern Hemisphere during the months of March, April and May.

**M104**, more commonly known as the **Sombrero Galaxy**, is a spectacular almost edge-on spiral galaxy in Virgo. At magnitude +8.4, it appears in binoculars as a small patch of nebulosity. Its most striking feature, which is visible in medium/large size amateur scopes, is a ring of thick dust encapsulating the galaxy bulge that gives it the appearance of a Sombrero hat. Many astronomers regard M104 as the finest of all the Virgo galaxies. It's located 30 million light-years distant, which corresponds to an actual diameter of 75,000 light-years. The galaxy is estimated to contain about 100 billion stars. It also contains a reasonably large number of globular clusters (approx. 2,000). It's the dominant member of a small group of galaxies known as the M104 group or NGC 4594 group.

**M106**, mag. +8.5, is a large spiral galaxy located in Canes Venatici. M106 is one of the brightest examples of a Seyfert type II galaxy and is therefore a strong X-ray emitter with unusual emission lines, which are believed to result from sections of the galaxy falling into the central supermassive black hole. American astronomer Carl Seyfert first identified this class of object in 1943.

Located at a distance of 25 million light-years from Earth, M106 is intrinsically large with a diameter of 135,000 light-years. It contains at least 400 billion stars.

**NGC 4013** is an edge-on barred spiral galaxy about 55 million light-years away in the constellation Ursa Major. The disk of NGC 4013 shows a distinct "peanut"-shaped bulge in long exposure photographs that N-body computer simulations suggest is consistent with a stellar bar seen perpendicular to the line of sight

**The Leo Triplet** (also known as the M66 Group) is a small group of galaxies about 35 million light-years away in the constellation Leo. This galaxy group consists of the spiral galaxies **M65**, **M66**, and **NGC 3628**. All three galaxies are visible even in small scopes, this is a particularly impressive sight when viewed through a reasonably large telescope.

## Moon

New moon 6<sup>th</sup> March

First quarter 14<sup>th</sup> March

Full moon 21<sup>st</sup> March, Last Full Moon of Winter (the worm moon)

As the Worm Moon is in March, it is usually the last Full Moon before the equinox which can take place on March 19, 20, or 21. In 2019, the Full Worm Moon on March 21 at 01:42 UTC is almost 4 hours after the March equinox on Mar 20 21:58 UTC.

Last quarter 28<sup>th</sup> March

## LAST MONTHS TALK

by Gwyneth Hueter

### February's talk

Edward Emerson Barnard (1857-1923) lost his father at a very young age and ended up working in a photographic studio from the age of nine. By the time he was 19 he had become interested in astronomy and made a decent bit of money by discovering five comets (worth \$200 each. Good money as we are talking about the 1880s here). In 1883 he photographed a dark region in Sagittarius, now called Barnard 86.

Barnard's talents led him to work up to a job at the Lick Observatory (Mount Hamilton, California.) which progressed to getting the 36" refractor in 1892, then to Yerkes and its 40" refractor. By 1916 he had collected a list of over 300 dark nebulae, as well as other discoveries such as Amalthea, the first non-Galilean satellite of Jupiter, the high proper motion of what we now call Barnard's Star, and of course the huge Barnard's Loop in Orion. The 'Photographic Atlas of Selected Regions of the Milky Way' has all his 'dark objects' collected.

The development of equipment that enables us to see further into the infrared and radio wavelengths made it much clearer that these dark bits were actually stuff obscuring other stuff. These dark clouds are very cold, dusty, large, irregular clouds of molecular hydrogen. The smaller ones in the Galaxy are relatively short lived, up to 300 light years across and containing up to ten million solar masses. These are star forming regions and you can see the small ones in photographs as blobs called Bok globules. Then you have the giant molecular clouds which are maybe 100,000 million solar masses or more, with roughly 2% of heavier elements. We have these in our Galaxy and they can just dissipate over millions of years. These are perhaps the coldest places in the universe at 10 to 50 Kelvin but they are a bit denser than purely empty space. Dr Hewitt gave us an unusual analogy of these tiny dust (silicates/ carbon/iron) grains, half a micron across, with a thin icy coating, like a Bounty bar. The clouds are pretty inert, but their H<sub>2</sub>

molecules do form and give off a bit of radiation in the process; that's how we detect them. If gravity does cause areas within the clouds to coalesce then you will get Bok globules and star clusters forming. The stars' radiation will then clear the area around them. The Rosette Nebula is a newly formed group of stars which still have stuff around them but there is a space around them where their radiation has cleared the area.

Interesting shapes can be seen among the dark nebulae, such as Barnard's E, near to Beta Aquilae.

Interesting that Barnard named lots of dark nebulae around the North American Nebula in Cygnus but never named the Gulf of Mexico bit. Different bits of the Pipe Nebula in Ophiuchus have their own Barnard designations. It is very intricate on deep exposures.

Dr Hewitt pointed out that the Sky Catalogue 2000 has them all listed in the dark nebulae index. 349 of them, and I have it if anyone wants to see. Two whole pages and most of them are those from Barnard's catalogue.

Local amateur Gordon Rogers has also been very good at photographing them and you can find a lot of them with the app Stellarium. Try Rho Ophiuchi for starters and you can benefit from an IDAS pollution filter for photography.

Try the Sagittarius M22 area towards Rho Oph with a 50mm lens.

Try the Scutum star cloud.

The Taurus molecular cloud has a lot going on, lots of young stars. Barnard 7 is a dark molecular cloud which has hot spots in it as confirmed by IR observations. Tau Tauri is a famous variable which has a lot of stuff falling in on it from time to time. This is a young star which is not yet in the Main Sequence stage. The area between the Hyades and Pleiades is well worth photographing deep.

Barnard 33 is the Horsehead.

Dr Hewitt finished by talking about his latest passion for monitoring dark nebulae to see if they are variable. In other words he is really looking for the effects of the young stars nearby. He still hopes he will be able to have a variable nebula named after him.



NGC 7354 – Ian Smith



NGC 7354 central part.



Last part of Lunar Eclipse – Steve Creasey

#### DATES FOR YOUR DIARY

**25<sup>th</sup> March 8pm Beginners' Meeting in the Main Hall., talks to include Observing Planetary nebulae and Women in Astronomy (although subject to change)**

**Observing evening: The next observing session will be on the FCN 1<sup>st</sup> – 3<sup>rd</sup> April 2019 at Frilford Heath Tubney Golf driving range, note that this is a new location and maps will be on the website. As always go/no go notes will be posted on the newsgroup as well as the Facebook page so please look there for more info or contact Trevor Pitt or Steve Creasey for details.**

**This will be the last observing meeting of the session because ether skies do not get dark early enough in May.**

**Abingdon Societies fair Saturday 16<sup>th</sup> March, Guildhall Abingdon**

**BAA Deep Sky section meeting 23<sup>rd</sup> March Cheltenham – featuring Ian. Details at <https://www.britastro.org/node/15421>**

