# Ordinary Meeting, 2012 January 25

## held at the Royal Astronomical Society, Burlington House, Piccadilly, London W1

**Prof Bill Leatherbarrow,** *President*
**Hazel Collett, Ron Johnson & Nick James,** *Secretaries*

The meeting was opened by the President. The minutes of the last meeting were agreed to be correct and were signed by the President. 17 new members had been elected by Council that afternoon, and the audience approved that they be duly elected members of the Association.

Nick James, Papers Secretary, said six new papers for the *Journal* had been accepted by Council this day:

*Historical annular eclipses*, by S. Mohammed Mozaffari

*The orbital and superhump periods of the dwarf nova SDSS J093249.57+472523.0*, by Jeremy Shears *et al.*

*Eclipse comparisons of the symbiotic nova V1413 Aql from visual photometry*, by Gary Poyner

*The BAAVSS Long Term Polar Monitoring Programme: The first five years, 2006–2011*, by Gary Poyner

*Barker's Circle: a 1930s BAA lunar observing group*, by Richard McKim

*Simultaneous still, video and radio detection of a bright Leonid fireball*, by Nick James, Peter Meadows & Iain Grant

The President said that the Association will have a stand at the forthcoming Astrofest in London, and invited members of the audience to call by if visiting the exhibition. He also reminded members of the Deep Sky Section meeting on March 10 at Northampton, and the BAA 'Back to Basics' meeting in Newbury on March 17. The Winchester Weekend would also be taking place from March 30 to April 1.

The President then introduced the first speaker of the evening, Dr Francisco Diego of University College, London, with the subject 'Aliens, where are you?'

The lecture started with amusement as members watched Dr Diego tie a string from one side of the lecture theatre to the other, like a 14m long washing line. He initially discussed the history of the idea of alien life. People as early as Giordano Bruno (1548–1600) suggested that there could be other worlds like ours, and Galileo Galilei (1564–1642) showed to all who wanted to look though his telescope that the Moon was not just a ball in the sky but was indeed another world.

Dr Diego used the string to visualise the time taken for the universe to evolve from the big bang at one end to the present day at the other. By hanging photos on the string at different places, events in time were illustrated. To get to life on our planet we needed many events to happen, at the right time and in the right order. The formation of the right type of stars, the correct type of planet, all were needed before life could be started. So overall the odds to get it just right are extreme, just to get life on one planet.


**Dr Francisco Diego with his 'time line'.**

Dr Diego calculated that the odds are one in 200,000 million. So to get another alien life at those odds we would need 250 Universes to find another Earth. He felt that there were probably no alien intelligences in the universe. We should take pride in the fact that we are in a unique position as an intelligent life form and recognise the responsibility that this implies.

After a interesting range of questions and answers in which Dr Diego suggested that the Drake equations were out of date, and the fact that we had had mass extinction events had helped to improve life on Earth, the President thanked Dr Diego for a most interesting talk and discussion.

Prof Leatherbarrow then introduced the second speaker of the evening, Dr Jim Emerson from Queen Mary College, University of London, to talk about 'VISTA: the Visible and Infrared Survey Telescope for Astronomy'.

Dr Emerson described the instrument, which is installed at the Paranal Observatory in Chile as part of the European Southern Observatory. The telescope has a 4.1m diameter mirror working at F1.2, providing a large 1.65° field. The infrared region of the spectrum is still relatively unexplored. The dust in the universe is typically 1/3 micron in diameter so in infrared we can see though this seven times better than at visual wavelengths. The telescope is suitable to survey large structures, variations over time and high redshift objects.

**The 4.1m VISTA telescope at Paranal. *(ESO/STFC).***

The results of the surveys will be available to the public via the Web but those interested should be warned they are very large data files. Dr Emerson quickly illustrated some of the first work being done with results from the telescope. The distance of the edge of our galaxy was being measured by looking at giant stars at distances of 16.4 kpc away. The same technique is being used to measure the tilt of the LMC. Both observations could have not been done before without the use of VISTA.

