ASTROCAMP

SPRING 2019

WELCOME TO ASTROCAMP

Thank you for booking and welcome to the Spring AstroCamp 2019. Rather than grow to accommodate more bookings, we're staying at the familiar AstroCamp campsite in Cwmdu, which means we remain small, friendly and have become perhaps the most exclusive starparty around!

AstroCamp is widely regarded as the friendliest and most helpful star party there is. So, if you're feeling sociable, come and set up around 'The Common', near the reception and the AstroCamp HQ tent. If you're new to astronomy or don't have your own telescope and want to look through a range of scopes and ask questions, 'The Common' is the place to come!

Of course, those that want to find a dark and quiet corner for some observing or imaging in blissful seclusion have everything they want in this weather protected valley under the uber dark skies of the Brecon Beacons International Dark Sky Reserve.

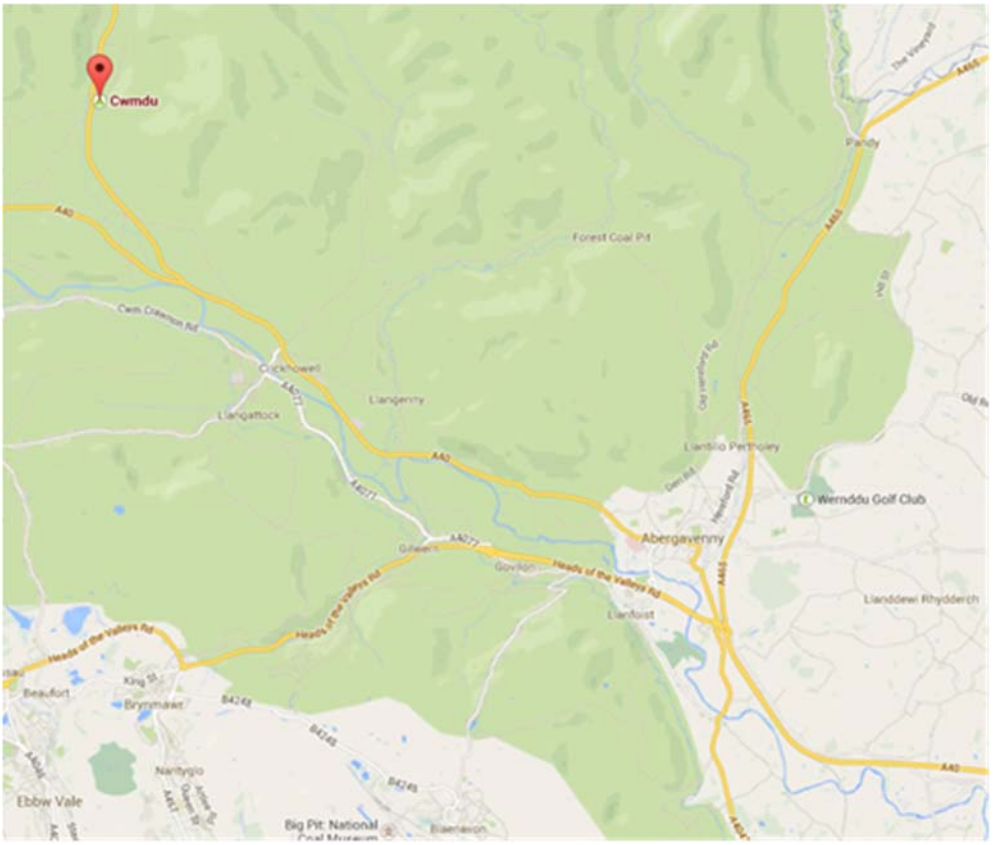
In this pack, you find a guide to the scheduled events and talks that will be taking place this AstroCamp. All talks, events & workshops are included in your admission, so please feel free to come along to any or all that you'd like.

We've also listed five objects each, as a starter for planning your observations or getting started in imaging over the weekend. All the observation times are listed in UK local time.

Apart from the Astronomers in the Pub event on Sunday afternoon, all workshops will begin from the AstroCamp HQ tent on 'The Common'.

The Sunday afternoon talks & quizzes will be held at Cwmdu Village Hall (which we've renamed The Spiral Arms so that we can carry on the tradition of Astronomers in the Pub now that we've actually outgrown the village pub). This is easy to find: from the Farmer's Arms pub, continue north on the A479 and turn left after 140m. All events are free, there are prizes worth many more times the cost of AstroCamp admission and we even have our own locally brewed AstroCamp Ale for the real ale drinkers.

HOW TO GET TO ASTROCAMP



By Train: The nearest train station to Cwmdu is Abergavenny. Bus services run weekly to Cwmdu so booking a taxi from the train station is recommended. Taxis cost around £25 each way, but most operators seem to be happy to negotiate a fixed price if you guarantee that you will use them for the return journey.

