



# South Downs Mercury



The monthly newsletter of South Downs Astronomical Society  
Issue: 422 - October 2009 Editor: John Simper

**Next Meeting - Friday 2<sup>nd</sup> October** Main Hall of Lower School, Chichester High School, Kingsham Rd., at 7.30pm.

☉ "What's Up!" - Guide to the month ahead, by SDAS member John Whittington.

☉ Main Speaker Professor Bob Nichol: "**Galaxy Zoo.**" Bob is a teaching professor at the Institute of Cosmology and Gravitation at the University of Portsmouth. His main research interests include galaxy evolution studies, surveys of galaxies and clusters of galaxies, and research into new methods of analysing massive astronomical datasets

\*\*\*\*\*

## In the News:

☉ As explained by Ron Arbour in his July talk, supernova are important to professional astronomers because Type Ia blasts can help give precise distances for galaxies and so help to determine the size of the Universe.

A British amateur astronomer, Tom Boles, has now broken a 36-year-old record for the number of supernovae discovered by one person. So far he has photographed and identified 125 supernovae erupting in distant galaxies from his private observatory. The previous record was held by Professor Fritz Zwicky at Caltech in the USA.

A former president of the BAA, Tom has been searching for supernovae since 1996, daily monitoring 12,000 galaxies using three computer-controlled telescopes. More information about Tom's observatory and his search can be found at: <http://coddenamobservatories.org/>

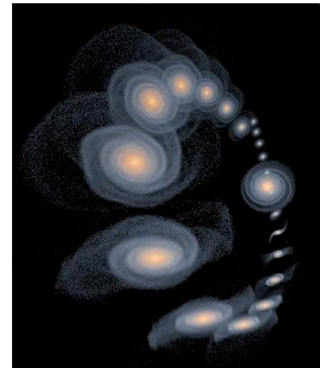
☉ Fancy a trip to Antarctica to experience the best sky-watching conditions available anywhere on Earth? Scientists have established that a 4000-metre-high ridge in Antarctica experiences the lowest wind speeds and clearest skies anywhere on the planet. The only drawback is that you would



have to venture through 3200 km of inhospitable terrain to get there and endure average winter temperatures of minus 70°C. It is reckoned that the spot on the Antarctic Plateau, identified only as Ridge A, would produce pictures three times sharper than those from the best sites already used by astronomers and nearly comparable to the Hubble telescope. More information can be found at: <http://www.universetoday.com/2009/08/31/astronomers-find-world-%20%80%99s-best-observing-site/>

(I couldn't find a picture of Ridge A, but the image above shows the sort of weather you might encounter en-route!)

☉ A favourite with amateur and professional astronomers, the Andromeda Galaxy contains a trillion stars and lies about 2.5 million LY away. A technical paper in *Nature* journal in early September concludes that wispy streams of stars on the outer fringes of the galaxy appear to be the remains of a collision of the Andromeda and Triangulum galaxies some 2-3 billion years ago. In this artist's rendering (credit AP Photo / Illustration by John Dupinski and Larry Widrow) Andromeda is shown at the 3'o-clock position). The changing shape of Triangulum is seen in a clockwise montage of views of the galaxy as it approaches Andromeda (moving from the 2'o-clock position) and then recedes (3 to 6'o-clock) and starts to close again with Andromeda (from 9'o-clock onwards). Eventually, Triangulum will completely merge with its larger Andromeda neighbour. More information can be found at: <http://www.sciencedaily.com/releases/2009/09/090904165246.htm>



☉ June Leach (our resident astro-artist) has a new website at: [www.astroart.co.uk](http://www.astroart.co.uk)

☉ Two upcoming lecture at the Portsmouth and District Physical Society may be of interest to members. On 14<sup>th</sup> October, Professor David Wark will be giving a talk on **Solar Neutrinos: Mysterious Messengers from the Heart of the Sun**. And on 9<sup>th</sup> December the Society special Christmas lecture will be **The Physics of Computer Games**, given by Dr John Purdy. Booking is required for the Xmas lecture ('phone: 0239 273 2649). Venue for both talks is the Lecture Theatre, St. Michael's Building, University of Portsmouth, White Swan Rd, Portsmouth, PO1 2DT.

