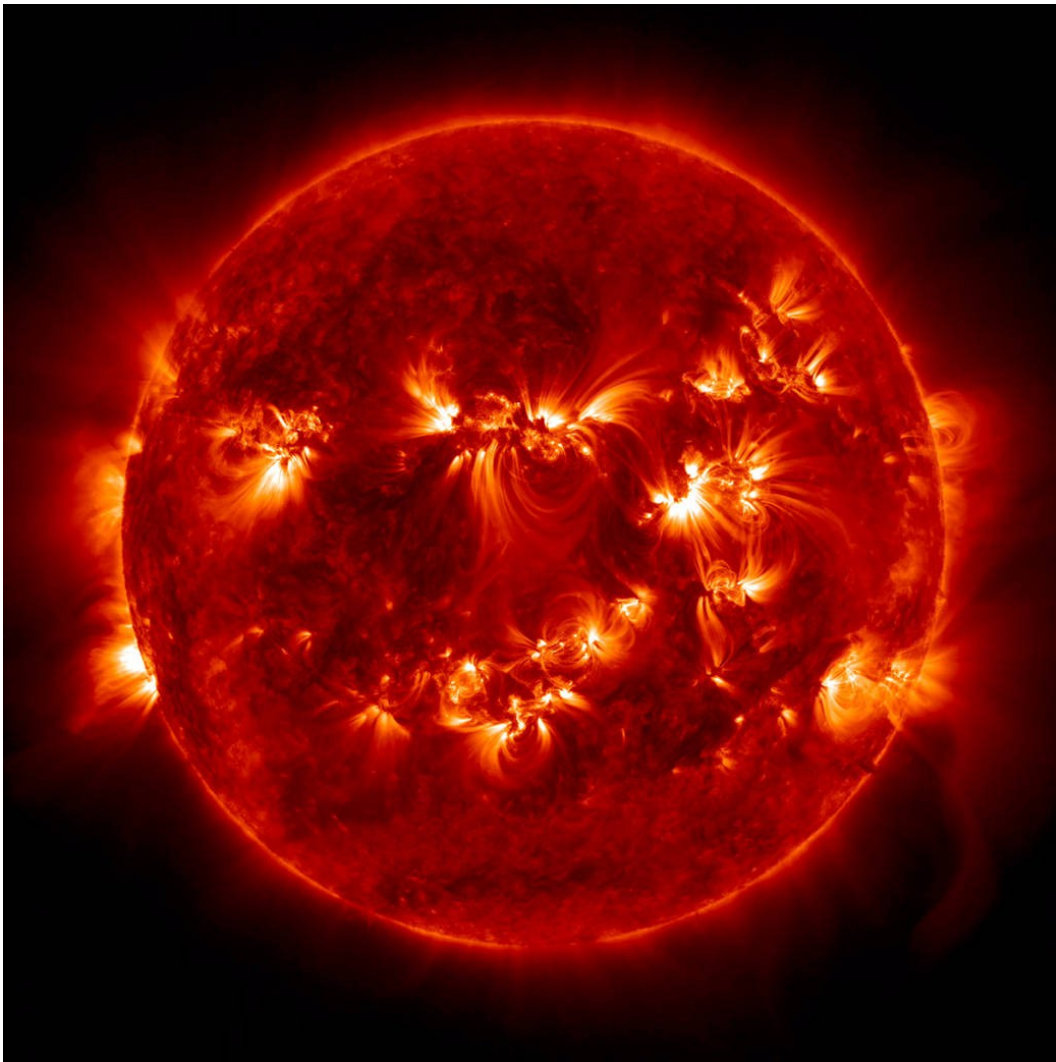


# Thanet Astronomy Group

Astronomy for Everyone in Plain English

## NEWSLETTER

November 2015



*Our Star the Sun : Credit: NASA/SDO*

This space is reserved for promoting member's businesses.  
You can place an advert here for a donation to the group.

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## Executive Committee Messages

### Christmas Dinner

# Thanet Astronomy Group Christmas Dinner

This year will be held on our Members Meeting Night

Wednesday 2<sup>nd</sup> December 2015 at the West Bay Cafe

There will be a 3 course dinner and entertainment.

The Menu this year is :-

#### MENU

##### Starter

**Tomato Soup or Pate on Toast**

##### Main

**Turkey Roast or Nut Roast**

##### Desert

**Christmas Pudding or Mince Pies  
with  
Custard or Cream**

We will also be holding a raffle  
(if you wish to donate any prizes, please let us know).

Prices for the dinner are £20 for Members and £25 for non members,

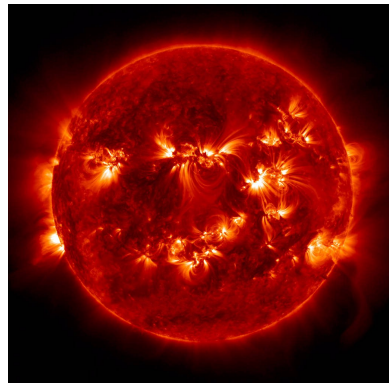
*If you wish to attend  
could you please let us know  
with your menu options ASAP  
so we can advise Alan and Kate of numbers.*

#### Newsletter

If any members would like to offer to help with any pages for the Newsletter we would be very grateful.

Danny, George, Gill.

## About the Cover Picture



*The Sun : Credit: NASA/SDO*

### **Our Sun is a STAR**

Our Sun is the 'star' at the centre of our Solar System and is the most important source of energy for life on our Earth. Without the Sun we wouldn't exist, we would not receive any warmth or light.



