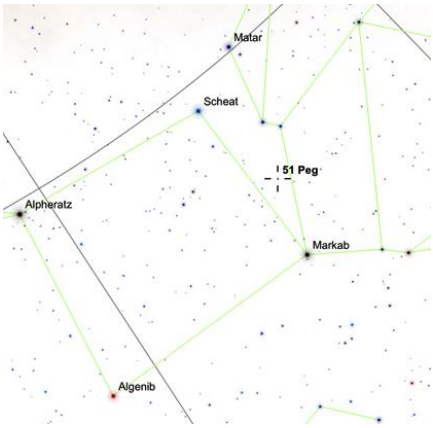
The Messenger
Mexborough & Swinton Astronomical Society
May 2017

## 51 Pegasus b




It was over twenty years ago that we found a new type of object, an invisible object circling an obscure star in the constellation Pegasus. The detection of 51 Pegasi b—the first planet ever found around a star similar to the sun — found something truly remarkable.

The exoplanet's discovery was announced on October 6, 1995, by Michel Mayor and Didier Queloz of the University of Geneva in the journal Nature. They used the radial velocity method with a spectrograph at the Observatoire de Haute-Provence telescope in France. The planet was discovered using a sensitive spectroscope that could detect the slight and regular velocity changes in the star's spectral lines as the planet moved around its parent star in just over 4 days at about 130 kilometres per second. The planet was found to have a mass of half that of Jupiter. This caused the star to “wobble” at some 50 metres/sec showing up in the spectral line shift.

51 Peg b changed how we looked at planetary systems. This newfound world was strange skimming the surface of its star in a blistering-fast “year” that lasted just 4.2 days. Its existence ran counter to the standard theories of how planets form and evolve. It answered one big question:

In April 2015 they revisited 51 Peg b and this time were able to detect the reflected light of the planet itself. That is the first time anyone has observed a direct reflection off the cloudtops of an exoplanet—an incredible achievement given that the nearby star is millions of times brighter

51 Pegasi b probably has a greater radius than that of Jupiter despite its lower mass. This is because its superheated atmosphere must be puffed up into a thick but tenuous layer surrounding it. Beneath this, the gases that make up the planet would be so hot that the planet would glow red. Clouds of silicates may exist in the atmosphere. Astronomers have now detected the presence of water molecules in the atmosphere of this planet. It is thought that the “surface” temperature of the planet could be as hot as 1300°K.

The planet is assumed to be tidally locked to its star, always presenting the same face to it. It orbits with a mere 0.053 AU (5 million miles) distance for its semi-major axis. As its parent star is bigger than the sun its radius is about 540,000 miles – so the planet is only 9 of its stars radii above the surface.

In July 2014, the International Astronomical Union launched a process for giving proper names to certain exoplanets and their host stars. The process involved public nomination and voting for the new names. In December 2015, the IAU announced the winning name for this planet was Dimidium. The name was submitted by the Astronomische Gesellschaft Luzern (German for Astronomical Society of Lucerne), Switzerland. 'Dimidium' is Latin for 'half', referring to the planet's mass of at least half the mass of Jupiter. Since the discovery of Pegasus 51b many other “hot Jupiters” have been discovered making them, at present, one of the most commonly discovered type of exo-planet.

51 Pegasus can be seen in binoculars at magnitude 5.5 (but not its hot companion!)

# Mike Hall's May 2017 Skynopsis



Diary (all times BST Greenwich, Sunrise/Sunset, local (Sheffield) time).

| | |
|---|---|
| 1st | Astronomical Twilight ends 23:23, starts 02:42 |
| 3rd | Moon at First Quarter |
| 7th | Astronomical Twilight ends 23:53, starts 02:15 |
| 7th | The Moon and Jupiter will make a close approach, passing within 1°59' of each other( 23:47 BST) |
| 8th | Twilight 05.47, Sunrise 06.23, Sunset 19.53, Twilight 20.29 |
| 9th | Beehive Cluster 3.9° North of Moon |
| 10th | Full Moon, |
| 14th | Astronomical Twilight all night! |
| 16th | 18.39 Jupiter 2.5° S of Moon |
| 18th | 17.25 Saturn 3.2° S of Moon |
| 19th | Moon at last Quarter |
| 21st | Astronomical Twilight all night! |
| 26th | New Moon |
| 28th | Astronomical Twilight all night! |