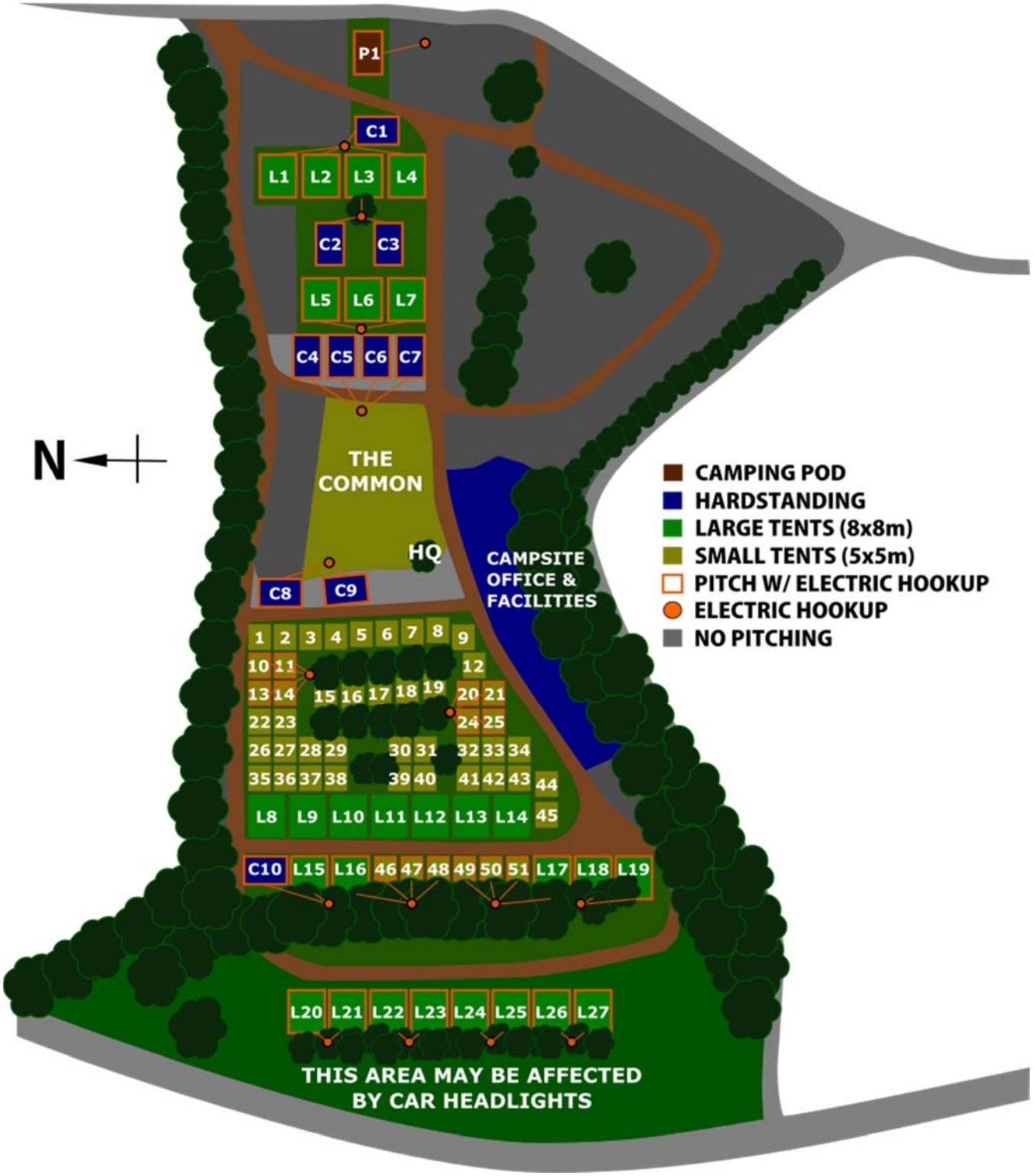
By Car: Cwmdu Caravan & Camp site is located four miles north of Crickhowell just off the A479 Turn right at the Farmers Arms public house in the small village of Cwmdu and follow the signs for 300m.

PLEASE NOTE: While SATNAV may bring you successfully to the area it may NOT deliver you to the campsite. Please follow the "camping" road signs from the Farmers Arms public house for the final 300m to the campsite.

Campsite Address: Cwmdu Campsite, Cwmdu, Crickhowell, Powys, NP8 1RU

CAMPSITE LAYOUT

Please pitch in your allocated area according to the map below. Please only park your car by your tent if it fits well within the dimensions of your chosen pitch (5x5m small, 8x8m large). Otherwise please park your car in the empty bottom field after unpacking and pitching up. Your neighbour will thank you for it!