*Earth and the Sun to scale : Image Credit: NASA*

### **The Size of our Sun**

Our Sun is a medium sized star and measures 864,948 miles (1,392,000 km) across – about 109 times that of the Earth!

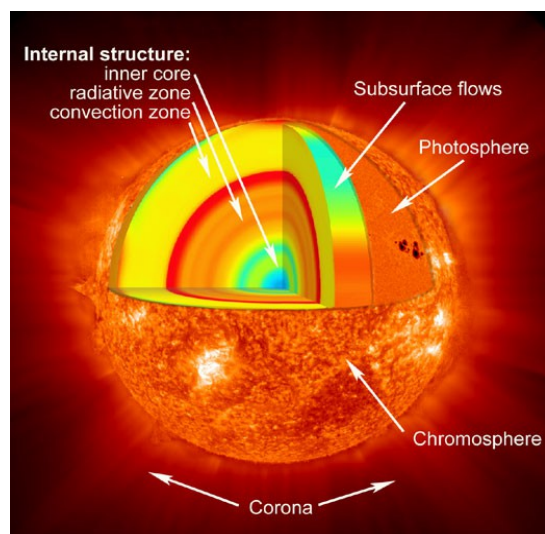
The Sun is so big that you could fit over 1 million Earths in the same space!!

The Sun accounts for about 99.86% of the total mass of our Solar System.

### **What the Sun is made of**

Nearly three quarters of the Sun's mass consists of hydrogen, the rest is mainly helium, with much smaller quantities of heavier elements including oxygen, carbon, neon and iron.

The Core of the Sun has a density about 150 times that of water and has a temperature of close to 15.7 million kelvin. The Sun gets this hot because the pressure in its core is so tremendous that it forces the nuclei of Hydrogen atoms to join together to make Helium atoms. This reaction in the Sun is called nuclear fusion! (Nuclear Fusion is the joining together of atoms to make a new type of atom). This reaction is the opposite of nuclear fission the reaction in a nuclear bomb (Nuclear Fission is the splitting apart of an atom into its constituent parts) both of these reactions releases huge amounts of energy. Nuclear Fusion reactions in the Sun's core convert 5 million tonnes of gas into energy every second, but the energy takes 10 million years to reach the surface of the Sun.



*The Sun : Image Credit: NASA*

## About the Cover Picture

The next layer is called the Radiative Zone. The temperature in this part of the Sun varies according to distance from the core, from approximately 7 million to 2 million kelvin. In this zone energy is transported by radiation.

There is a transition layer between this zone and the next called the Tachocline.

The next layer is called the Convective Zone. The temperature is lower than in the radiative zone. Energy in this one is transported primarily by convection. Heated plasma ascends and cooled plasma descends.

The next layer is the Photosphere. This is the visible surface of the Sun and temperatures are a lot cooler than at the core – 5,800 kelvin. This is where the light and heat we see and feel on Earth comes from.

The Sun's atmosphere is seen during a total solar eclipse. The atmosphere is made up of three distinct parts; the chromosphere, the transition region and the corona. These form the heliosphere and is much hotter than the surface of the Sun. The temperature in the chromosphere increases gradually with altitude, ranging up to 20,000 K near the top. In the thin (about 200km) transition region the temperature rises rapidly to closer to 1,000,000 K as it nears the corona.

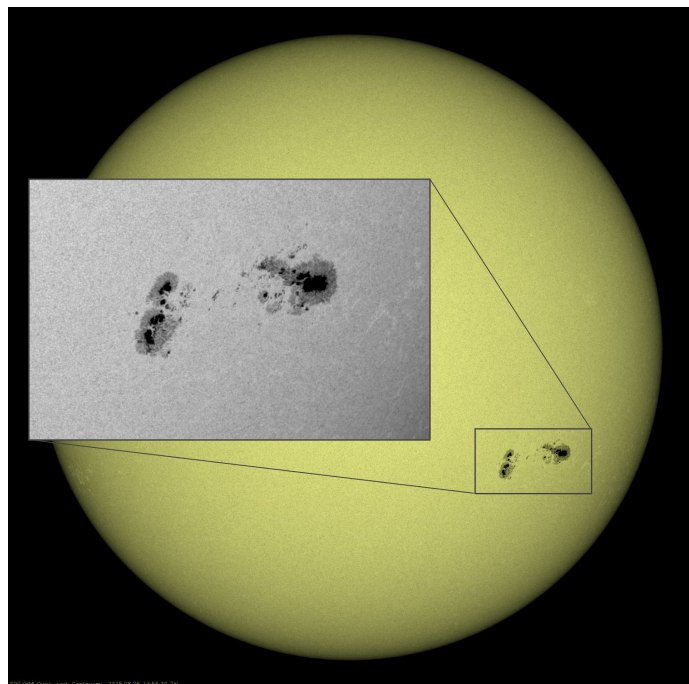
The corona is the extended atmosphere of the Sun. The average temperature of the corona and solar wind is about 1,000,000 – 2,000,000 K but in the hottest regions it is 8,000,000 – 20,000,000 K. Waves at the outer surface of the corona that randomly blow from the Sun are called the solar wind.

### **Sunspots**

Sunspots are dark spots on the Sun's surface, they appear dark as they are 1500°C cooler than the rest of the surface. The darkest part in the centre of the sunspot is called the umbra, this is the coolest part. The lighter area surrounding the centre is called the penumbra.