**The Solar System**

| | |
|---|---|
| Mercury | Not really observable from Rotherham area |
| Venus | Morning object in Pisces but very low in the East before sunrise |
| Mars | Difficult to see, currently setting just after twilight |
| Jupiter | Good visibility all month in Virgo opportunity to observe the four Galilean moons |
| Saturn | Morning object in western Sagittarius but very poor visibility |
| Uranus | Not visible this month due to solar conjunction on 14th April |
| Neptune | Very difficult to see, obscured by morning twilight |

The η–Aquarid meteor shower will reach its maximum rate of activity on 6 May 2017. Some shooting stars associated with the shower are expected to be visible each night up to 20 May.

Note From May 14th we are technically in the period when Astronomical Twilight last all night and we will get some brightening of the sky along the Northern horizon due to the closeness of the sun below the horizon. The "return" to dark skies will begin on July 30th when we will get 30 minutes of "darkness between 1:00am and 1:30am.

## SOLSTICE DINNER - FRIDAY JUNE 23rd 2017

For those wishing to attend this year's event please note that the bookings have to be finalised by the end of May – please get your name down as soon as possible. Menu choices are on the notice board at the club room

It is being held at Rotherham Golf Club, Thryberg. 7.00pm for 7:45pm meal: Bar available to midnight. We hope to have our Honorary President, Alan Chapman FRAS as our after dinner speaker

The total cost including deposit will be £25.

## THE THOUGHTS OF CHAIRMAN LES



I have to start by welcoming the new members that have joined us recently. Over time you will realise that you have made a very smart decision in joining the best astronomical society around and I hope that you will reach a lot of your targets in astronomy.

Our organised events within the society are many and varied, just recently our 'Jupiter Watch' was quite successful apart from the clouded skies preventing many good shots of Jupiter being gathered. The period of the event ran from 20 March to the completion Saturday 8 April in the meeting room headed 'Processing Jupiter Images' which was well attended by most of the astrophotographers in the society. Nine members attended on the day with me being there to pictorially record the day, all credit for the event must go to Paul D'Silva and Roy Gunson for a job well done.

Things are still moving along albeit slowly just now with the extension development for the observatory. Finding any kind funding for our project is proving to be difficult, do any of you have some different ideas for attacking this from finding a different approach – let us know if you do. If we were looking for football, doing a marathon or some other such event we might succeed, but most people think astronomers are nuts anyway, so what chance to we stand. That might sound a bit defeatist but have been trying for such a long time it gets you that way.

Our weekly programme continues to function very nicely due to sometimes hard work to encourage our members to have a go at the sometimes daunting idea of doing your first time presentation I feel that you would find the effort very rewarding when it's over and you feel that could do another makes all worthwhile.

Our AGM isn't far away so if you have anything to say now is the time to make it known. Should you have something to offer as a committee member please enter your name on the nomination forms on display in the meeting room.

We as the committee continue with our efforts to keep our society on its forward path to keep us on moving onward 'n upward.

Les Marsden FRAS

*Chairman*

# BAA Weekend Meeting, Chester

Venue: The King's School, Vanbrugh Theatre, Wrexham Road Chester CH4 7QL
Date: Friday, 2017, September 8 - 19:00 to Sunday, 2017, September 10 - 15:00

## Stars: Life and death of the Universe

The Chester Astronomical Society are the hosts for this weekend

**Friday Evening (19:00 until 21:30)**

Lyndsay Fletcher (Glasgow University) "Living with a Star"