ASTROCAMP EVENT SCHEDULE

Saturday 27th

En route to Cwmdu, listen to the Awesome Astronomy special podcast extra just for AstroCampers! Just look for 'Awesome Astronomy' on iTunes (goo.gl/oax2Yg) or go to awesomeastronomy.com/getpodcast

13:00 ..... Arrive at campsite, pitch up & set up

15:00 ..... Meet & Greet. Come to the gazebo on The Common to meet new friends, share stories & a drink or two

16:00 ..... John's collimation tutorial. Make sure the mirrors in your scope are in tip-top alignment before the stars come out.

21:00 ..... Paul's starhopping & navigating tutorial on The Common. Learn how to find your way around the sky and pick out a few treats in the cosmos.

Sunday 28th

10:00 ..... Solar SUN-day - solar observing in white light and hydrogen alpha on The Common

The Sunday afternoon talks and quizzes are held at our pop-up pub 'The Sprial Arms' at Cwmdu Village Hall. All talks and quizzes are included in your admission price.

14:00 ..... The Spiral Arms Astronomy Quiz to win big prizes from the Tring Astronomy Centre

15:30..... "Uncovering the secrets of dark matter" by David Abergel - David is an Associate Editor at Nature Physics.

16:30 ..... Champions of the Universe Quiz (the difficult quiz in which you're playing for beer!)

Monday 29th

14:00 ..... High Tea on 'The Common'. Bring food, drinks, (guitars & mandolins?), chairs & tables if you have them, for this social gathering that proves so popular each year

Tuesday 30th

12:00 ..... Leave campsite

The Common (in the middle of the campsite) is the area we've created for socialising and observing together. There's always lots gathered here to share eyepiece views and learn new astronomy tricks from others.

Join us in the AstroCamp family at the Common!

RALPH'S IMAGING TARGETS FOR BEGINNERS

My picks are all visible in a 4" (100mm) scope and can be imaged in 1 minute exposures with a tracking mount. With a good polar alignment, you may be able to take 3 minute exposures or longer. But look at them carefully and if the stars look like they're smearing, discard them and take slightly shorter exposures or refine your polar alignment.

Come and ask me if you have any imaging questions and any of the imagers on site will be happy to give you pointers if you're new to astrophotography.

WIDEFIELD ASTROPHOTOGRAPHY

If you don't have a telescope & mount but have a camera and tripod, this is the simplest way to capture the wonder of night skies in areas as dark as Cwmdu.

Play with the manual focus on your DSLR camera to get nice tight round stars on your viewfinder or a short test exposure. One of the brighter stars at dusk (such as Vega, Capella or Arcturus) or the moon or Jupiter in the pre-dawn sky are great for getting a sweet focus.

Then take a 20 or 30 second exposure, with an ISO value of 800 or 1600 and your widest aperture setting. If you have a viewfinder, you'll be able to scan the thousands of stars you've captured and see which of the larger clusters, nebulae and galaxies are revealed as smudges of light. The seam of the Milky Way will be overhead too and that will blow your mind in widefield images taken this way!

If the stars look to be trailing (moving on your sensor) in your images, decrease your exposure time. You can zoom in for more detail or zoom out for wider-field images of the night skies but remember that the more you zoom in the shorter your exposures can be before the stars will begin to trail. You will also need to re-focus each time you change your zoom setting.

Push your exposure times for as long as possible, before the stars begin to smear, and you'll be amazed how many star fields and deep sky objects you'll be able to reveal in your images.

STAR TRAILS

You can take some fabulous images by deliberately exploiting the rotation of the sky to create beautiful circles of stars around the north celestial pole.

Turn off noise reduction & image stabilisation on your lens and always shoot in RAW format. Point your camera north on its tripod (towards the Pole Star, Polaris) and use manual focus on a bright star to make sure you're perfectly focused.

Startrails look the best when you have a foreground object occupying 10-20% of the image - trees, unlit buildings or the Welsh mountain ridges are perfect for this. As Cwmdu's so dark, your long exposures won't be affected by these objects being over-exposed.