Sunspots appear in groups which appear to move across the Sun over 2 weeks as the Sun rotates. Individual ones can last from a few days to a few months. It takes the Sun about 30 Earth days to rotate once.

The number of sunspots reaches a maximum approximately every 11 years. This is called the solar or sunspot cycle.



*Sun Spots : Credit: Solar Dynamics Observatory, NASA*

Sunspots can accompany secondary phenomena such as coronal prominences. Most solar flares and coronal mass ejections originate in areas around visible sunspot groupings.

Tracy Howes.

## About the Cover Picture

### Solar Flares



*Solar Flare : Image Credit:NASA/SDO/Steele Hill*

Solar flares are sudden eruptions on the surface of the Sun. They flare up in a few minutes, then take more than half an hour to die away again. They are often, but not always, followed by a coronal mass ejection.

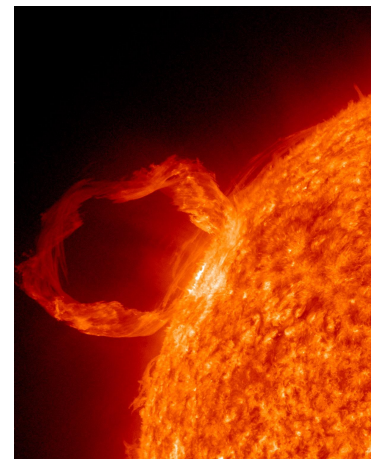
Flares reach temperatures of 10 million °C and they have the energy of billions of nuclear explosions. Solar flares not only send out heat and radiation but also streams of charged particles into space. The solar wind carries these charged particles in all directions from the Sun at speeds of over one billion km/h. It reaches Earth in several days but also goes throughout the rest of the Solar System. The Earth is shielded from the effects of the solar wind by its magnetic field.

### Solar Prominences

Solar prominences extend outward from the surface of the Sun, often in a loop shape.

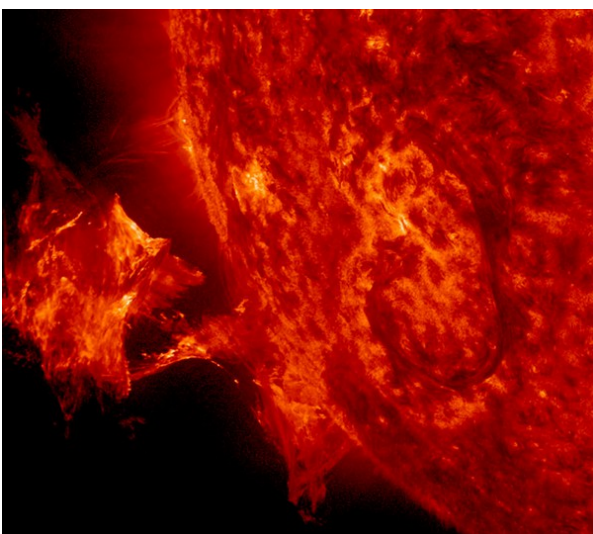
They are anchored to the photosphere and extend into the corona. The plasma contained in prominences are typically a hundred times cooler and denser than those in the corona.

A prominence takes about a day to form and can persist in the corona for several weeks or months. When prominences break apart they can give rise to a coronal mass ejection



*Prominence : Credit:NASA/SDO/AIA*

### Coronal Mass Ejections



*Coronal Mass Ejection : Credit:NASA/SDO Tracy Howes.*

These are gigantic eruptions of charged particles from the Sun, which create gusts in the solar wind that set off magnetic storms on Earth. Most of these ejections originate from active regions on the Sun's surface, such as groupings of sunspots associated with frequent flares.

When these charged particles reach the Earth they can cause strong aurorae around the magnetic poles. These aurorae are also known as Northern Lights (aurora borealis) in the northern hemisphere and the Southern Lights (aurora australis) in the southern hemisphere.

Coronal Mass Ejections can cause disruptions to radio transmissions and cause damage to satellites.

## Thanet Astronomy Group Contact Details

### Executive Committee

Chairman	Daniel Day	01843 228 904
Treasurer	George Ward	01843 292 640
Secretary	Gill Palmer	07543 942 245

### Committee

Volunteers	George Cozens	07970 181 395
Members	Sheila Bull	07791 892 057
Newsletter	Janet McBride	01227 364 092
Newsletter	Tracy Howes	07917 710 638
Library	Janet McBride	01227 364 092
Web Site	Danny Day	01843 228 904
JAC & Gill	Gill Palmer	01843 848 064

## Member's Meeting Dates and Times

### Thanet Astronomy Group Member's Meetings Dates and Times

4<sup>th</sup> November 2015 at 7.30pm

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**\*\*\* 2<sup>nd</sup> December 2015 at 7:30pm \*\*\***

**\*\*\* Christmas Evening Meal and Entertainment \*\*\***

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6<sup>th</sup> January 2016 at 7:30pm

3<sup>rd</sup> February 2016 at 7:30pm

2<sup>nd</sup> March 2016 at 7:30pm

6<sup>th</sup> April 2016 at 7:30pm

4<sup>th</sup> May 2016 at 7:30pm

1<sup>st</sup> June 2016 at 8pm

6<sup>th</sup> July 2016 at 8pm

3<sup>rd</sup> August 2016 at 8pm

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**\*\*\* 7<sup>th</sup> September 2016 at 8pm \*\*\***

**\*\*\* Anniversary Three Years at West Bay Cafe Party \*\*\***

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5<sup>th</sup> October 2016 at 7:30pm

All Member's meetings will be held at the :-

West Bay Cafe,  
Sea Road,  
Westgate-on-Sea,  
Kent.  
CT8 8QA



Advertisement

# WEST BAY CAFE

Sea Road - Westgate-on-Sea  
CT8 8QA

**Location :-**

This Family Friendly Cafe is situated on the promenade just beside the sandy beach. Opposite the junction of Sea Road and Rowena Road. Westgate-on-Sea. CT8 8QA.