**Saturday (10:00 until 18:00)**

Professor Paul A Crowther (Sheffield) “Birth, life and death of massive stars”
Professor Nate Bastian (Liverpool John Moores) “Stellar clusters and stellar populations”
Dr Jacco van Loon (Keele) "Stellar Ecology"
Professor Bill Chaplin (Birmingham): "Sounding stars and the search for other worlds in our Galaxy"
Dr Matt Darnley (Liverpool John Moores University) Novae: (Brief) new life after stellar death

Costs for Friday and Saturday: -

Friday evening refreshments only BAA Members, & under 16's £1.00 Non-Members £1.50
Refreshments on Saturday excluding lunch BAA Members, & under 16's £2.50 & Non-Members £3.00
Refreshments on Saturday including a cold buffet lunch BAA Members & under 16's £11.00 per person. Non-BAA Members, £15.00 per person,

**Sunday Morning (10:00 - 13:00)**

The OpTIC Centre St. Asaph Business Park, Ffordd William Morgan, Saint Asaph LL17 Coach pick up will be at 9 am from Chester Station and return by 13:00.

Cost for the tour: -
BAA Members & under 16's £2.00 & Non-Members £2.50 which includes refreshments.

We have also organised a coach to take us from Chester to St Asaph and return the cost for this is £12.00 per person. We will leave from Chester station at 09:00 and Kings School at 09:10. We will leave St Asaph at 12:00

When we arrive at OpTIC we will be given a short introduction by Prof Paul Rees. We will then be split into 2 or 3 groups to tour the factory. As capacity is restricted they can only take one group at the time so whilst you are waiting for your tour you can circulate and have tea or coffee which will be available. When everyone has been on the tour we will gather for a further 15 -20 minute question and answer session before boarding the coach at 12:00 to return to Chester Station via Kings School.

For those coming by train the number 1 buses link Chester Railway Station with both King's School and the Holiday Inn Hotel. They run every 12 minutes between 06:00 AM and 6:00 PM and every half hour after 6:00 PM up to 11:20 PM on both Friday and Saturday, and every half hour on Sunday between 08:30 AM and 11:20 PM, there are many stops in between.

There is plenty of parking at the venue if you are coming by car.

# KEEP YOUR EYES OPEN

**Thursday 4th May : Supernovae: exploding stars that have revolutionised astronomy**



**Justyn Maund**

Justyn Maund is a University Research Fellow based at the University of Sheffield. Justyn graduated from Trinity College Cambridge with a PhD in astrophysics, before going on to hold the Supernova postdoctoral fellowship at the University of Texas at Austin and the Sophie & Tycho Brahe Fellowship, jointly held at the Dark Cosmology Centre Copenhagen and the University of California Santa Cruz. Justyn's research focuses on observationally constraining the nature of the explosion mechanism that destroys massive stars as supernovae.

**Thursday, 18th May : Triumphs of Voyager pt1: Journey to Jupiter/Splendours of Saturn**



**Paul L Money**

2017 is the 40th anniversary of the launch of the Voyager space probes to the outer solar system. This first of two talks takes a look at the remarkable mission and the many discoveries the Voyagers made before continuing on to the "Ice Giants".

**Thursday, 25th May 2017 : The Life Cycle of a Massive Star**



**Katie Tehrani**

Kate will speak about the life cycle of a massive star, explaining the key evolutionary stages from birth to supernovae, and how this journey differs from low mass stars.
Katie began studying astronomy in 2011 when she started her undergraduate degree at the University of Sheffield - She was lucky enough to be able to continue studying here as a postgraduate PhD student! Katie is a keen traveler, and through her studies recently had the opportunity to visit New Zealand to attend a massive stars conference. Other hobbies include baking and long walks trying (fruitlessly) to tire out her puppy - Bella!

**Friday 23rd June 2017 : Solstice Dinner**



**Dr Allan Chapman**

Dr Chapman is well-known to the amateur astronomy community, for his books; for his appearances on television shows including The Sky at Night; but most of all for the many talks that he has given to astronomical societies around the UK. We are honoured and delighted that Dr Allan Chapman serves as a patron and honorary President of Mexborugh & Swinton Astronomical Society.
We welcome him back twice each year for a truly interesting evenings talk

**Thu 29th June : AGM**

It doesn't get more exciting than this!!!!

