

Stargazey Pie

A slice of Highlands' astronomical life!

Notices October 2012



The Tea-break



**Orkney Science
Festival with Jocelyn
Bell Burnell**



Prof. Mark Sims at HAS

In the absence of *Highland Skies* please ensure that you download a copy of October's Evening Sky Map.

<http://www.skymaps.com/downloads.html>

2012-13 Programme Update and Dates for Your Diary.

Should you see an aurora, sprites or anything else of astronomical interest please alert Pat W. (0793 0183 999), Paul (01667 456789) or Pauline (07751 112586).

1. The Next HAS Meeting is on Tuesday 6th November 2012.

The “**Youngstars**” session for 8-14 year olds, before the main meeting, will run from 19:00 until 19:30 led by Triona.

Main Talk – Pauline's talk is very topical giving us an update on *Mercury*.

After the **tea-break**, the **Discussion Group**, with Arthur and Pauline or join the **Basics Group Telescopes – Terms and Types** with Steve Cullen.

2. On 16th October a series of stamps is being issued celebrating "Space Science."

- Sun: Particles ejected from the solar surface seen by the SOHO satellite (1st-60p)
- Venus: Clouds in the southern hemisphere viewed by Venus Express (1st-60p)
- Mars: Ice within a 35km wide impact crater photographed by Mars Express (77p)
- Lutetia: The asteroid's cratered surface seen during Rosetta probe's fly-by (77p)
- Saturn: The gas giant and its sunlit rings seen by the Cassini satellite (£1.28)
- Titan: Largest moon of Saturn, on which the Huygens probe landed in 2005 (£1.28)

www.collectspace.com/ubb/Forum20/HTML/000818.html

3. Wed. October 17th Apollo 12's Command Module Pilot Dick Gordon will be in Glasgow.

<http://www.walkwithdestiny.com>

4. Saturday 1st December HAS Christmas Dinner 19:00 for 19:30.

The dinner for members and partners will be held at the Beaufort Hotel, 11 Culduthel Road, Inverness IV2 4AG

tel. 01463 222897. Cost is £25.00 per person inclusive of tip. Drinks should be paid for separately. Please sign the sheet tonight or contact Pat Escott if you wish to attend.

Tel. 01463 239746 or <mailto:Pat.Escott@btinternet.com>

Once you have signed up please ensure that you have paid in full by Tuesday 6th November. Cheques are to be made out to "Highlands Astronomical Society" and sent to Paul Jenkins, Meikle Kildrummie, by Nairn, IV12 5NY or can be paid at the October or November monthly meeting.

Observatory and Home Viewing:

1. Evening Winter Observing –

The 14" LX 200 is currently in Sussex awaiting repair. Many thanks to those members who built the crate to transport it and arranged for uplift. The Dobsonian, built by members, gives excellent views. Feel free to bring your own telescope. Binoculars are available to borrow.

Date	For Whom	Time	Supervisor
Fri. 5 th Oct.	public and members	20:00 – 23:00	Gerry
Sat. 6 th Oct.	members and guests only	20:00 – 23:00	Pat W
Fri. 12 th Oct.	public and members	20:00 – 23:00	Pauline
Sat. 13 th Oct.	members and guests only	20:00 – 23:00	Steve C
Fri. 19 th Oct.	public and members	20:00 – 23:00	Paul
Sat. 20 th Oct.	members and guests only	20:00 – 23:00	Gerry
Fri. 2 nd Nov.	public and members	20:00 – 23:00	Steve C
Sat. 3 rd Nov.	members and guests only	20:00 – 23:00	Pat W

Please wear warm clothes and check the website before setting out.

2. Skye- www.darksky-skye.com this website details dark sky sites on the Island of Skye.

<http://www.spacegazer.com/> SC 037209 Pat Williams

Main Meeting

Arthur opened the meeting welcoming both old and new members. (It was noted, by those in the audience that the sound system including the loop system was much improved. Thank you to Arthur and Bill).

Pat Escott, our Vice-Chairwoman, introduced Maarten who is a regular contributor to HAS having given many interesting talks in the past. He joined HAS in 1999 and is a keen member being lured onto the Committee for a few years, playing an important part in getting our observatory off the ground, setting up the website and was even Chairman for a short while. He is a Management Trainer, is studying for a physics degree and plays the organ in his spare time.

Stellar Siblings

Maarten warned us there would be one equation but it would be hidden. Otherwise the talk would be an equation free zone.