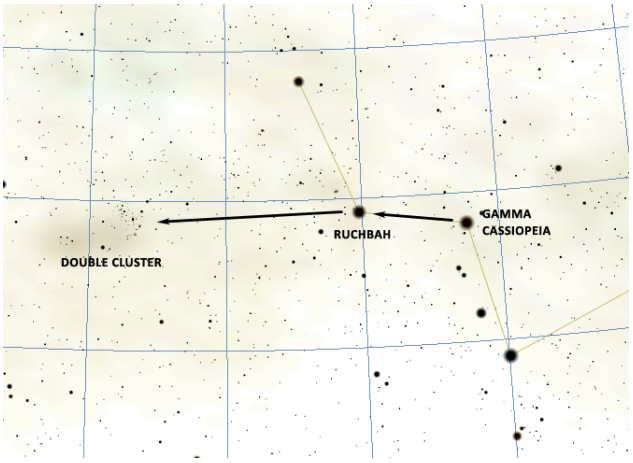
Then take a series of 5-10 minute exposures on your camera's 'bulb' setting with an ISO of 200 or 400 and your widest aperture setting. You should get images with nice arcing startrails. If you use a remote timer, you can leave your camera to take dozens of these shots and play around with different foreground objects or where Polaris sits in your frame – some of the most artistic star trail images have the centre of rotation offset from centre.

If you're proficient with Photoshop, after you've taken a dozen or more of these images, import them as individual layers (Adobe Bridge is the simple way to do this) and select the 'Lighten' blending option for each layer.

NGC 869 & 884 - THE DOUBLE CLUSTER

As a must see object for any newbie amateur astronomer, this is naturally a must capture object for beginner astrophotographers too. And, as it's large and bright, it's also easy to photograph using a camera lens or a telescope as your lens, despite it being relatively low in the sky during spring.

Hanging between 18-25 degrees in altitude all night, this pair of open clusters dips as the night progresses so is better to image or observe just after dark or just before morning light.



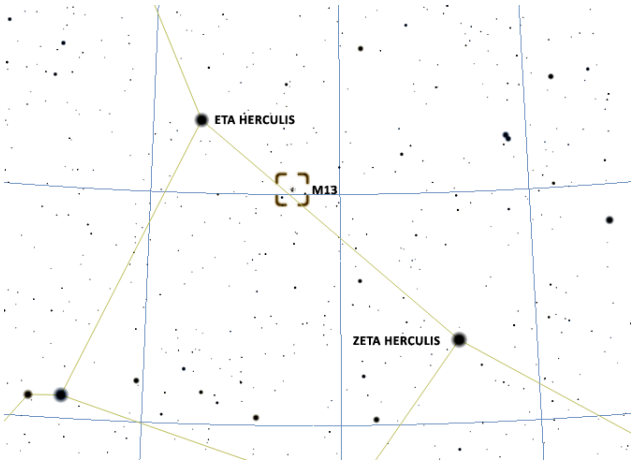
You can star hop to the Double Cluster by locating Gamma Cassiopeia (the apex in the centre of the 'W' shape of the constellation) any time after darkness sets. Draw a line from Gamma Cassiopeia to Ruchbah at the bottom left hand dip in the 'W' and follow that line for the same distance. You'll almost certainly see a large faint smudge of light with the naked eye – probably before you attempt the star hop.

Using a small scope or binoculars will show it as two pretty star clusters in the same field of view. They're actually moving towards us at 25 miles per second but, luckily, it'll take 13 million years to get anywhere near us!

A one minute exposure with a DSLR fixed to a scope will easily reveal the mass of stars in these two clusters. Multiple images stacked in free software - such as Deep Sky Stacker - will be almost as good as taking much longer exposures. This object is so large and bright that you may keep catching them in the corner of your unaided eye as you scan the skies. Because of this, if you're pointing north while taking widefield photos of the sky, you'll certainly catch the large open cluster pair that is the Double Cluster.

M13 - THE GREAT GLOBULAR CLUSTER IN HERCULES

Getting higher in the sky as the night goes on, Messier 13 is best imaged after midnight – though it will be on show for observing or imaging from dusk 'til dawn.



This is the largest and most spectacular globular cluster we can see in the northern hemisphere and looking through one of the larger scopes at camp will give you an idea of the immense concentration of individual stars in this cluster.

M13 is a gravitationally bound ball of more than a quarter of a million stars. It sits 22 light years away from us in a halo around our galaxy (as do all the other globular clusters).

To find it, take a look two thirds the way along a line imagined between the stars zeta and eta Herculis in the square of stars that sits in the middle of the constellation of Hercules – also known as the Keystone.