# SOUTHING

The transit of an astronomical object across the meridian due south of the observer. Will be the position in the sky when an astronomical body (for example the moon – but could be anything such as a planet, comet, star or the sun) is due south and at its highest point above the horizon.
Southing was an important terminology in sea navigation, especially in the days before radio and modern systems. The following is an extract from "***The Seaman's Daily Assistant***", by W. Elliot, published in 1810

*To find the golden Number.*

RULE. Add 1 to the given year and divide the sum by 19; the remainder will be the golden number.

EXAMPLE. Required the golden number for the year 1809.

Add 1 to the year 1809 and it makes 1810; this divided by 19, gives 95 for the quotient, and leaves 5 for the remainder, which is the golden number for the year 1809.

OF THE EPACT.

The Epact is the Moon's age at the beginning of the year; it increases 11 every year, being the excess of the solar year of 365 days, above the lunar year of 354 days, or 12 lunations, and goes through all its varieties in a period of 19 years: hence it happens that the same golden number has always the same epact, that is, when the golden number is 1, the epact is 0; when 2, the epact is 11; when 3, 22; &c. and as the golden number at the birth of Christ was 1, we have the following rule:

*To find the Epact.*

RULE. Divide the given year by 19; multiply the remainder by 11, and the product will be the epact, if it does not exceed 29; but if it does, divide the product by 30, and the last remainder will be the epact.

EXAMPLE. Required the Epact for the year 1809.

1809, divided by 19, gives 95 for the quotient, and 4 for the remainder, which multiplied by 11 gives 44; this, divided by 30, gives the quotient 1, and the remainder 14; which remainder is the epact for the year 1809.

OF THE NUMBER FOR THE MONTH.

The Number, or Epact for the month, is the Moon's age at the beginning of that month, when it is new Moon on the first of January; hence,

*To find the number for any given month.*

RULE. Divide the number of days contained in the preceding months, reckoning from the beginning of January, by 29.5, or rather 29.53 (the period of a mean lunation in days and decimal parts) and the nearest whole number to the remainder is the Epact, or number for the month required.

EXAMPLE. Required the Number, or Epact, for September.

The days contained between the beginning of January and the beginning of September are 243; this number, divided by 29.53, gives the quotient 8, and the remainder 6.76 or 7 nearly, which is the Epact for September.

The Epacts, or Numbers for each month, are as follow.

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| In common years . . . . . | 0 | 1 | 0 | 1 | 2 | 3 | 4 | 5 | 7 | 7 | 9 | 9 |
| In leap years . . . . . | 0 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 8 | 10 | 10 |

OF THE MOON'S AGE.

The Moon's age is the number of days that have elapsed since the last change or the new Moon, and never exceeds 30.

*To find the Moon's Age.*

RULE. To the epact for the year add the number for the month and the day of the month; the sum, if it does not exceed 30, is the Moon's age; but if it does, subtract 30 from it and the remainder will be the Moon's age.

EXAMPLE. Required the Moon's age on July 26, 1808.

```
19) 1808 (95
    171
    ----
     98
     95
    ----
      3
     11
    ----
30) 33 (1
    30
    ----
```

The epact for 1808 = 3

```
Epact for 1808 . . . . . 3
Number for the month . . 5
Day of the month . . . . 26
                         --
                         34
                         30
                         --
The Moon's age . . . . . 4 Days.
```

The Moon's southing is the time she passes the meridian of any place, which is about 48 minutes, or $\frac{4}{5}$ of an hour later every day: now as the Moon comes to the meridian with the Sun on the day of new Moon, the time that she comes to the meridian after the Sun on any day of her age is easily found as follows:

*To find the time of the Moon's southing, or passage over the meridian.*

RULE. Multiply the Moon's age by 4, and divide the product by 5; the quotient will be the hours, and the remainder multiplied by 12, the minutes past noon that the Moon comes to the meridian. Or multiply the Moon's age by 8, and point off the right hand figure, then the left hand figure or figures will be the hours, and the product of the right hand figure by 6, the minutes past noon of the Moon's southing. If the hours exceed 12, subtract that time from them, and the remainder will be the time of the Moon's southing after midnight.

