Stargazey Pie!
A slice of Highlands astronomical life!
Tues 2nd September 2014

HAS Meeting Notices September 2014

1. Current News and Dates for your Diary

- The Committee HAS 20th Anniversary celebratory meal will be at Fairways on 22 November (cost about £24) with Howie Firth as speaker. If you'd like to come along (partners welcome) please e-mail Pat or any of the Committee.

- Our updated 2014/15 Programme of Events is available at reception; the details are also on the website at: www.spacegazer.com

2. Winter Observing Season

- The nights are drawing in and our evening sessions at the observatory will commence in the near future – further information will be available very soon and will on the website – fingers crossed for some clear skies.

3. Other news

- **The next meeting is on 5 October** - this will be a talk by Ken MacTaggart on Lunar Science / the Apollo Journals.

- **Suggestion Box** – at reception. Don't forget to let us know if you have any ideas you would like the committee to look at – this is your Society, please help the committee to provide what you are looking for. Or of course speak to a committee member.

- **Replacement of telescope mounts –** many thanks go to the Councillors from Highland Council's Ward 20 who have granted funding of £1254 from the Ward Discretionary budget, this being 50% of the cost of the replacement EQ8 mount for the large telescope at the Observatory; many thanks also to Lifescan who have granted funding of £335 to pay for a new mount for the smaller telescopes at the observatory

- **Aurorae and Telephone alerts** – should you see an aurora, noctilucent clouds, or anything else of astronomical interest, please alert Paul (01667 456789) or Pauline (07751 112 586). It is never too late at night to let us know.

Main Event

For the second year running we decided to hold a meeting for the members that enabled them to learn about different ways to view the night sky; ***a practical observing night.***

Maarten started off with an introduction to the meeting about how to start observing, what to do and see, and the equipment required and later expanded on all these aspects.

To put observing in perspective, he explained that the 23.4 degree tilt of the Earth gives us our seasons and thus longer days in summer and longer nights in winter. At midsummer, the Sun is only 10 degrees below the horizon at our high latitude, which is why it is so light up here, whereas at midwinter the Sun is 56 degrees below the horizon, thus long dark nights.

Astronomical darkness is when the Sun is more than 18 degrees below the horizon, occurs from 28th August – 12th April and is essential for observing deep sky objects and for most astronomical photographs. At midwinter we have about 12 hours of astronomical darkness starting at about 18.00.

Where to start

When starting out in astronomy, all you need are your eyes and a star chart or planisphere to find your way around the sky. Learn the constellations and the names of some brighter stars and from there you can find some objects that can be seen with the naked eye (the Moon but also bright star clusters and even a galaxy – the Andromeda galaxy) or binoculars before you start using a telescope. You need a dark, safe and sheltered site with a good southerly aspect and Maarten would also suggest a western sky too (take a compass if you are unsure of your direction**)**. A red torch helps you see where you are and illuminates a star chart but most importantly, it doesn't destroy your night vision, which requires about 20 minutes to dark-adapt.

Maarten also explained how to get the best from a planisphere. It is a simple clever device that can show you what you can see in the sky on any particular night, it shows you where to look for stars and planets, the best time of year to see constellations, midnight culminations and the rising and setting of stars so you know when to go outside to look for them.

On my (Pauline Macrae) table were various bits and pieces, which covered the basic equipment required for observing. Sky maps, DIY planispheres (if you cannot find one to buy), Astronomy magazines - again with star charts, a large Sky Atlas which shows the star positions in detail, books on constellations and books useful for finding objects with a small telescope. The best of these are "Turn Left at Orion" by Guy Consolmagno and Dan M. Davis, along with "Celestial Sampler" by Sue French. There are some great free apps of the night sky now available for mobile telephones and one of the best planetarium software packages is Stellarium, which can be downloaded free from the Internet at www.stellarium.org This was available to look at on both my table and with James who had a large pair of binoculars with him.

Binoculars by James Hitchmough

Heading up the binocular front, James brought his Revelation 20x80's, which he uses as his main observational instrument both at home and when at the observatory. When observing at home the binoculars (mounted on a very sturdy Manfrotto 055XPROB tripod) are fantastic for quick looks at the sky, but also for more extended viewing since the stereoscopic view given by the binoculars makes for very comfortable observing. The binoculars are brilliant for wide field views of the sky, and objects such as the Double Cluster in Perseus, M81 and M82 in Ursa Major and Kemble's Cascade and NGC 1502 in Camelopardalis are all spectacular binocular objects.