Open star clusters are the easiest objects to see in the night sky whether with the naked eye, binoculars or telescopes and the stars are often different colours. They may contain tens, hundreds or even thousands of members. We were shown a few pictures of clusters some of which were taken by one of our members, Eric Walker.

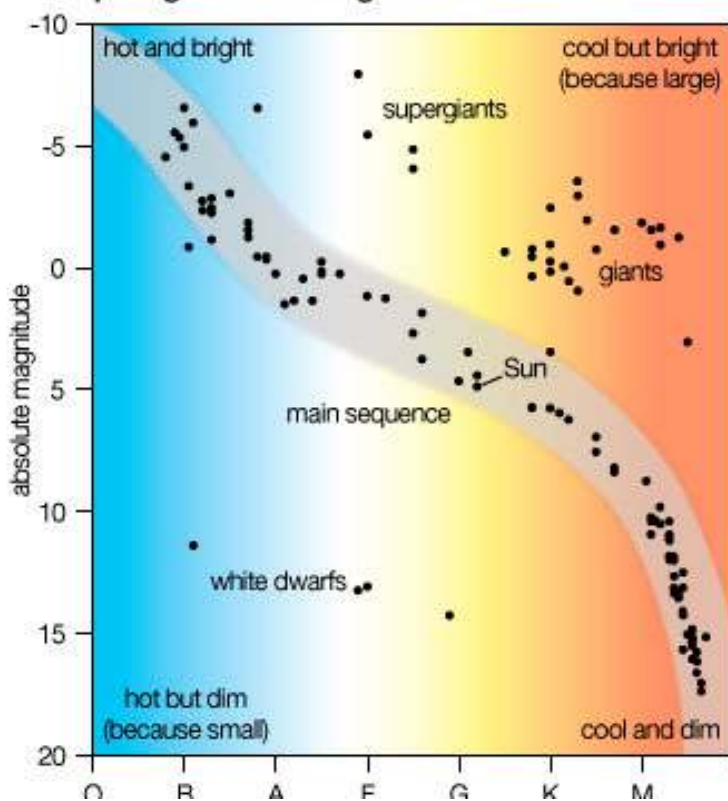
Maarten posed the question as to why clusters exist. What is the relationship between the stars in a cluster? They are not gravitationally bound because, through time, they slowly drift apart.

Stars show black body radiation in that they produce a continuous spectrum that depends only on the temperature of the star. So cool stars glow red and as their temperature increases they will change colour through orange, yellow, white to blue-white. We can thus work out the temperature of a star by looking at its colour.

Stars which have a mass eight or more times that of our Sun have a higher rate of nuclear fusion so they produce more energy and are therefore hotter so appear bigger, brighter and bluer. Low mass stars are cooler and therefore look redder.

The Hertzsprung-Russell diagram is a famous diagram showing a plot of luminosity against surface temperature. It shows most of the stars lying on a diagonal line called the main sequence (DIAGRAM) these are stars living normal lives. However, there are also stars found

Hertzsprung-Russell diagram



at the top right of the diagram: cool but very large – the giants and supergiants, and some at the bottom left of the diagram: hot but very small stars – the white dwarfs. At the end of their lives, stars appear to move off the main sequence and quickly become red giants remaining in that form for millions of years. Eventually they throw off their outer layers and become white dwarfs. Very massive stars become supergiants and explode as supernova. The resulting neutron stars are hot but so tiny they wouldn't even be on the diagram.

The stars in the Pleiades cluster, when plotted on an H-R diagram, are all found on the main sequence. There are numerous hot stars, some of which are only just beginning to leave the main sequence (this is the turn off point meaning they are at the end of their lives) and as we know these tend not to live for more than 10 million years or so, this turn point can indicate the age of the cluster which is probably between 10 million and 100 million years old. This is the same with many open star clusters – we find numerous blue stars (hot, young stars) but few red giants (cool, old stars). The stars of open clusters are all the same distance, which suggests that were probably all born together.

Next Maarten showed us a map of Hydrogen alpha radiation, which comes from the hydrogen between the stars. Space is filled with about 75% hydrogen, 25% helium and a tiny amount of everything else that astronomers call ‘metals’ and these constituents make up the interstellar medium. The gas is mostly in the form of very hot but very sparse gas, warm gas, diffuse clouds, dense clouds, and areas known as HII regions. Dense clouds contain molecules, which may be complex in nature, and there may also be dust particles the consistency of smoke yet they can still block out the light from the stars e.g. the Horsehead Nebula.