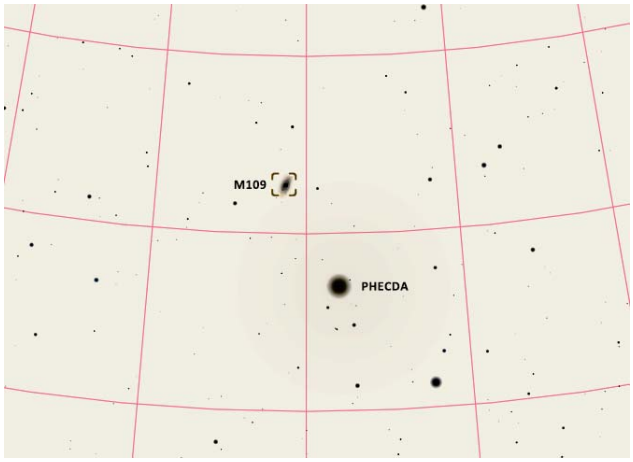
As with the Double Cluster, a one minute DSLR exposure from an alt/az or equatorial mount will show dozens of individual stars. If you have an equatorial mount, try taking longer exposures or stacking lots of 1 minute exposures in Deep Sky Stacker to reveal hundreds of stars.

PAUL'S VISUAL DSO HUNT

For this camp I am going to suggest a tour through what looks like a pretty unremarkable pair of constellations, both with odd names, Canes Venatici and Coma Berenices. What these constellations lack in readily identifiable shape and size they more than make up for in deep sky targets, between them they contain 13 Messier objects!

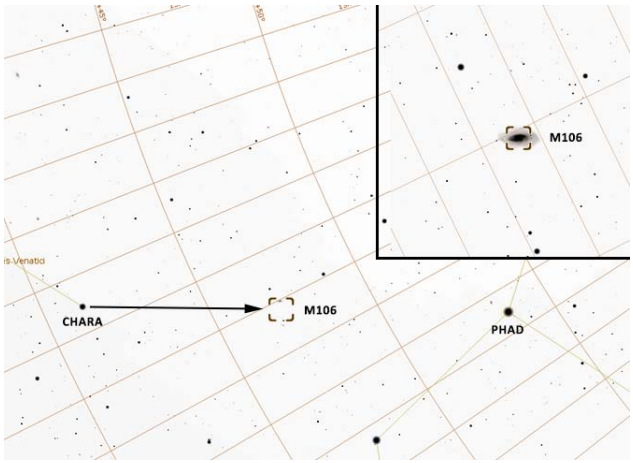
M 109

We start with a surprisingly difficult and frustrating target, a barred spiral about 84 million light years away just south-east of the star Phecda. This is the star and the bottom right of the 'bowl' of the plough and at magnitude 10.6 this should be an easy find, but with a low surface brightness and only between 7 and 4 arc seconds across, it is easily missed as you sweep away from Phecda. It is the most distant of the messier objects by a large margin, with the next closest being M91 in Coma Berenices, being a 20 million light years closer. M109 is the brightest of the M109 group (see what they did there?) which can found all over this part of Ursa Major with over 50 members. If you have aperture then have a sweep of the area, NGC3726 is almost as bright.



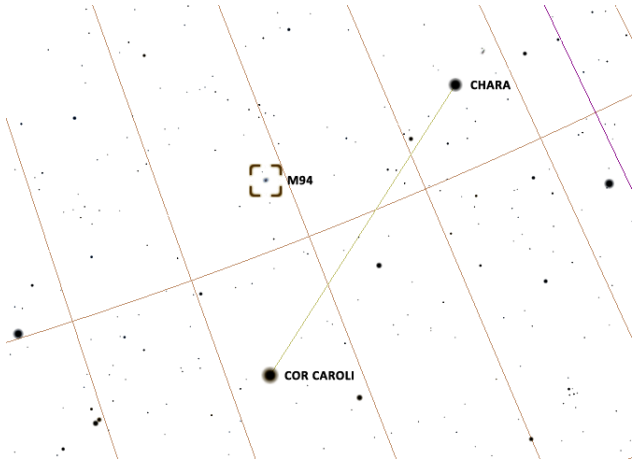
M 106

Next it's time to travel further south east from Phecda. Draw a line to the double star Cor Caroli in Canes Venatici. This should be around 18 degrees long and if you travel along it just under half, about 8 degrees your scope should fall into the area of M106. This is an intermediate spiral, thought to be similar to Andromeda and has a very active core containing a supermassive black hole. It was a key galaxy on creating the cosmic distance ladder as it contains Cepheid variable stars with a similar metallicity to the stars in the Milky Way. It is about 24 million light years away, has a magnitude of 8.4 and is over twice the apparent size of M109, so an easier target to calm your frustrations.