EXAMPLE I. Required the time of the Moon's southing, Aug. 2. 1808.

```
Epact for 1808 . . . . . 3
Number for the month . . 6
Day of the month . . . . 2
                         --
Moon's age . . . . . 11 Days
```

```
Moon's age . . . . . 11 Days
                        4
                        --
                    5) 44 (4
                       12
                       --
Moon's southing . . . . 8h 48m. P.M.
```

EXAMPLE II. At what time will the Moon pass the meridian, October 5, 1809?

```
Epact for 1809 =  14
Number for the month  7
Day of the month . .  5
                      --
Moon's age . . . . 26 Days
```

```
Moon's age . . . . . 26 Days
                        8
                        --
                     20,8
                        6
                        --
Moon passes merid. . . 20h 48m. P.M.
                       12  0
                       --
                    Or 8h 48m. A.M.
```

How does this work out for 2017? – The Full Moon is on May 10th @ 21:42 UTC

The "Epact" is $\frac{2017}{19}$ = 106 remainder 3, multiply by 11 = 33, take off 30 we get 3 which is our epact

Month number = 2 (from the table – a "non leap year"

So 3 + 2 + 10 = 15 : Moon's age is 15 days – about right for a full Moon

It passes the Meridian at 15 x 4 ÷ 5 = 12, which is 12pm at night – (1am BST) – which is what you'd expect!

So the formulae still works today !

| Date | Time | Location | Subject / Event | |
|---|---|---|---|---|
| **Thu May 4th** | **19:45** | **Club Room** | **Supernovae** | *Dr. Justyn Maund* |
| **Wed May 10th** | **20:00** | **Club Room** | **Executive Committee Meeting** | |
| **Thu May 11th** | **19:45** | **Club Room** | **The Summer Sky** | *A Kirton-Vaughan* |
| **Thu May 18th** | **19:45** | **Club Room** | **The Triumphs of Voyager Pt 1** | *Paul Money* |
| **Thu May 25th** | **19:45** | **Club Room** | **The Life Cycle of a Massive Star** | *Katie Tehrani* |
| **Thu June 1st** | **19:45** | **Club Room** | **Mars and the Spiders** | *Peter Jalowiczor* |
| **Thu June 8th** | **19:45** | **Club Room** | **Sun & Solar Photography** | *Mick Nicholls* |
| **Wed Jun 14th** | **20:00** | **Club Room** | **Executive Committee Meeting** | |
| **Thu June 15th** | **19:45** | **Club Room** | **Astro Clinic** | *Various* |
| **Thu June 22nd** | **19:45** | **Club Room** | **Astronomy News** | *Various* |
| **Fri June 23rd** | **19:00** | **Rotherham Golf** | **Solstice Dinner** | *Alan Chapman* |
| **Thu June 29th** | **19:45** | **Club Room** | **AGM** | |

**Old Moor RSPB –** Manvers Way, Barnsley, S73 0YF
**PVE** – Public Viewing Event – Bookable Only
**CAE** – Community Access Event
**PO** – Public Outreach
**TBA** – To be announced – (otherwise – We don't know!)

**Web site:** http://msas.org.uk
**Meeting room** is at Swinton Working Men's Club, Station Street, Swinton, South Yorkshire, S64 8AU.
**Observatory** is at Lee Brook Lane, Hoober, S62 7SH
*Mexborough & Swinton Astronomical Society is Registered Charity N° 1064103 in England & Wales*

*For submissions to The Messenger - Editor: Roy Gunson:* royg@gmx.co.uk