## How to Contact us:

Editor - by email at: [sueandjohn88@btinternet.com](mailto:sueandjohn88@btinternet.com)

Or by telephone: 01483 200286

Society - by email via: [www.southdownsas.org.uk](http://www.southdownsas.org.uk)

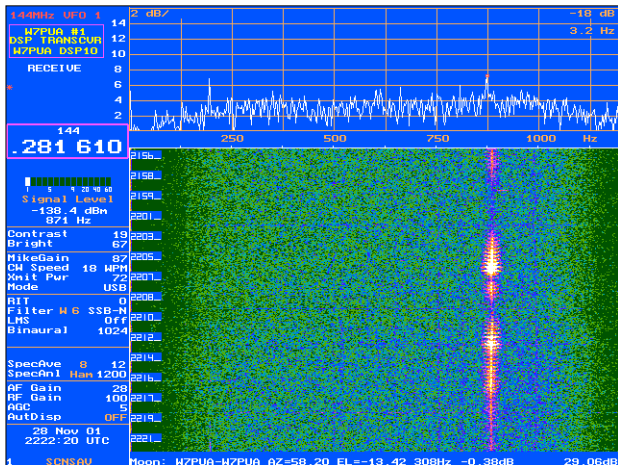
## RADIO ASTRONOMY IN THE HOME

(Contributed by Mark Ford)

So what exactly can astronomers do during the day? Well apart from sleeping-in or looking at the Sun, there is obviously a lack of visual observing opportunities. But one area of great interest to observers that is often over looked is *Radio Astronomy*. Traditionally, the view of radio astronomy has been that you need a large dish and two PhD's after your name. This, of course, is not the case - there are a multitude of ways the amateur can study and use radio waves to enhance his/her astronomical hobby.

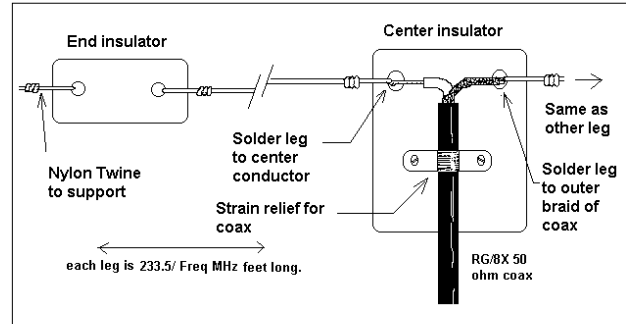
The first and probably the easiest way to use radio waves is to listen for 'meteor pings.' Easily achieved, all that needs to be done is to tune a radio receiver to a signal that is being transmitted from a radio station that is just below your line-of-sight horizon. Commercial radio and TV stations are ideal for this. Just select a continental Europe transmitter station, tune your radio receiver to it and, not surprisingly, you will not hear any signal as the station is below the horizon.

Now, when a meteor enters the atmosphere and creates an ionized trail, it will reflect some radio signal back down to Earth and, thus, towards you, and you hear the radio signal (or a small part of it.) The better your antenna the more you will hear, and since meteor trails are always changing, the noise you hear often sounds like a long 'ping.' By counting the pings you can get an idea of the meteor activity during the day. Adding some specialist, relatively inexpensive, software to your home computer will enable you to plot these pings as they are heard through your computer's sound card, and produce a characteristic trace of the signal. An example of this software presentation of a meteor ping on a home PC is shown below. Confirming how easy this procedure is, it is worth noting that some people have even heard meteor pings during the Perseids shower on a normal car stereo, just sitting in a seafront carpark!



Another easy to hear source of radio signals is from objects such as Jupiter. As Jupiter interacts with its moons, it creates powerful magnetic field 'kinks' which generate radio waves that can be picked up from Earth. To listen to Jupiter it is best to use an AM (or USB/LSB) short-wave receiver and a good short-wave antenna (i.e. a length of wire) arranged as shown in the diagram above right.

The best frequency range to listen on is between 18 and 28Mhz and you should immediately be able to hear the quite wide radio bursts from the planet/moon(s) interaction. Another easy-set-up that you can try is a household LW receiver providing you make a very good aerial for it.



A piece of plastic sheet can be used as the insulator boards and the aerial can be, for example, either hi-fi speaker wire or plain copper wire. Cut two pieces each about 11ft long and solder/attach one to the central conductor of a co-axial cable and the other to the co-axial braid (as shown above.) This simple arrangement will work best at around 20Mhz and should give immediate results.