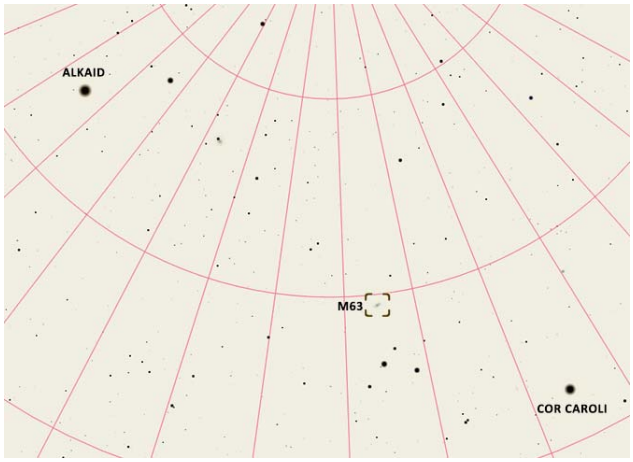
M 94

Now it is time to move right into Canes Venatici for out next object that sits between and above the two main stars of Canes Venatici, Cor Caroli and beta. These stars are quite close together and forming a flat triangle with them is Galaxy M94. This is a tightly wound spiral with a magnitude of 8.2 making it slightly brighter than that most famous of Canes Venatici galaxies M51 and at 14 million light years distant it less than half the distance of the Whirlpool. Small telescopes in a dark sky may start to get a hint of the spiral arms, medium and large telescopes will certainly be able to tease out the detail.



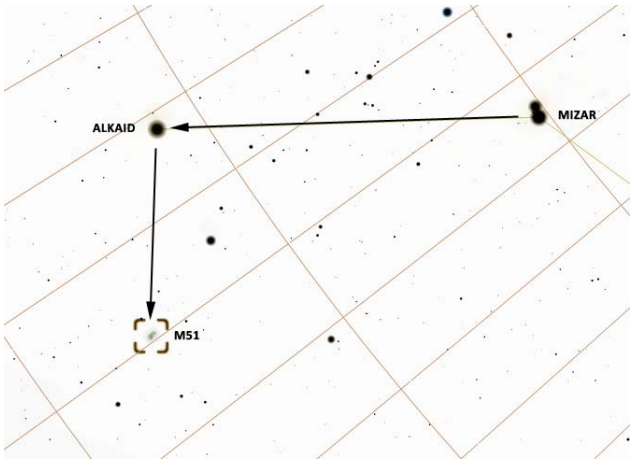
M 63

Next it is time to draw a line from Cor Caroli again, but this time towards the star at the end of the handle of the plough, Alkaid. This line is about 22 degrees and a quarter of the way along it, next to a group of four magnitude 4 / 5 stars is the Sunflower Galaxy. This is a large spiral galaxy just under 30 million light years away with a magnitude of 9.3. It is a described as flocculent, meaning it demonstrates a continuous spiral structure with no discernible arms, but interestingly in the infrared two clear arms can be seen

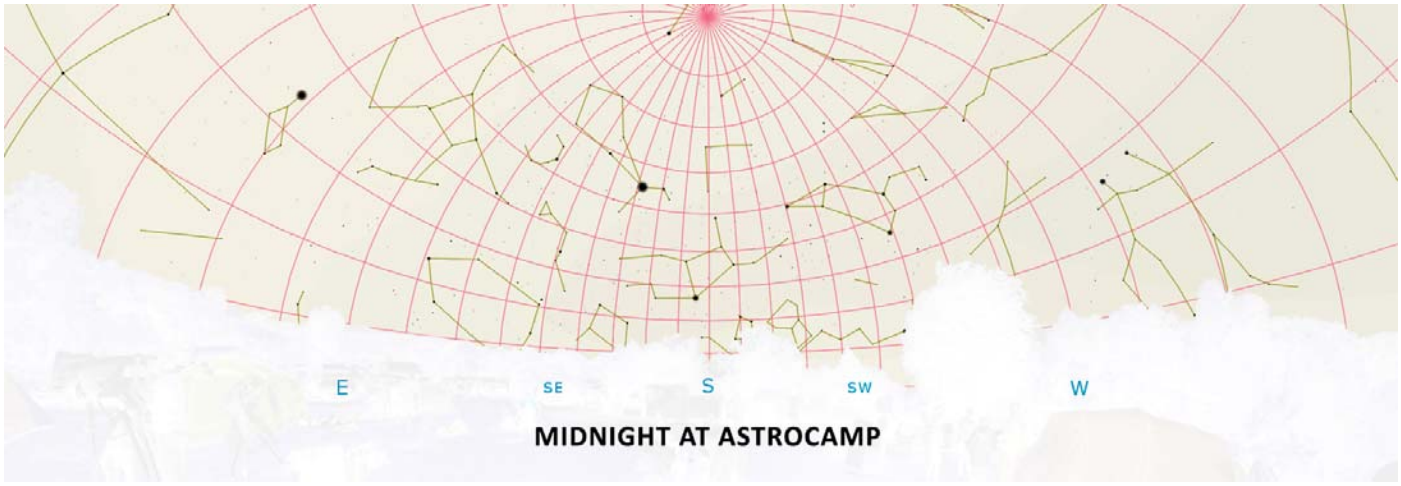


M 51

Last is the Whirlpool. Stunning and notoriously easy to miss, it is never quite where you think it is. Looking at the star Mizar draw a line Alkaidto where you found M94, move your scope towards the centre of Canes Venatici by 3 degrees and get your averted vision ready. It may be only 23 million years away, it may be magnitude 8, but it has a low surface brightness and is only 11 arc seconds across, it is always smaller than you remember.