**Access :-**

via a flight of steps behind the cafe.

**Disabled Access :-**

via the main entrance to the bay and a slope at the cafe door.

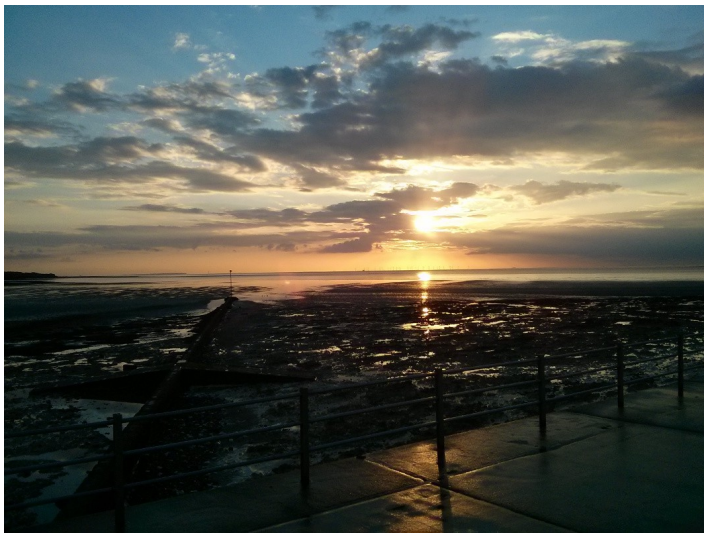
West Bay Cafe run by Alan and Kate and has a very friendly atmosphere.



*Alan outside the new style West Bay Cafe*

There is a wide variety of good food and drinks at very reasonable prices and there are always special offers.

There is seating both inside and outside for those extra hot days.



*A Typical Sunset at the West Bay Cafe*

**The Sunsets at the West Bay Cafe are Spectacular.**

**With a meal, some friends,  
and a pint or two.**

**What more could you ask for!**

West Bay Cafe have hosted Thanet Astronomy Group since September 2013.

We would like to say a  
**HUGE THANK YOU to Alan and Kate**  
for all the help and support they have shown us over the last year.

**Please use this Brilliant Seaside Cafe and Tell Your Friends.**

## What we did in September

September 2015

### Saturday 5<sup>th</sup> September Public Outreach Meeting

The telescopes were on the horizon today as the Sun was hidden behind the clouds. It was a very quiet afternoon as we didn't get many visitors.

### Sunday 6<sup>th</sup> September Ramsgate Vikings 29<sup>th</sup> Model Ships Rally

The group were at the model ships rally in Ramsgate today. It was a lovely clear, sunny day. We had a telescope aimed at the Sun and another on the Moon. A lot of people came over to find out who we were and to have a look through the telescopes.



*At the Ramsgate Vikings*

### Wednesday 9<sup>th</sup> September 2<sup>nd</sup> Anniversary at West Bay Cafe Buffet

Today was a buffet to celebrate holding the public Saturday meetings at West Bay Cafe for 2 years!! It was a wonderful social evening. And we had telescopes outside once it was dark and we all had a look at the Andromeda galaxy (M31) and a globular cluster in Hercules (M13). Thank you to all members and guests who attended.

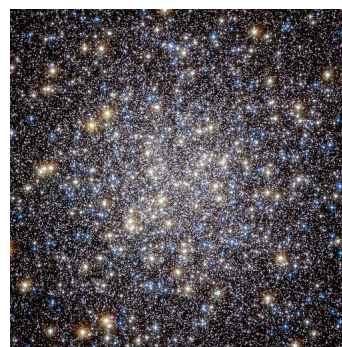
### Saturday 12<sup>th</sup> September Public Outreach Meeting

The day started off with rain, but cleared up in time for our meeting! It was still a bit cloudy at first but the Sun did eventually stay out long enough for us to see the sunspots. We also looked at Sheppey and the chimney stacks on the Isle of Grain.

### Saturday 12<sup>th</sup> September Viewing Evening



*M31 Andromeda : Image credit: NASA/JPL-Caltech*



*M13 in Hercules Credit: ESA/Hubble and NASA*

Tonight the sky was clear enough for us to hold a viewing evening. We saw quite a few constellations and some of us saw a shooting star or two! George also found M31 and M13 for us to look at again.

Tracy Howes / Danny

## What we did in September

September 2015

### Saturday 19<sup>th</sup> September Public Outreach Meeting

Today was busy at the JAC & Gill club today with several new children. We did the usual planets walk around the bay to teach the children the scale of our Solar system.

While the adults learnt about the telescopes and used them to look at sun spots and distant objects.

### Saturday 26<sup>th</sup> September Public Outreach Meeting

A very quiet day today, we looked at the cormorants drying their wings on the near and far posts. There were a few Sun spots to be seen but a lot of cloud to cover them.

Meanwhile the JAC & Gill club children were learning about the Moon Madness ( see page 13 ) which was to happen the next day.