There are various websites devoted to Jupiter radio observation that can be consulted for more information - a good introduction to this whole area of Jupiter-watching is <http://www.radiosky.com/rjcentral.html>. Some sites will also provide charts telling you the best time to listen - certain times of year are better than others, and Sun activity plays a major part. The sound of Jupiter has been likened to a fading hiss or waves rolling on a shore.

Another often-overlooked area of radio astronomy is Very Low Frequency (VLF) observation. Such observations do require a special low frequency receiver, but these can be built very easily (again, plans can be found on the internet.) Since we are talking about observations from just a few kilohertz and up to about 50kHz, the use of wound components is often not required, and some receivers use only a few simple components. During solar storms, the Sun kicks out a lot of energetic particles that collide with the Earth's magnetic field and cause not only auroral displays, but also curious radio emissions, called whistlers. Some emissions even sound like frogs croaking or cats meowing! One note of caution, however - exploring the skies at radio wavelengths can be addictive and can become a hobby in itself. That's the beauty of amateur astronomy - so many diverse things to study, and it doesn't even have to be dark!

[Editor's Note: Karl Jansky discovered the first astronomical radio source in the early 1930s. Investigating static that interfered with short-wave transatlantic voice transmissions, he noticed that his recording system recorded a signal of unknown origin that peaked every 23 hours 56 minutes. By comparing his observations with optical astronomical maps, Jansky eventually concluded that the radiation was coming from the Milky Way and was strongest in the direction of the center of the galaxy, in the constellation of Sagittarius.]

## A CELESTIAL ROSETTA STONE

The Rosetta Stone is an ancient Egyptian artifact which was instrumental in advancing our understanding of hieroglyphic writing. Dating from 196 BC, the stone has a carved text made up of three translations of a single passage: two in the hieroglyphic and Demotic languages of ancient Egypt and one in classical Greek. Discovered by the French in 1799 at Rosetta, it contributed greatly to the deciphering of the principles of hieroglyph writing.

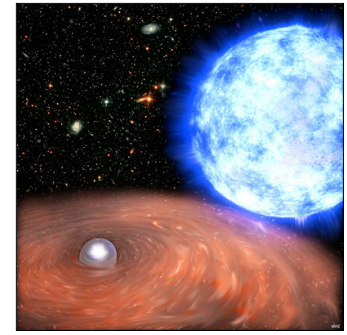
Now, the European Space Agency (ESA) XMM-Newton orbiting X-ray telescope has discovered a celestial Rosetta Stone: the first observations of a white dwarf star that could explode as a particular kind of supernova in a few million years and be used as a beacon to measure cosmic distances.

Astronomers have been on the trail of this mysterious object since 1997 when they discovered that something was giving off X-rays near the bright star HD 49798. Now, thanks to XMM-Newton's superior sensitivity, the mysterious object has been tracked along its orbit. Observations have shown it to be a white dwarf, the dead heart of a star, shining X-rays into space.

They also discovered that this is no ordinary white dwarf. They measured its mass and found it to be more than twice what they were expecting. Most white dwarfs pack 0.6 solar masses into an object the size of Earth but this particular white dwarf contains at least double that mass but has a diameter just half that of Earth. It also rotates once every 13 seconds, the fastest of any known white dwarf.

The mass determination is reliable because the XMM-Newton tracking data allowed the astronomers to use the most robust method for 'weighing' a star, one that uses the gravitational physics devised by Isaac Newton in the 17<sup>th</sup>

century. Most likely, the white dwarf has grown to its unusual mass by stealing gas from its companion star, a process known as accretion (an artist's impression of the white dwarf and its companion are shown below.) At 1.3 solar masses, the white dwarf is now close to a dangerous limit. When it grows larger than 1.4 solar masses, a white dwarf is thought to either explode, or collapse to form an even more compact object called a neutron star. The



explosion of a white dwarf is the leading explanation for type Ia supernovae, bright events that are used as standard beacons by astronomers to measure the expansion of the Universe. Until now, astronomers have not been able to find an accreting white dwarf in a binary system where the mass could be determined so accurately.

An ESA news release in early September announced: "This is the Rosetta Stone of white dwarfs in binary systems. Our precise determination of the masses of the two stars is crucial. We can now study it further and try to reconstruct its past, so that we can calculate its future."

That future is a spectacular one. The star is likely to explode in a few million years' time. Although it is far enough to pose no danger to Earth, it is close enough to become an extraordinarily spectacular celestial sight. Calculations suggest that it will blaze initially with the intensity of the full moon and be so bright that it will be seen in the daytime sky with the naked eye.