DAMIEN'S SOLAR SYSTEM ROUND UP (ALL TIMES IN BST)



JUPITER DIAMETER: 43" MAGNITUDE: -2.5

Jupiter is currently sitting in virgo, and can be spotted easily by looking SE at dusk.

Filters: Blue to bring out rills, festoons and the GRS, dark blue for the belts and GRS.

Rise: 00:27 **Culmination:** 04:24 **Set:** Daytime

Great Red Spot Transits:

29th Start: 01:56 Midpoint: 03:56 End: 05:56

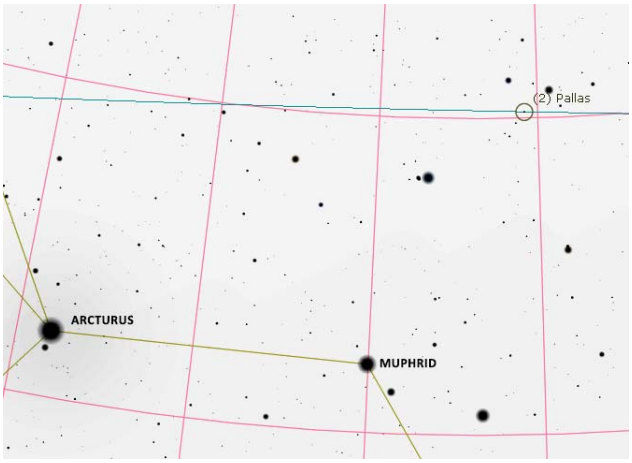
Moon Occultations:

27th	Io	Start: 23:14	End: Daytime
28th	Europa	Start: 03:20	End: Daytime
29th	Europa	Start: 03:20	End: Daytime

2 PALLAS DIAMETER: 0.3" MAGNITUDE: 8.2

512km in diameter, Pallas is the third most massive asteroid and responsible for 7% of the mass of the asteroid belt. This dwarf planet sits just under 5 degrees away from Muphrid in the constellation of Bootes.

Rise: Daytime **Culmination:** 00:34 **Set:** Daytime



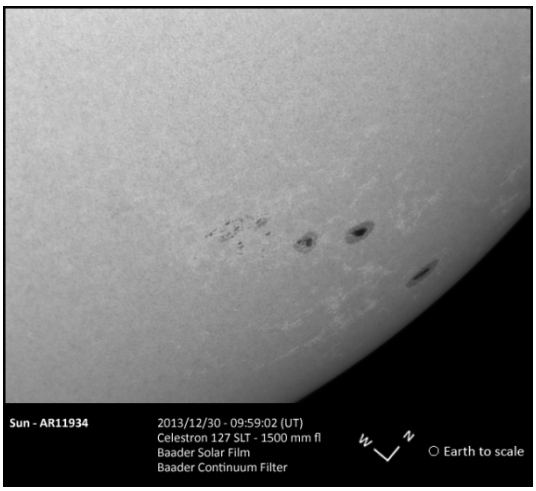
SATURN DIAMETER: 17" MAGNITUDE: 0.6

While Jupiter may be the king of planets, I'd argue that Saturn is the most magnificient and inspiring planet in our solar system. It's rings are noticable in smaller scopes and amazing when viewed in larger apertures.

Filters: Blue to bring out rills, festoons and the GRS, dark blue for the belts and GRS.