Giant molecular clouds can consist of diffuse clouds with dense clouds inside and these dense clouds can have denser cores. Orion has huge dense molecular clouds, which are full of star clusters – the most famous is M42 in Orion’s sword. M16 is another example. This suggests that stars must be born from these clouds.

An astronomer called James Jeans (and here was the equation Maarten promised us – it was for the Jeans mass, was written on the slide and seen first by Samantha) worked out the conditions required for a cloud to collapse to form a star – i.e. the mass of the cloud, the particle mass, the particle density and the temperature of the cloud. Clouds greater than a mass of 1000 Solar masses can collapse, if cool enough – these are the dense clouds – thus diffuse clouds, warm interstellar medium, hot interstellar medium and HII regions are too warm or too thin and therefore cannot collapse

There has to be a trigger to cause the collapse and this usually takes the form of some sort of pressure wave perhaps from a supernova explosion creating a dense region of gas; OB associations producing stellar winds which in turn produce shockwaves; pressure waves in spiral arms of galaxies or colliding galaxies. Collapsing clouds create smaller denser areas of cloud but these don’t get hot enough to stop the collapse, which continues until the fragments of cloud eventually become so dense they become opaque and now temperature can rise until a protostar is born. A short movie demonstrated the collapse of a rotating cloud, which threw out protostars as it fragmented.

<http://www.youtube.com/watch?v=YbdwTwB8jtc>

The H-R diagram shows that very young stars tend to be found just above the main sequence. As the protostars are formed through collapse, they get smaller and therefore less bright so appear to move downwards towards the main sequence. However the more massive stars move sideways as they heat up and become brighter. Big hot protostars move onto the main sequence more quickly than the smaller cooler ones. Young stars produce violent solar winds in the form of jets.

T-Tauri stars are very young stars shrouded in a molecular dust cloud; their jets blowing a hole in the gas. They shine brightly in the infrared and are generally irregular variables before they settle as fully-fledged stars onto the main sequence. They are also found to contain lithium, which is always a sign of a young star and often have protoplanetary discs, which could form planets, some of which have been photographed by the Hubble Space Telescope in the Orion Nebula.

After the first stars have been born their intense radiation creates a hole in the gas cloud revealing a star cluster. A good example is the Rosette Nebula. The bubble nebula is interesting because it shows a large bubble of gas created by the radiation from hot, young stars inside.

With time, clouds disperse and just the stars are left. Eventually the stars move apart as they are not gravitationally bound except for stars that form pairs or multiples. Over billions of years the stars end up

on their own (unless they have a partner). Our Sun must have started in a cluster although it is difficult to know which other stars are its siblings. However, some of the stars in the Plough move in the same direction and with the same speed as eight other stars nearby including our Sun so they may have once been part of the same star cluster billions of years ago.

Pauline Macrae

Gordon McKenna gave the vote of thanks and Pauline presented Maarten with a card to mark the occasion.

Paul, in the absence of Gerry and Steve, reported on the observatory and finished by presenting Pat W and Pauline with their Messier Certificates.

Should you wish to take on the Messier Challenge then go to:

<http://www.spacegazer.com/index.asp?pageid=174540>

The observatory telescope should be back in place within the next few weeks. Come up to one of our members' Saturday viewing nights and give it a try.

Pat Escott, in her events report, highlighted the Orkney Science Festival and anticipated the Christmas Dinner (see notices).

After the tea-break, the first of a new series of break-out groups when Paul stood *on the shoulders of giants* to cover the history of astronomy in 30 minutes or so. Arthur and Maarten continued the discussion on stellar siblings and other matters of topical interest.

A final few words from Pauline: "Thank you Maarten for your revealing talk about Stellar Siblings and the lovely pictures of star clusters.

Next time it is my turn to give a talk and it will be on scorched Mercury (not literally thankfully) and the latest findings from the Messenger spacecraft. After tea and biscuits, there will be a discussion or you can join the Basics group all about telescopes with Steve Cullen.

One sad piece of news for us, announced at the meeting, was that Pat Williams will be leaving HAS for pastures new; she and her husband Frank are destined for Edinburgh on the 1st January 2013. We would like to thank her for the immense amount of work during her time as Secretary and to wish her well."