### Sunday 27<sup>th</sup> / Monday 28<sup>th</sup> September Moon Madness Viewing Evening

This evening we all met at on the cliff top at Dumpton Gap to watch the evenings events.

***Full Moon - Harvest Moon - Super Moon – Blood Moon - Total Eclipse of the Moon*** (See <http://www.thanetastronomygroup.com/moonmad.html> for all the details) We came with plenty of Food, Drinks, Chairs, Blankets, Telescopes, Cameras, Etc. Etc. Etc. We were going for an all night viewing session.

The weather was very clear, but it was windy and this was making even the bigger telescopes jump around a lot. We set up and started taking pictures of the Moon with DSLR / Web Cameras attached to telescopes and Mobile phones held in front of eyepieces.

As the evening moved on at about 2:07am ! the Eclipse Started and what a fantastic spectacle it was. The Moon ever so slowly moved into the shadow of the Earth. To start it looked like a tiny dark bite had been taken out of the Moon. As time went by this got bigger and bigger till at 3:11am the Moon was totally inside the Earth's shadow. Now the Moon glowed in the night sky with a dark reddish brown colour. The Moon was in the shadow for a long time.

At 4:23am the above process was reversed as the Moon slowly moved out of the Earth's shadow. until at 5:27am the eclipse ended.

Of course this was only the Umbral Eclipse (the central darkest part of the Earth's shadow), the Penumbral Eclipse started much earlier at 1:12am and ended much later at 6:22am. This is where the Moon passed into the outer less dark shadow zone. This part of the eclipse is hard to see by eye.

Several people stayed for the whole event and a few even stayed till dawn to see Venus, Mars and Jupiter rise in the east.

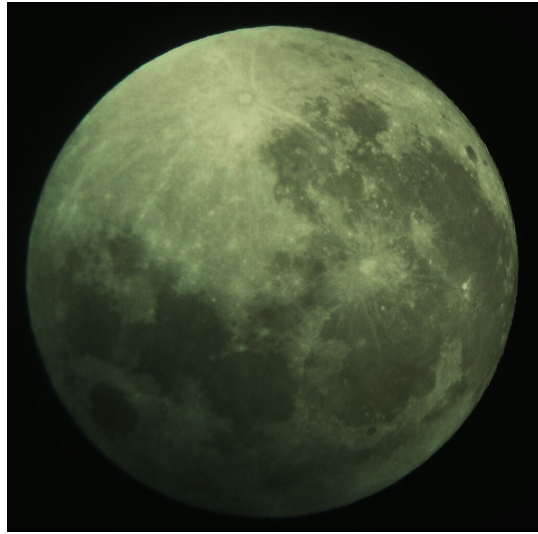
A really outstanding night was had by all that attended. (Pictures on the next page !)

Tracy Howes / Danny

## What we did in September

Sunday 27<sup>th</sup> / Monday 28<sup>th</sup> September

### Moon Madness Pictures



*The Full Super Moon 27<sup>th</sup> September 2015*



*Moon Before Total Eclipse*



*Moon Just Before Total Eclipse*



*Venus Mars and Jupiter Just Before Dawn 28 09 2015*

*Danny*

## What we did in October

October 2015

### **Saturday 3<sup>rd</sup> October** Public Outreach Meeting

Not a bad day, many people turned up including some new people that wanted to join our group.

We spent the afternoon catching glimpses of the sun spots between the clouds and looking at distant objects on the horizon.

The JAC & Gill club was busy as usual with Gill and her helpers doing a good job teaching the children.



*Danny George Gill and Tara at Silver Sunday*

### **Sunday 4<sup>th</sup> October** Silver Sunday Event

The group was at St Augustine's in Westgate for Silver Sunday promoting Thanet Astronomy Group. A great deal of interest was shown.

### **Wednesday 7<sup>th</sup> October** Members Meeting

Tonights Presentation was Asteroid 2014 DA14. A half football pitch sized asteroid that only just missed the Earth the day that a meteor exploded over Russia.

This must see presentation explained all about these most dangerous asteroids and what is done to track them.

### **Saturday 10<sup>th</sup> October** Public Outreach Meeting

Not a bad day today, some Sun Shine and some cloud. Today the end of the bay was opened so we took the children on the planets walk.

This time with the extra 'space' (sorry) we were planning to start the walk at the far end west of the bay and walk back to and past the Cafe. However with the time available we only got as far as the Cafe. But we did manage to reach Saturn!

### **Saturday 17<sup>th</sup> October** Public Outreach Meeting

Today was cold and wet and we held the meeting in the Cafe. It was a lovely social afternoon with quite a few members turning up, even though the weather was bad.

We spent the afternoon chatting about Astronomy and learning some useful tricks.

### **Saturday 24<sup>th</sup> October** Public Outreach Meeting

Today was not a good weather day, it was cloudy, despite the bad weather many of our regulars turned up to chat about astronomy and other things. A relatively quiet day at West Bay Cafe.

### **Saturday 31<sup>st</sup> October** Public Outreach Meeting

It was quiet a nice day, the sun was out and we had a few telescopes looking at a group of sunspots.

Thats 15 meetings in two months. An average of 7.5 meetings a month.

Not bad for our friendly little Thanet Astronomy Group.

Thanks go out to all that helped to make all this possible !



*Saturday 31 October Meeting*

Tracy Howes / Danny

## Junior Members Page

October 2015



*Demonstrating the Eclipse of the Moon*



*The Eclipse at Dumpton*

It has been an exciting but frustrating time for our Junior members, as they have been so fired up by the events surrounding September's Moon Madness... but most were asleep when it happened!