From questions from the members Dr Emerson stated that the detectors cost 5m Euros each and run at a temperature of 80K. Also the mirrors of the telescope were first coated with silver, which reflected infrared better, but as this needed to be recoated every six months, aluminium was later used for coating.

The President thanked Dr Emerson and hoped that we will see more results from the telescope as it becomes fully operational.

Dr David Arditti then described what could be seen in the sky in the next few weeks. Venus and Jupiter were well placed and prominent in the evening sky. He showed some recent images obtained by David Peach of Jupiter. Jupiter currently has storm features called 'barges' which are dark and are quite easy to see. The comet 2009P1 Garradd would soon be a 7th magnitude object in the northern sky.

Prof Leatherbarrow thanked the speakers for an excellent set of talks, and adjourned the meeting until Wednesday March 28 in the same hall.

**Alan Dowdell**

# Ordinary Meeting, 2012 March 28

## held at the Royal Astronomical Society, Burlington House, Piccadilly, London W1

**Prof Bill Leatherbarrow,** *President*
**Hazel Collett, Ron Johnson & Nick James,** *Secretaries*

The meeting was opened by the President. The minutes of the last meeting were agreed by the audience and signed by the President. It was announced that there were 89 new members proposed for membership, and the audience agreed that they be duly elected members of the Association.

Nick James said that two papers had been approved that afternoon for publication in the *Journal*:

> *Investigating the properties of the near contact binary system TW CrB,* by D. Pulley *et al.*
> *John Ellard Gore: of immensity and minuteness,* by Jeremy Shears

The President reminded members that there will be a full day meeting of the Association on April 28 in Leicester as part of the celebrations of the 50th anniversary of the Leicester Astronomical Society. Also on May 5 in Birmingham there will be a meeting of the Association's Historical Section. He hoped many members will make the effort to attend these meetings.

The President then introduced the first speaker of the evening, Professor Raman Prinja from University College London, whose talk was titled 'Stellar Outflows; spreading the stuff of life'.

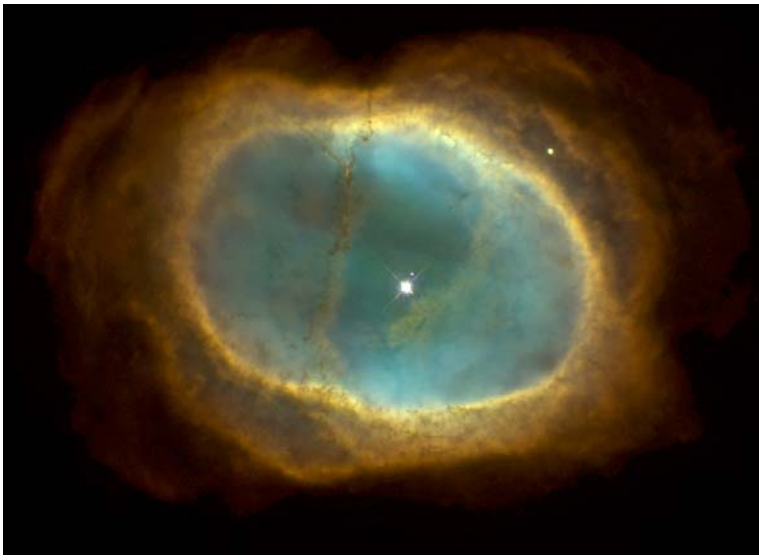
Dr Prinja started his talk by outlining stellar evolution with the life and death of stars. He reminded members that it took 12 Nobel Prize winners to obtain this story. Stellar evolution from birth to death is governed by stellar winds and mass outflows. Mass loss and the mechanical and chemical feedback all have an effect on the evolution of the host galaxy. Dr Prinja showed a short time-lapse movie which showed the outflows of gas which are funnelled by way of a magnetic field, so that the loss reduces the angular momentum of the system. Most stars are in balance of pressure and gravity.