\*\*\*\*\*

## ASTRONOMY AT THE OPEN UNIVERSITY

The new Open University prospectus includes various Astronomy courses from introductory through to advanced level. Whether working towards a formal qualification or just for interest, these courses are extremely stimulating and offer excellent value for money. A brief overview of only five of the astronomy-related courses is outlined below:

**S194: Introducing Astronomy.** If you are an amateur astronomer, or have read popular books on astronomy, you will find that the course develops your understanding and introduces areas of astronomy that you have not met before. Topics covered include planets, stars, galaxies, extraterrestrial life, and the origin of the Universe.

**S196: Planets - an Introduction:** This course concentrates on the planets and planet-sized objects in orbit around our own star (the Sun), and also delves into our rapidly advancing knowledge of planets around other stars.

**S197: How the Universe Works.** Have you ever wondered how the Universe came to be as it is; or how it may evolve in the future? This course presents answers to such questions, covering topics such as measuring the speed and distance to galaxies; the expansion of space; the cosmic microwave background radiation; atoms, nuclei, quarks and neutrinos; electromagnetic and gravitational forces and dark matter.

**S282: Astronomy.** This introductory course considers the structure, origin and evolution of stars, galaxies and the Universe as a whole, asking questions such as: How are stars born, and what happens when they die? How do galaxies form, and how do we know that the Universe began in a 'big bang'? Topics covered include stars and their life cycles, galaxies and quasars, and the origin and evolution of the Universe. Divided into two modules, each consisting of a full-colour book, DVD and web-based material. Some science background is required.

**SXR208: Observing the Universe.** This is a one-week residential school at the Observatori Astronòmic in Mallorca, providing experience of practical astronomy and planetary science under professional supervision. There is a course book introducing observational and experimental techniques in astronomy and planetary science, and a short assignment testing your understanding of the material. In Mallorca there will be a number of telescope and laboratory-based projects - a typical study day at the observatory starts in late afternoon and continues until the early hours of the morning.

More information on these and other astronomy courses can be obtained by 'phone: 0845 300 6090, or on the website: <http://www3.open.ac.uk/study/undergraduate/course/s197.htm>

## October 2009 Sky Diary:

### Chart for Chichester, mid-month, 9.00 p.m.

(Compiled by Peter Littlejohns)

**Mercury:** at greatest elongation on the 6<sup>th</sup>, rising about 05:30 and brightening to mag.-1 by the 13<sup>th</sup>. Best chance of observation this year will be in first half of the month when it will be 10° above the horizon, presenting an 8-arcsecond disc, with the Moon close by on the 17<sup>th</sup>.

**Venus:** rises around 04:40 at start of month, shining at mag.-3.9. Close to Mercury on the 8<sup>th</sup>.

**Earth:** end of British Summer Time at 02:00 on the 25<sup>th</sup>. Clocks set back by 1 hour.

**Mars:** moves from Gemini to Cancer through the month, rising about midnight and brightening slightly to about mag.+0.4. At the end of the month it passes in front of M44 (Praesepe, or Beehive) open star cluster, making an interesting spectacle.

**Jupiter:** still dominates the evening sky until just before midnight, shining at mag.-2.5 in Capricornus.

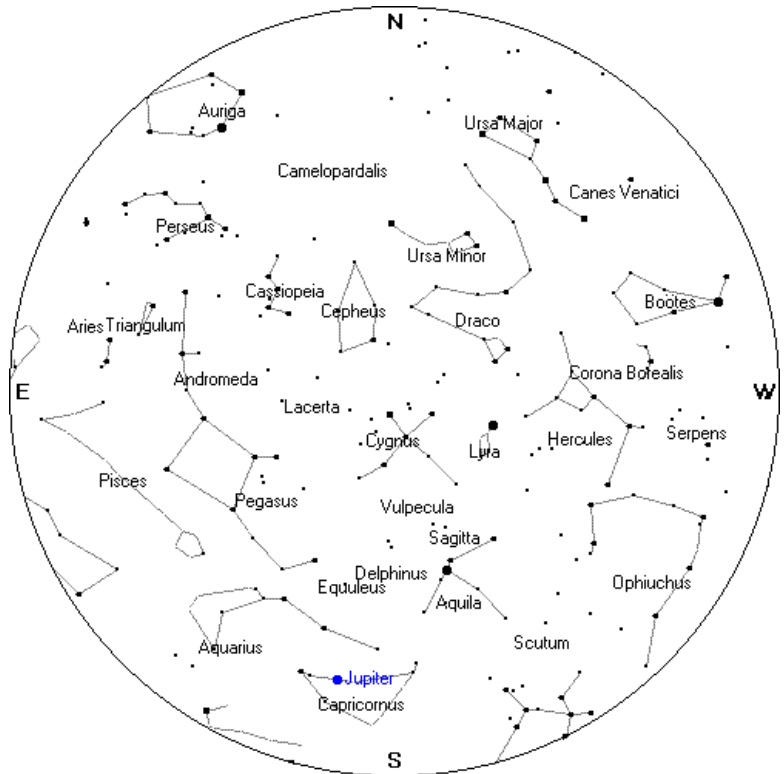
**Saturn:** shining at mag.+1.1, close to Mercury on the 8<sup>th</sup>.