To make up for it, Charlotte brought her cuddly Earth, Moon and Sun (from her own personal Solar System) to one of our afternoon meetings, which were very useful when attempting to demonstrate the Lunar Eclipse first hand to the youngsters before the event.

However, our faithful Junior Astronomer, George Harvey, was not to be beaten by bedtime!!! He set his alarm clock for the middle of the night and persuaded his Mum and sister to join him in our night vigil on the clifftop at Dumpton Gap on the night of Sunday 27<sup>th</sup> into the early hours of Monday morning 28<sup>th</sup> September 2015!

We were all rewarded with spectacularly clear views all night as the Super, Harvest, Blood, Full Moon was slowly eclipsed by the shadow of our Earth, then reappeared as the night turned into day while we sipped hot chocolate under the warmth of our quilts!

As an added bonus, Venus, Mars and Jupiter came out to play just before dawn and hung brightly together in the East...before Sunrise!



*Some of us at the Moon Mad night Dumpton*



*Dawn at the cliff top Dumpton*

Reach for the Stars, Junior Astronomers!

Gill P.

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## Book review

# Essentials ASTRONOMY

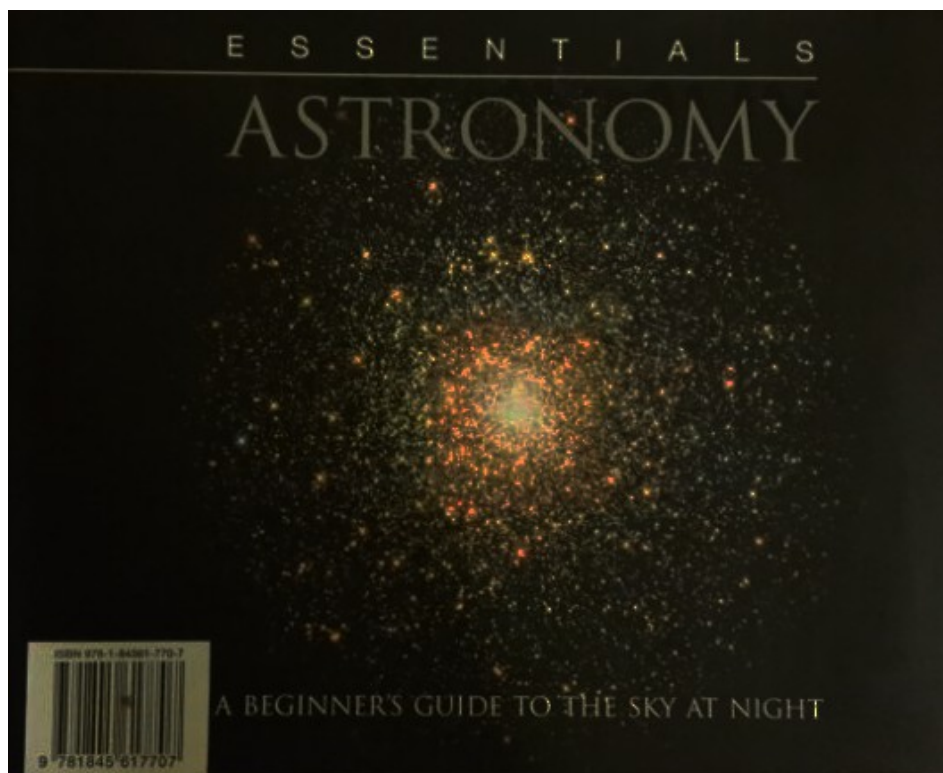
By

Paul Southerland

My initial thoughts to the title were 'Here we go again!', having read similar titled books and not being overjoyed with the end result.

I'm extremely pleased to say I was totally wrong not only was it the best starter book that I've read.

**I actually learnt a lot.**



Maybe 2 months back a drop in visitor asked me a question about the seasons of our planet, I pointed out that I was about to give her what I thought to be true but could not confirm it.

Now having read the book it confirmed that my thoughts were in fact correct.

This encouraged me to read the whole book, well almost. There were a few parts that either didn't interest me or I felt I already knew.

In short, a worthwhile read not only for the beginner but someone who is just past the 1<sup>st</sup> stage of interest in Astronomy.

***The book has now been donated to the Thanet Astronomy Group library.***

George C.



## What's in the sky this month

### What to see early morning Saturday 14<sup>th</sup> November at 5:00am

Planets (Venus, Mars and Jupiter)

#### Venus, Mars and Jupiter

For the next few weeks Venus, Mars, and Jupiter can be seen low down in the eastern sky. The three planets can be seen clearly by eye. They are very close together and can be seen from when they rise above the horizon just before 3:00am till about 5:45am when the Sun's light begins to wipe out the night sky.



*Venus, Mars and Jupiter at 5:00am Saturday 14<sup>th</sup> November 2015*

**On no account use any optical aids (binoculars telescopes etc.) while looking east when the Sun is anywhere near rising !**

## What's in the sky this month

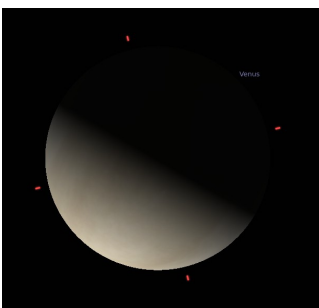


*Close up view of Venus, Mars and Jupiter*

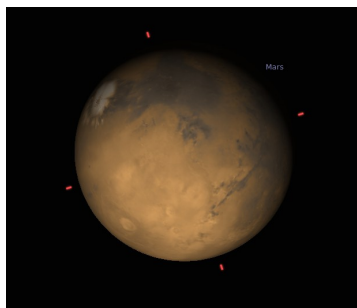
At about 5:00am Looking a little to the right of East, at  $117^\circ$  and up above the horizon at  $19^\circ$ . You will see the planet Venus! The morning star. It is living up to its name. You can not miss it, it's the brightest object in the sky (apart from the Sun and Moon). Venus will remain visible long after Sunrise has obliterated from view all of the stars. Venus is the second planet from the Sun and orbits it at a distance of 67.2 million miles (108.2 million km).