In the example of the Sun, solar winds result in a mass loss of some $2\times10^{-14}M_{sun}$ per year. The high wind speeds over the pole have velocities in the order of 1000 km/s, while coronal mass ejections can be up to 1500 km/s. The birth mass of a star governs the life of that star. Lightweight stars such as the Sun end as white dwarfs, mid-weight (8–25 solar mass) end as neutron stars, while those over 25 $M_{sun}$ can end as supernovae. As a result of mass loss from red giant stars, the outer edges are cool enough to cause dust and water vapour to form, while the central stars become white dwarfs which are very hot, pushing out the remaining gas to form a planetary nebula.

In a very massive star the nuclear reactions continue until the formation of iron is reached. Nuclear reactions can no longer proceed; the next step in the formation of heavier materials is the creation of a supernova, pushing material into space. Supernovae cause super bubbles which can affect the shape of the host galaxy, as seen in M82. The products of massive stars and supernovae provide the second generation dust which allows the formation of life to be possible.

After questions from members, the President thanked Professor Prinja for his talk.

Prof Leatherbarrow then introduced the second speaker of the evening, Dr Matthew Malek from Imperial College London, whose talk was titled 'Neutrino Astronomy: seeing the cosmos in a ν light'. Dr Malek reviewed the fact that when we look at the sky we can do astronomy with all types of radiation from the infrared through to X-rays and microwaves, but at very high energies cosmic waves and neutrinos can also be used. In 1930 Wolfgang Pauli proposed the particle known as the neutrino; however he thought it would never be detected. He even put up a prize of a case of wine for whoever detected it. It was finally found in 1956. Although it was proved that they are very difficult to detect, taking about a light year of lead to stop one, it was shown that after the photon it is the most common particle in the universe. They were produced in the same order of particles as photons in the big bang. In 1988 their mass was finally measured.



**Southern hemisphere planetary nebula NGC 3132 imaged by the Hubble Space Telescope.** ***NASA/ESA/STScI/ Hubble Heritage Team***

Neutrinos are available from cosmic rays, nuclear reactors, the Sun, supernovae and from the cosmic background. Dr Malek explained that only about one third of those expected from the Sun were origionally detected. Light that is produced in the centre of the Sun takes about a million years to leave the surface, while neutrinos emerge straight away, as nothing stops them. It is from neutrinos that we can know the temperatures in the core of the Sun.

**Dr Matthew Malek**

Supernovae type IA, a binary star process, do not produce neutrinos, but massive stars greater than 8 times the mass of the Sun can cause Type II supernovae from core collapse. Neutrinos account for 99% of the energy from these supernovae in the core collapse, while photons are produced in later stages of the event. So far we have only seen one supernova in neutrinos, on 1987 Feb 24 (SN 1987A), when 25 neutrinos were detected in ten seconds. Since then about one paper has been published per week about this event.

Dr Malek said that as the neutrinos emerge before the light, their detection could be used to predict a visible supernova. There are of course relic supernova neutrinos throughout the universe as all those generated from past supernovae still remain. It has also been shown that 10 million big bang neutrinos go through each of us all the time, but they are very low energy and currently cannot be detected. Dr Malek summarised by saying that we live in an extremely interesting time for working with neutrinos.

The President thanked Dr Malek after he answered questions from the members.

Prof Leatherbarrow then introduced Nick James to give the sky notes for the month. Mr James said that in the last month we have all had the advantage of a period of reasonably clear skies. He showed some images received from David Tyler showing an active Sun. From Tom Boles a short video was shown of aurora seen in northern Norway. Other images were shown of the planets by Damian Peach.

The meeting closed at 19.50 hrs.

**Alan Dowdell**

BAA members are reminded that videos of talks at Meetings may be downloaded from the Members' section of the BAA website, **www.britastro.org**