Ideally for astronomy, binoculars need Bak-4 prisms and good coatings on the lenses. 7x50 and 8x50 are probably the best for beginners – the most important aspect being the aperture (the second number), which relates to light-gathering power and will allow more detail to be seen. Above ten times the magnification (the first number) a tripod will be required to hold the image steady (as with James' and also Gerry's 100 mm binoculars). However, even the 7x50 binoculars allow you to see many star clusters and the larger and brighter galaxies and nebulae.

Telescopes

The best telescope is the one that you will use most often and not the big one that looks impressive but is too heavy to carry outside. Again aperture is the most important thing, allowing as much light to be gathered as possible to see detail. 20 –150 times magnification is practical to enable views of planets and many deep sky objects, and if sky conditions are good enough occasional forays into the 200-odd range may be allowed. A sturdy tripod and mount is important. Come along to the observing sessions for a chance to look through our 14” LX200R telescope and borrow the 90mm Maksutov if you would like to try one out.

Newtonian Reflectors and video astronomy by Maarten de Vries

If you want aperture, then Newtonian reflectors provide the best value for money. You can pick up a very decent 114mm (4.5”) Newtonian with mount for as little £135 (Sky-Watcher Skyhawk-1145P). Whichever brand you get, a parabolic mirror gives better results. "Fast" reflectors, for example focal length 500mm, 114mm aperture, giving a focal ratio of f4.4 give excellent wde-field views and are ideal for video astronomy. Reflectors with higher focal ratios (eg 1000mm focal length, 114mm aperture, = f8.7) make very good planetary telescopes and require much less frequent collimation than the "faster" models. Even bigger apertures such as 6” and 8” are still very affordable, but need sturdier mounts. Large Newtonian telescopes can be mounted on the very popular Dobsonian mount, giving great aperture for often modest investments. The telescopes on display on the evening were the Society’s 12” (300mm f/6.7) Dobsonian telescope, with its 2” Crayford (friction based) focuser and Telrad finder. This ‘scope was made from an older telescope, that is to say, only the mirror was kept and re-coated; the rest of the ‘scope was constructed by members of the Society in 2001.

The other telescope on display was the Sky-Watcher 150PDS, (one similar on the left) which is a very economic parabolic 6” reflector (f/5) with a dual speed (useful for photography and video) 2” Crayford style focuser. It was mounted on a HEQ5 Pro mount, which is much sturdier than necessary for such a ‘scope, but quite useful when using it for video astronomy (the sturdier the mount the better). It has also very accurate pointing capabilities, which is essential when you want to find very dim video objects. Maarten also had a number of ‘challenges’ which include Messier objects challenges: bronze, sliver, gold and platinum; Lunar 100 challenge and new for this year, planetary nebulae challenges 1 and 2.

Video astronomy is getting more and more popular and is possibly one of the cheapest and easiest ways of getting into astronomical imaging. You can get a good astronomy video camera for around a £100 (£160 with all the accessories). The Society got a special discount from Phil Dyer (www.astrophoto.co.uk). On display was my monochrome Mintron video camera (now superceded by the colour Huviron). Besides being able to record video images, astro video cameras are much more light sensitive than the eye, so it increases the light gathering power of your telescope by 2-3 magnitudes. The video cameras have built in image stacking facilities to increase sensitivity. The perform best on smaller, fast telescopes, such as 80 or 100mm f/5 refractors, or 114mm or 150mm f/5 reflectors. At longer focal lengths, the field of view gets very restricted. You can improve the field of view by adding a 2x focal reducer to the camera. Stability is very important too; you want a reasonably sturdy mount. Go-to mounts can be a boon when trying to find dimmer objects, although setting up go-to for this purpose requires a bit of practice (very precise alignment). The video camera produces a video signal that needs to be converted if you want to connect it with a laptop or PC. For this you can get a USB/Video adapter (included in the £160 Huviron kit). You also need some software to display or record the video images (also included in the kit). Registax, free software from www.astronomie.be/registax allows you to stack stills from your video recordings to produce very acceptable astro photos.