Still looking a little to the right of East, at  $120^\circ$  and  $23^\circ$  above the horizon. Just to the right and slightly above Venus you will see a second planet, Mars! This time it's nowhere near as bright, but it's still easy to see by eye. Mars is sometimes called the red planet, it was named after Mars the Roman God of War. Mars is the fourth planet from the Sun and orbits it at 141.6 million miles (227.9 million km).

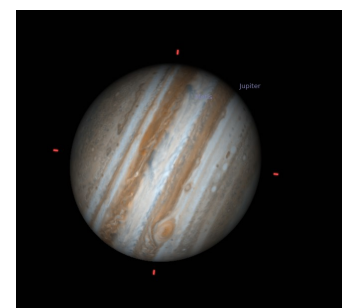
Last and still looking little to the right of East, at  $129^\circ$  and  $32^\circ$  above the horizon. To the right and above Mars you will see a third bright planet, Jupiter! It is the second brightest object in the sky after Venus. It is also by far the largest planet in our Solar System. Jupiter is more than twice the mass of all the other planets combined! Jupiter is the fifth planet from the Sun and orbits it at 483.7 million miles (778.5 million km).



*Venus*



*Mars*



*Jupiter*

George Ward.

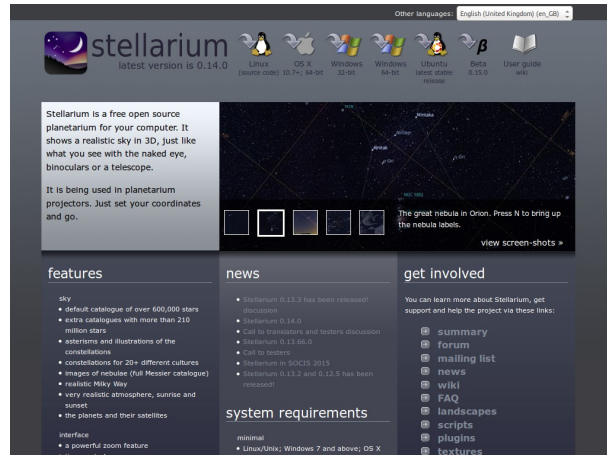
## Member's Page

One of our most successful members meetings this year was on Wednesday 4<sup>th</sup> November 2015, when we decided to change the format of the meeting into three sections.

The first section was an update on group activities and the forthcoming Christmas meal. Whilst this was very interesting and informative, it was quite perturbing trying to listen while people were carrying on discussions which may or may not have anything to do with the group.

Therefore the committee is respectfully requesting members to refrain from carrying on personal conversations once the meeting has formally started. This will enable everyone to be able to hear what the presenters are saying. This obviously does not stop people from asking questions, which we heartily encourage. There is ample time both before, during the break and after the meeting for everyone to talk to each other.

The second section was a short talk / explanation on Stellarium, as members continue to ask for clarification and advice on using it.



*Stellarium Web site*

[http://www.stellarium.org/en\\_GB/](http://www.stellarium.org/en_GB/)

**[We will continue to hold these Stellarium sessions regularly] Ed.**

After a short break, the third section was when the group split into separate workshops.



*The Comet Catalina Group*

The second workshop entailed breaking down a telescope and reassembling it. By exploring how a telescope is assembled, this enabled participants to further their understanding of the mechanics of a telescope.

One looking at Comet Catalina; the comet will be visible in the Northern Hemisphere from around the end of November 2015 and the talk was to inform members of forthcoming events.



*The Telescope Strip Down Group*

As this new concept was so successful, we will be continuing this process at future meetings.

Sheila Bull

## Did You Know ?

### What is a Pulsar ?

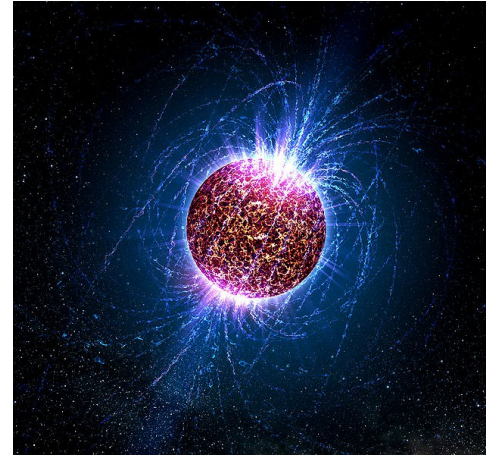
Well to start with a Pulsar it a type of Neutron Star, so lets start with a brief description of a Neutron Star.