**Uranus:** still rather dim at mag.+5.7, between Pisces and Aquarius.

**Neptune:** even dimmer at mag.+7.9, in Capricornus.

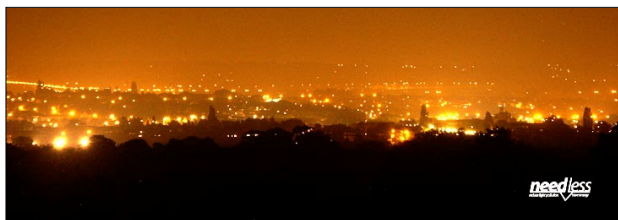
**Meteors:** following its double maximum in September the Piscid shower has a third fairly visible maximum on the 13<sup>th</sup>. Debris from Halley's comet hits the Earth as the Orionid shower over the night of 21<sup>st</sup>/22<sup>nd</sup>. Maximum rate will be about 30/hour.

\*\*\*\*\*



### Last Month's (September) Meeting:

☞ After this month's **What's Up** from John Whittington, Bob Mizon talked about **The Dark Skies Campaign** to reduce light pollution. Started about 20 years ago, the campaign actively beats the drum to make the general public and the authorities aware of the negative impacts of light pollution. As Bob emphasised, light pollution doesn't just make it difficult for astronomers to go about their hobby or



work, but it results in an enormous waste of money, currently estimated at about £1 billion each year! The campaign has notched up some recent successes, such as the new lighting on the southern part of the MI motorway, but the scale of the problem is still enormous, as evidenced by this typical night-time view across a typical town in the UK (from the [www.need-less.org.uk](http://www.need-less.org.uk) website.)

\*\*\*\*\*

☞ Our main talk, also by Bob, was on the **Tunguska Event**, when at 07:14 on 30<sup>th</sup> June 1908 a meteoroid about 40-50 m diameter exploded at a height of 5-10 km above the Podkamennaya (Lower Stony) River in Siberia. Trees were levelled over an area of about 2150 sq. km., roughly equal to the London and suburbs area enclosed within the M25, and the blast was heard hundreds of kilometres away. The damage was estimated to be equivalent to that caused by an earthquake of about 5 on the (yet to be devised) Richter scale, and a blast power of about 30 megatons (more than 1000 times more powerful than atomic bombs used in the last world war.) The first exploration of the area was not until 1927 when Leonid Kuril surveyed the site but failed to find any solid remains of the meteorite. A later Swedish exploration found evidence of Nickel and Iridium spheres, confirming the meteoroid airburst theory.

Bob also drew attention to the numerous worldwide large-impact features found in recent years, some of which appeared large enough to have ejected enough into the atmosphere to cause significant dimming of sunlight and damage to plant life, leading to large-scale extinction of animals. Many thanks, Bob, for a most interesting talk.

### Planetarium Shows in October:

Fri. 4<sup>th</sup> 7:30 p.m. Jupiter, King of the Planets  
 Sun. 6<sup>th</sup> 3:30 p.m. Voyage to the Outer planets  
 Sun. 20<sup>th</sup> 3:30 p.m. The Northern Lights  
 Fri. 25<sup>th</sup> 7:30 p.m. The Northern Lights

Sun. 27<sup>th</sup> 3:30 p.m. The Stars this Month  
 Do remember! SDAS Members can watch planetarium shows at the special, discounted, ticket price of only £5.  
 Booking by Telephone: 01243 774 400 or 07818 297 292