Catadioptrics and Go-To telescopes by Gerry Gaitens

Catadioptric telescopes use both mirrors and lenses so are a combination of a refractor and reflector. There are two main types: a Schmidt-Cassegrain and a Maksutov-Cassegrain.
These telescopes fold the light path three times which means a much shorter tube can be used. Light enters the front of the tube through a corrective lens. The light then travels down the tube to the primary mirror. It is then reflected up the tube to a secondary mirror, which in turn reflects light back down the tube to the eyepiece. The focussing mechanisms of these telescopes are different to reflectors and refractors; with these telescopes the eyepiece is moved in and out to focus whereas in a catadioptric, the whole primary mirror is moved in and out.
The main advantage of Go-To telescopes is that they enable the user to locate celestial objects with relative ease by selecting objects from the thousands contained in the 'scope's database. This is particularly the case when it comes to locating faint objects. With a little practice these telescopes are generally easy to set up and if a Go-To telescope is set up at a permanent location then they can be ready to use at the flick of a switch.

One of the Go-To telescopes that Gerry had on display was a Meade 125mm diameter Maksutov. This type of telescope uses a combination of lenses and mirrors, which result in a compact, portable, high performance instrument, which is particularly effective in giving good views of the moon and planets.

The other Go-To telescope on display was an 80mm wide-field refractor on a Skywatcher Synscan Go-To mount (same type of mount as the new one we have bought for the LX200R at the observatory). Once again this mount is relatively easy to use as it also has an extensive database of celestial objects. The wide-field 80mm is ideal for viewing large parts of the sky and observing star fields in the Milky Way. This telescope is also ideal for video astronomy. Attach a webcam to this telescope, and you are rewarded with some stunning images of star clusters and nebulae.

Another catadioptric telescope by Ronnie Fraser

The telescope is a Celestron Nexstar 9.25 (inch) GPS. The only other thing he had that was different was a Canon DSLR attached to a Vixen flip mirror instead of a diagonal, with the eyepiece parfocal with the camera, shutter controlled and stacked by software (DSLRlite from CercisAstro.com)

All of the above is over 10 years old, but may still be available!

Refractors by Paul Jenkins

Paul mounted a display of refractor telescopes; in this case a 5-inch Helios achromatic refractor and a 6-inch Skywatcher achromat. He showed how it was possible to purchase a telescope such as the 5-inch for as little as £72 second hand. How much you then spent on upgrading it was a matter of personal choice; in the end Paul spent an additional £143 on this one, which is now a very capable telescope. We shall gloss over how much he has spent on the 6-inch!

Paul also demonstrated an EQ-5 German Equatorial mount, (one similar on left) which had again been bought second hand (for £170 through eBay). A particularly good source for such items is the UK Astronomy Buy & Sell website at this link: http://www.astrobuysell.com/uk/propview.php. If you are a beginner though, do take advice from one of the more experienced members before you jump in...

Eyepieces and refractor telescopes by Antony McEwan

Antony was one of this event's proponents of Refracting telescopes, and had with him a trio of the telescopes. These included a 50-year old Swift 839 60mm f13.5 achromat, made in Japan by the company that would later evolve into Takahashi.

He also had a Skywatcher ED100 in the new Black Diamond livery, fitted with a dual speed Moonlite focuser; (photo on left) and finally a Lyra 102mm f11 achromat. The two larger refractors were mounted on a SkyTee II alt-azimuth mount, making for very quick set-up time, great solidity and supreme ease of use. The 60mm Swift was mounted on a heavily modified AZ-3 alt-az mount and makes for a superb go-anywhere "back of the car" grab & go setup.

His selection of eyepieces included specialist planetary Orthoscopics, workhorse Plossls and ultra-wide-field "spaceship porthole" types. Why so many different types of eyepieces? The eyepieces that come in telescope packages off the shop-floor are generally built to a budget and are the lowest cost versions that are available to complete the package. They allow the buyer to get started observing, but improvements in the view can be had for very small investment after the initial purchase. The marketplace is awash with different brands, types and designs of eyepiece and although they all do the same basic job, there are differences - subtle and not so subtle - between them.

The magnification any eyepiece gives in your telescope is determined by dividing the focal length of the telescope by the focal length of the eyepiece. So for a 1000mm focal length telescope, using a 25mm Plossl will give 1000 / 25 = 40x magnification.