#### **Neutron Stars**

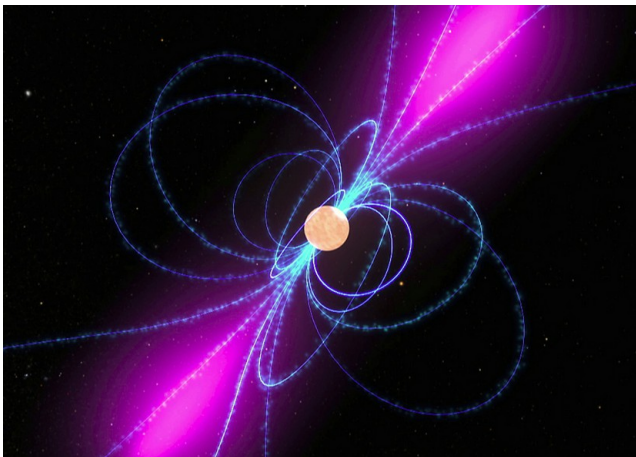
A Neutron star is a very dense compact star that can form as a result of a massive star going supernova.

They are the smallest and densest stars in the universe only about 14 miles (22.5 km) in diameter but with a mass of about twice that of the Sun !!

Neutron Stars are mostly composed of (*you guessed it*) Neutrons !



*Neutron Star Credit: NASA*



*Pulsar Credit: NASA*

#### **Pulsar**

Pulsar is short for “Pulsating Radio Star”. It is a neutron star that is highly magnetised and rotating, that emits a beam of electromagnetic radiation.

Like a lighthouse (you can only see the distant light when it sweeps round and points at you) the beam of electromagnetic radiation can only be detected when it is pointing at Earth. It is this beam of electromagnetic radiation that is detected as a '*pulse*' each time it passes, that gives this type of star its name.

The rate at which a pulsar rotates or pulses is very constant indeed and some types of pulsars are as accurate as atomic clocks.

The first Pulsar was observed in 1967 by Jocelyn Bell Burnell and Antony Hewish. The pulses were exactly 1.33 seconds apart Jocelyn and Antony noted :-

*"we did not really believe that we had picked up signals from another civilization, but obviously the idea had crossed our minds and we had no proof that it was an entirely natural radio emission. It is an interesting problem—if one thinks one may have detected life elsewhere in the universe, how does one announce the results responsibly?"*

They nicknamed the pulsar LGM1 [*little green man 1*]. Soon after it got its official name CP1919. Since then many other pulsars have been discovered even some that emit X-rays, Gamma-rays and even some that emit visible light.

Danny

## Junior Astronomers Club (JAC & Gill)

Our Junior Members have been getting very creative down at West Bay!

Not only have they been pacing out the Solar System along the newly opened prom (we can now reach Saturn but still cannot quite make it to Uranus...unless we walk towards Margate instead) but they have been testing one another's knowledge of the constellations by re-creating their patterns on the beach for their friends to guess!

Charlotte's favourite at the moment is Leo, which she cleverly made using various sized stones and shells.

George re-created Orion in accurately spaced detail, including his belt, sword and bow!



*JAC & Gill Meeting : Telescope Making : Production*

My efforts were limited to Cassiopeia...which everyone guessed immediately, of course!

The following week, we progressed to more technical experiments, with the help of some tubes from Alanna and Elsie and magnifying glasses of various sizes. Our aim was to attempt to make a primitive telescope to demonstrate the effects two lenses have when viewing an object through a cylinder.

Surprisingly, the simple experiment worked and the children were amazed when the image they could see at the other end was actually upside down!!!

Now all we have to do is refine the length of the tubes to find the focal point so that the image can be magnified, like a real telescope...but we'll save that for another day when our technical expert (Danny) can step in!

For the moment, we're quite proud of our efforts...and the results!

Reach for the Stars, Junior Astronomers!



*JAC & Gill Meeting Telescope Making: Planing : Testing Focal Length : Testing the Telescope*

Gill Palmer.

## Adult Word Search

ANDROMEDA  
ASTERISM  
CONJUNCTION  
MAGNITUDE  
PEGASUS

APOGEE  
BLACKHOLE  
DECLINATION  
ORIONIDS  
POLARIS

ARCMINUTE  
CASSIOPEIA  
ECLIPSE  
OWLNEBULA  
UMBRA

C E E G O P A R C M I N U T E  
A S M Q A S T E R I S M A J S  
I F A K I N Z W S U K D N A U  
D W G Q E G A V N A E O L S S  
I A N M P A T J V M I U U D A  
B Z I E O F I M O T B E A I G  
L W T S I X B R A E W B K N E  
A W U P S V D N N U R B Y O P  
C W D I S N I L K S T L A I H  
K U E L A L W K A T I N Y R D  
H Q L C C O N J U N C T I O N  
O I U E U S N M C G P U I N J  
L S D S D R B P O L A R I S L  
E Q T N A R A L U V K H O V H  
L Z D K A X G Y M E L U M I X

## Junior Word Search

AURORA ECLIPSE GALAXY

METEOR ORBIT ORION

PULSAR SOLAR STAR

R K T T I P Q G C Q G  
H K Y Y P M B S I P S  
T A W S X E U N E F P  
P E X V S A C C O G E  
U N T C S T L C Y H Z  
L L O Q M I H A C L S  
S B P I P B U U G G O  
A P U S R R M R O V L  
R M E T E O R O X H A  
O K S A D T M R X F R  
C X C R Q Z P A V T W

**We hope that you find the Adult and Junior word searches interesting and that they inspire you to look up any of the words you don't know *Absolutely Everything About* :-)**

**If you like these please let us know and we will continue to produce them.**

**We are thinking of adding a crossword as well in future newsletters. If you like this idea please let us know.**

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