Rise: 02:19 **Culmination:** 06:19 **Set:** Daytime

THE SUN

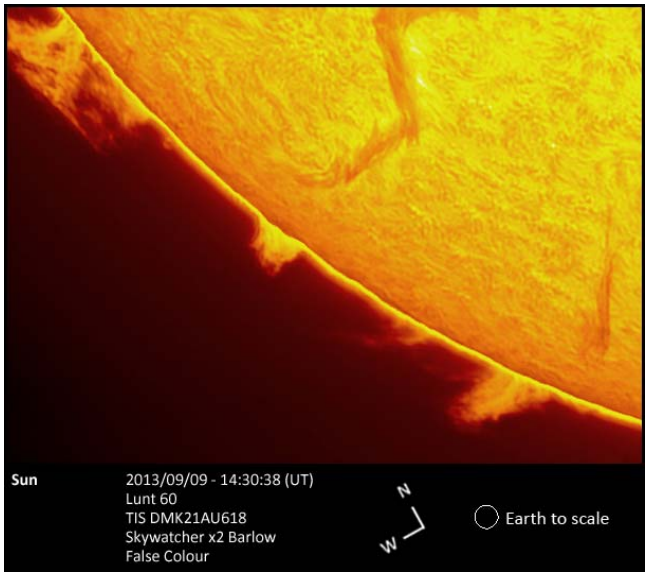


The simplest way to safely observe the Sun is with a simple white-light filter made using Baader Solar Film, which comes with instructions on how to assemble a filter to fit your scope. White-light filters cut down the light entering your telescope to safe levels and allow you to observe the Sun's photosphere, the surface of the sun that we perceive to emit light.

The most obvious feature to look at are sunspots, which come in a variety of shapes and sizes. The larger spots will present a dark central area called the umbra, surrounded by a lighter, greyer penumbra. Sunspots are dynamic features and it is worth spending a few hours revisiting the sunspot group to see how it has changed.

Sunspots are often surrounded by faculae, these are brighter (and therefore hotter) regions of the sun and can best around the limbs of the Sun.

If you're lucky enough to have a hydrogen alpha scope available, you'll also be able to make out features in the Sun's chromosphere. There are a wide range of features to keep an eye out for, too many to mention right now, so here are a few to whet your appetite.



One of my favourite Ha targets are prominences, clouds of plasma arcing from the Sun's photosphere into the corona and are observed around the limb of the Sun. They are highly dynamic and make for great time lapses. When prominences are viewed top-down, that is with the Sun in the background, they are referred to as filaments which appear as narrow, darker regions on the face of the Sun.

Next up we have plage, these are bright patchy areas that can be found in active sunspot regions. Plage are markers for areas of the Sun that have nearly vertical emerging or reconnecting magnetic field lines.

Finally we have spicules, smaller jets of gas that create the feathery effect that can be seen on the disk of the Sun in Ha at lower magnifications. Little is known about how they are formed, and remain an active area for researchers.

STAR CAMP ETIQUETTE

LIGHTS

Please only use red light torches at night. If you use a laptop, please cover the screen with a sheet of red acetate. Toilet block lights will be switched off or covered in red acetate during the dark hours. We discourage the use of laser pointers as they'll interfere with astroimaging and can be dangerous. Also, cigarette lighters produce light as well as heat. Please screen your lighter flame from astronomers. Please be aware that lights inside tents and caravans are also visible to people outside of them - red lights or no lights please.

This is the one piece of etiquette that will make offenders very unpopular - dark adaption takes up to half an hour to achieve but only a second of normal light will take you back to square one.

EQUIPMENT

People will be happy to let you look through the eyepiece at their scopes but please do ask the owner before taking a look. Be aware that telescopes are carefully aligned and assembled and as little contact to see through them is best.

Be mindful of astroimagers. Astrophotography requires very steady and unobscured exposures, so please don't touch or walk in front of a scope being used for imaging. We will try and set aside an area for astroimagers for this very purpose. I'm told they're still a very friendly bunch despite their obsession with long exposures!

CARS

No car movements are permitted after dark, so please arrange to arrive before this time. Remember that opening car doors or the boot always turns an interior light on so disable them if you can, or remove the fuse before sunset. Alternatively, cover them with opaque tape, including those in the boot. If a bright light is unavoidable call out: “LIGHTS IN 3 SECONDS” to give everyone time to turn the other way.

The best advice here is to remove everything you'll need from cars before nightfall and don't return to them.

CHILDREN

Children are welcome to the event, but please remember the field is dark, there are lots of very valuable bits of equipment and many people will have carefully aligned their telescopes. Also, tired astronomers are often glad of a lay in the following morning. Please keep your children and their volume under control.

NOISE

We want this to be an astronomy party, but please be considerate of others and refrain from any raucous behaviour or loud talking. Some people will want to catch up on some sleep for a few hours during the night and others will be sleeping during the day. Please be considerate of others trying to sleep when it is cloudy by not playing music late at night.

RUBBISH

The site is rich in wildlife and a very pleasant place to stay. We would like to keep it that way. Please keep your rubbish in a suitable container and dispose of it in the bins provided. Dark sites and loose trash do not mix well.

DOGS

Well behaved dogs are welcome to the event, but please remember the field is dark, there are lots of very valuable bits of equipment and many people will have carefully aligned their telescopes. Also, tired astronomers are often glad of a lay in the following morning. Please keep your dogs on a lead if they are anywhere near other people’s equipment and their volume under control.

Please also be mindful of others who might have a fear of dogs.