How much sky area will it show? This is the "True Field Of View". Every eyepiece has its own value for Apparent Field Of View, which is defined by the physical design of the eyepiece, and is stated in an eyepieces sales blurb. Plossls have about 50 degrees, Orthoscopics about 42 degrees, Naglers and other ultra-wide field eyepieces about 82 degrees, and so on, up to a massive 110 degrees in some cases! To see how much actual sky that translates to in your telescope, you need to know the Apparent Field Of View of the eyepiece and the magnification that it gives in your telescope (see above).

Then, you divide the AFOV by the magnification. So in this example, using a 25mm Plossl in a 1000mm focal length telescope, giving 40x magnification, the True Field of View will be 40x (magnification) / 50 (AFOV of a Plossl) = 0.8 degrees. For reference, the full moon is about 0.5 degrees and the full expanse of the Pleiades is about 1.5 degrees.

The two main classes of eyepiece are 1.25" barrel and 2" barrel. Older eyepieces can be 0.96" diameter but unless you have a very good quality Zeiss Abbe or Pentax Orthoscopic (very valuable) they are not generally as useful as modern 1.25" ones. 2" barrels allow a wider Apparent Field Of View in the design, but incorporate more glass elements in their make-up. With modern coatings and design they are very good generally, showing pin-sharp stars almost to the edge of the large field of view, but you do usually get what you pay for and compromises have to be made with cheaper examples.

Ultra-wide field 2" barrel eyepieces are great for framing large open or globular clusters, or huge open star fields, or groups of galaxies. Narrower 1.25" eyepieces are still great performers, especially if you are observing planets and are not bothered with a wide field. Planets don't take up a lot of "space" in an eyepiece's view so narrower field of view Orthoscopics or Plossls, with their lower price, lighter weights, superb contrast and fewer glass elements can outperform Ultra-wides when it comes to the study of planets, multiple stars or lunar detail.

Antony likes to remember a simple axiom: the view through a telescope will only be as good as the weakest link in the optical train. This is why he has such a large range of good quality eyepieces: so that he has the right eyepiece to show the object to best potential effect in the telescope he is using at the time.

Solar Telescopes

Of course, not all observing is done at night. Our solar telescope, the Lunt, is the top of the range 60mm model that allows us to view the Sun. It has a Hydrogen-alpha filter which is an optical filter designed to block out as much of the spectrum as possible allowing only a narrow bandwidth through which light can pass at the H-alpha frequency. This wavelength, 656nm, causes the deep red colour of the Sun when seen through a H-alpha telescope. Like white light filters, the overall light transmission is attenuated to 0.001% blocking the potentially harmful infrared light completely for safe observing.

White light solar filters are made either from glass coated with metallic layers or from thin sheets of film such as Mylar or similar material. Most filters provide a white image of the Sun, whilst some give a yellow-orange colour. Small telescopes can be fitted with a filter to allow a view of sunspots on the surface. Pauline's ETX 125 sported a solar filter that screws onto the end of the telescope to maximise safety.

Astrophotography

If placing the camera at the eyepiece, this is known as afocal photography. An SLR camera can be fitted to a telescope at the prime focus and as long as the mount is driven, long exposure photographs are possible. Nowadays CCD cameras are available and good photos are possible as some of our members, including Maarten, have demonstrated (see our website).

Observing sessions at the JSL Observatory

Check the website www.spacegazer.com for dates of the observing sessions and to see if the session is going ahead; these are always weather dependant. The sessions, arranged by Rhona Fraser, usually take place around the time of the New Moon, on a Friday evening between 20.00 – 23.00 with last admission at 22.00, for the public and members, and also on the following Saturday between 20.00 – 23.00 for members only with last admission at 22.00. We have a dark sky location and a wide area of sky to view and as well as looking through the main telescope, there are others you can try. Usually we have Stellarium running on the computer to show you what is currently in the sky and you can warm up in the observing station with a cup of tea. These sessions are a chance to learn from the 'experts', so do come along.

Thank you everyone who contributed.

Next month join us for a talk involving the Moon and/or Lunar science and a cup of tea followed by a break out group with Antony where he will tell you why the ED100 is the best all round telescope to have for the money.

Until next time, clear skies,

Pauline Macrae